Power Systems

Enclosures and expansion units

Note

Before using this information and the product it supports, read the information in “Safety notices” on page v, “Notices” on page 21, the *IBM Systems Safety Notices* manual, G229-9054, and the *IBM Environmental Notices and User Guide*, Z125–5823.

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

Contents

Safety notices

Safety notices may be printed throughout this guide:

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

World Trade safety information

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

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

German safety information

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

Laser safety information

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

Laser compliance

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

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

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

- If IBM supplied the power cord(s), connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
  - For AC power, disconnect all power cords from their AC power source.
  - For racks with a DC power distribution panel (PDP), disconnect the customer's DC power source to the PDP.
- When connecting power to the product ensure all power cables are properly connected.
  - For racks with AC power, connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.

  - For racks with a DC power distribution panel (PDP), connect the customer's DC power source to the PDP. Ensure that the proper polarity is used when attaching the DC power and DC power return wiring.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Do not attempt to switch on power to the machine until all possible unsafe conditions are corrected.
- Assume that an electrical safety hazard is present. Perform all continuity, grounding, and power checks specified during the subsystem installation procedures to ensure that the machine meets safety requirements.
- Do not continue with the inspection if any unsafe conditions are present.
- Before you open the device covers, unless instructed otherwise in the installation and configuration procedures: Disconnect the attached AC power cords, turn off the applicable circuit breakers located in the rack power distribution panel (PDP), and disconnect any telecommunications systems, networks, and modems.

DANGER:

- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

  To Disconnect:

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

  To Connect:

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

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

(R001 part 1 of 2):

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

- Heavy equipment–personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet if provided, unless the earthquake option is to be installed..
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.

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

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

(R001 part 2 of 2):

CAUTION:

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

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

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

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

(R002)

(L001)

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

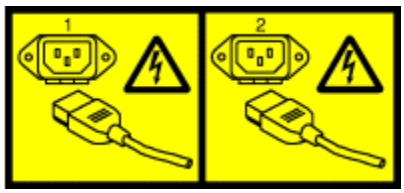
(L002)

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

- The rack may tip over causing serious personal injury.
- Before extending the rack to the installation position, read the installation instructions.
- Do not put any load on the slide-rail mounted equipment mounted in the installation position.
- Do not leave the slide-rail mounted equipment in the installation position.

(L002)

(L003)



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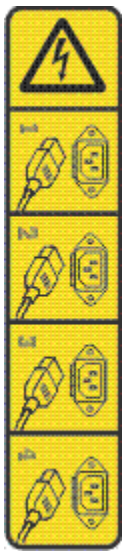

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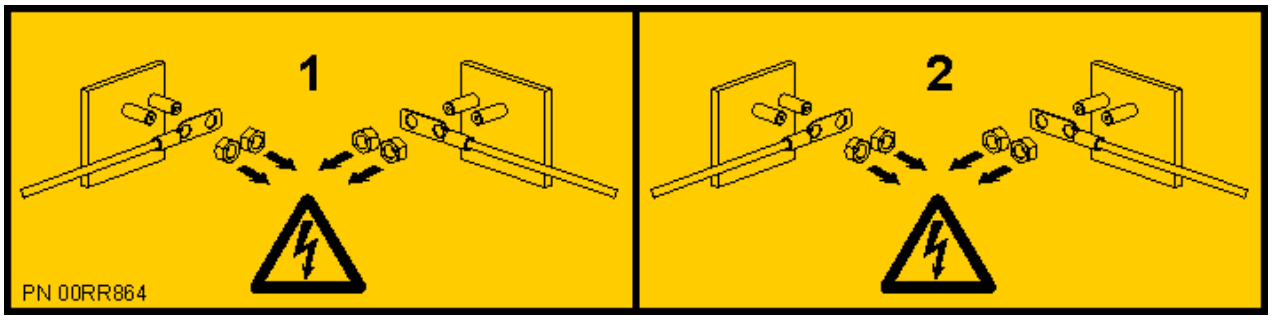

DANGER: Multiple power cords. The product might be equipped with multiple AC power cords or multiple DC power cables. To remove all hazardous voltages, disconnect all power cords and power cables. (L003)

(L007)

CAUTION: A hot surface nearby. (L007)

(L008)

CAUTION: Hazardous moving parts nearby. (L008)

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

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

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

(C026)

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

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

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

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

(C030)

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

Do Not:

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

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

CAUTION: Regarding IBM provided VENDOR LIFT TOOL:

- Operation of LIFT TOOL by authorized personnel only.

- LIFT TOOL intended for use to assist, lift, install, remove units (load) up into rack elevations. It is not to be used loaded transporting over major ramps nor as a replacement for such designated tools like pallet jacks, walkies, fork trucks and such related relocation practices. When this is not practicable, specially trained persons or services must be used (for instance, riggers or movers).
- Read and completely understand the contents of LIFT TOOL operator's manual before using. Failure to read, understand, obey safety rules, and follow instructions may result in property damage and/or personal injury. If there are questions, contact the vendor's service and support. Local paper manual must remain with machine in provided storage sleeve area. Latest revision manual available on vendor's web site.
- Test verify stabilizer brake function before each use. Do not over-force moving or rolling the LIFT TOOL with stabilizer brake engaged.
- Do not raise, lower or slide platform load shelf unless stabilizer (brake pedal jack) is fully engaged. Keep stabilizer brake engaged when not in use or motion.
- Do not move LIFT TOOL while platform is raised, except for minor positioning.
- Do not exceed rated load capacity. See LOAD CAPACITY CHART regarding maximum loads at center versus edge of extended platform.
- Only raise load if properly centered on platform. Do not place more than 200 lb (91 kg) on edge of sliding platform shelf also considering the load's center of mass/gravity (CoG).
- Do not corner load the platforms, tilt riser, angled unit install wedge or other such accessory options. Secure such platforms -- riser tilt, wedge, etc options to main lift shelf or forks in all four (4x or all other provisioned mounting) locations with provided hardware only, prior to use. Load objects are designed to slide on/off smooth platforms without appreciable force, so take care not to push or lean. Keep riser tilt [adjustable angling platform] option flat at all times except for final minor angle adjustment when needed.
- Do not stand under overhanging load.
- Do not use on uneven surface, incline or decline (major ramps).
- Do not stack loads.
- Do not operate while under the influence of drugs or alcohol.
- Do not support ladder against LIFT TOOL (unless the specific allowance is provided for one following qualified procedures for working at elevations with this TOOL).
- Tipping hazard. Do not push or lean against load with raised platform.
- Do not use as a personnel lifting platform or step. No riders.
- Do not stand on any part of lift. Not a step.
- Do not climb on mast.
- Do not operate a damaged or malfunctioning LIFT TOOL machine.
- Crush and pinch point hazard below platform. Only lower load in areas clear of personnel and obstructions. Keep hands and feet clear during operation.
- No Forks. Never lift or move bare LIFT TOOL MACHINE with pallet truck, jack or fork lift.
- Mast extends higher than platform. Be aware of ceiling height, cable trays, sprinklers, lights, and other overhead objects.
- Do not leave LIFT TOOL machine unattended with an elevated load.
- Watch and keep hands, fingers, and clothing clear when equipment is in motion.
- Turn Winch with hand power only. If winch handle cannot be cranked easily with one hand, it is probably over-loaded. Do not continue to turn winch past top or bottom of platform travel. Excessive unwinding will detach handle and damage cable. Always hold handle when lowering, unwinding. Always assure self that winch is holding load before releasing winch handle.
- A winch accident could cause serious injury. Not for moving humans. Make certain clicking sound is heard as the equipment is being raised. Be sure winch is locked in position before releasing handle. Read instruction page before operating this winch. Never allow winch to unwind freely.

Freewheeling will cause uneven cable wrapping around winch drum, damage cable, and may cause serious injury.

- This TOOL must be maintained correctly for IBM Service personnel to use it. IBM shall inspect condition and verify maintenance history before operation. Personnel reserve the right not to use TOOL if inadequate. (C048)

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

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

The equipment is suitable for installation in the following:

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

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

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

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

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

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

Enclosures and expansion units

Enclosures and expansion units can be connected to POWER9 processor-based servers.

Use the following table to determine which enclosures and expansion units are supported on your server.

Table 1. Server support for the 5887 disk drive enclosure, EMX0 PCIe Gen3 I/O expansion drawer, ESLL storage enclosure, or ESLS storage enclosure

Server	Enclosure or expansion unit
8335-GTC	None
8335-GTG	None
8335-GTH	None
8335-GTW	None
8335-GTX	None
9006-12P	None
9006-22C	None
9006-22P	None
9183-22X	None
9008-22L	• 5887 disk drive enclosure[2] • EMX0 PCIe Gen3 I/O expansion drawer • ESLL storage enclosure • ESLS storage enclosure
9009-22A	• 5887 disk drive enclosure[2] • EMX0 PCIe Gen3 I/O expansion drawer • ESLL storage enclosure • ESLS storage enclosure
9009-22G	• 5887 disk drive enclosure[2] • EMX0 PCIe Gen3 I/O expansion drawer • ESLL storage enclosure • ESLS storage enclosure
9009-41A	• 5887 disk drive enclosure[2] • EMX0 PCIe Gen3 I/O expansion drawer • ESLL storage enclosure • ESLS storage enclosure
9009-41G	• 5887 disk drive enclosure[2] • EMX0 PCIe Gen3 I/O expansion drawer • ESLL storage enclosure • ESLS storage enclosure

Table 1. Server support for the 5887 disk drive enclosure, EMX0 PCIe Gen3 I/O expansion drawer, ESLL storage enclosure, or ESLS storage enclosure (continued)

Server	Enclosure or expansion unit
9009-42A	• 5887 disk drive enclosure[2] • EMX0 PCIe Gen3 I/O expansion drawer • ESLL storage enclosure • ESLS storage enclosure
9009-42G	• 5887 disk drive enclosure[2] • EMX0 PCIe Gen3 I/O expansion drawer • ESLL storage enclosure • ESLS storage enclosure
9040-MR9	• 5887 disk drive enclosure[2] • EMX0 PCIe Gen3 I/O expansion drawer • ESLL storage enclosure • ESLS storage enclosure
9080-M9S	• 5887 disk drive enclosure[2] • EMX0 PCIe Gen3 I/O expansion drawer • ESLL storage enclosure • ESLS storage enclosure
9223-22H	• 5887 disk drive enclosure[2] • EMX0 PCIe Gen3 I/O expansion drawer • ESLL storage enclosure • ESLS storage enclosure
9223-22S	• 5887 disk drive enclosure[2] • EMX0 PCIe Gen3 I/O expansion drawer • ESLL storage enclosure • ESLS storage enclosure
9223-42H	• 5887 disk drive enclosure[2] • EMX0 PCIe Gen3 I/O expansion drawer • ESLL storage enclosure • ESLS storage enclosure
9223-42S	• 5887 disk drive enclosure[2] • EMX0 PCIe Gen3 I/O expansion drawer • ESLL storage enclosure • ESLS storage enclosure
IBM Elastic Storage Server Data Server and Management Server (5104-22C and 5105-22E)	None

Table 1. Server support for the 5887 disk drive enclosure, EMX0 PCIe Gen3 I/O expansion drawer, ESLL storage enclosure, or ESLS storage enclosure (continued)	
Server	**Enclosure or expansion unit**
[1]The SAS port connectors are on the rear bulk head. The external SAS ports are used for expansion to an external SAS drawer. [2]The 5887 disk drive enclosure is supported as a migrated only enclosure for the POWER9 processor-based servers.	

5887 disk drive enclosure

This topic provides users and service providers with installation and maintenance information for the 5887 disk drive enclosure (IBM EXP24S SFF Gen2-bay Drawer).

Overview for the 5887 disk drive enclosure

The 5887 disk drive enclosure provides extra disk drives and solid-state drives.

The 5887 disk drive enclosure is connected to system units via a serial-attached SCSI (SAS) port. The SAS disk drive enclosure can hold up to 24 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

Installing a disk drive enclosure

Learn about installing your disk drive enclosure.

About this task

To learn how to install a disk drive enclosure, refer to Installing the 5887 disk drive enclosure or setting up a preinstalled 5887 disk drive enclosure (http://www.ibm.com/support/knowledgecenter/POWER9/p9ee3/p9ee3_kickoff.htm).

You can also refer to the installation guide that came with the disk drive enclosure.

Removing a disk drive enclosure from a rack

Use this procedure to help you physically remove a disk drive enclosure that is mounted in a rack. Because methods for the attachment of enclosures to a rack vary by model, this procedure provides only conceptual removal steps.

Before you begin

To complete this task, you need the following items:

- A flat-head screwdriver
- A Philips-head screwdriver
- A Torx screwdriver
- Up to three people to physically lift and move the enclosure
- A clear space to place the enclosure and mounting hardware that you are removing

Important: Supplement each step of this procedure with detailed information about the installation of the enclosure, when possible. Before you begin this procedure, check to see whether the following information is available about the enclosure that you are removing:

- The inventory list of parts that are provided with the delivery of your enclosure.
- Installation documentation about your enclosure model provided online or with the delivery of your enclosure.

  Tip: Online installation documentation for your enclosure might not be present in the Power Systems hardware level that you are currently searching. You might need to search earlier Power Systems hardware levels to locate installation documentation for the enclosure that you are removing.

About this task

To remove an enclosure from the rack, complete the following steps:

Procedure

1. Power off the enclosure.
2. If a service position exists for your enclosure, place the enclosure in its service position.
3. If the enclosure was installed with shipping or bracing brackets, complete the following steps:
   a. Remove any screws that attach the brackets to the rack.
   b. Remove any screws that attach the brackets to the enclosure.
   c. Carefully lift the brackets from the enclosure and remove them from the rack.

      

      CAUTION: Shipping and bracing brackets can be heavier than expected. Use more than one person to lift and move the brackets.
4. Disconnect the enclosure from all devices and power as follows:
   a. At the rear of the enclosure, disconnect power cords, any I/O bus cables that connect the enclosure to adapters, and other cables that might be present.
   b. At the front of the enclosure, disconnect any UPIC cables and other cables that might be present.
5. Note the location of all screws that provide for the attachment of the enclosure, the mounting hardware, and the rack to each other.

   If the bezel covers screws on the left and right ends of the front enclosure panel, remove those bezels.
6. Identify which screws secure the enclosure in position, which screws are weight-bearing screws, and which screws serve more purposes.

   To remove the enclosure safely, you must understand the functions of all screws that are used to install the enclosure. Evaluate the screws in the following order:

   a. Make a note of which screws are securing screws. You can identify a securing screw as any screw that fastens the enclosure chassis to any other fixture, such as the rack or a rail. Even if a screw attaches the chassis to another fixture that bears weight, it remains a securing screw and not a weight-bearing screw. If a screw secures only a mounting hardware item to the rack, it is not a securing screw. Check both the front and rear of the enclosure for securing screws. During the enclosure installation task, screws to secure the enclosure were the last screws to be installed. Therefore, they are the first screws that you are directed to remove later in this task to enable the detachment of the enclosure.

      Note: The enclosure might be installed in a shell that is, in turn, installed to a rack or rails. If so, then any screw that fastens the enclosure to the shell is a securing screw. Also, any screw that fastens the shell to the rack or rails is a securing screw.

      Exception: If the enclosure is installed on slide-out rails, the securing screws that attach the enclosure to the rails might also be weight-bearing screws. These models were installed in a two-step process that used rail-mounting guides. In the first step, the guides were temporarily attached to the sides of the enclosure. In the second step, the guides were removed after the enclosure was lifted onto the rails and securing screws were installed. For the purposes of this procedure, identify these screws as the weight-bearing screws that you are directed to remove later in this task.

b. Make a note of which screws are enclosure weight-bearing screws. You can identify a weight-bearing screw as any screw that fastens a rail to the rack, unless the screw is already identified as a securing screw. The type of rail, such as a stationary rail or a slide-out rail, is not a factor in identifying weight-bearing screws. During the enclosure installation task, screws to attach weight-bearing mounting hardware to the rack were installed before the enclosure was lifted onto the rails and secured. Therefore, you will be directed to remove them later in this task only after the enclosure is safely removed.

c. Make a note of any remaining screws that are used in the installation of the enclosure. These screws serve other purposes and are the last screws that you are directed to remove later in this task.

7. If the enclosure is installed on slide-out rails and you identified the securing screws as weight-bearing screws in step "6.a" on page 4, review the following options for the removal of the enclosure. Then, complete the option that is best for your situation:

   a. If you have the original rail-mounting guides and screws that were used during the installation of the enclosure, complete the following steps:

      1) Attach the rail-mounting guides to the sides of the enclosure by using the screws that are provided for the original installation.

      2) Remove the screws that you identified in the Exception note of step "6.a" on page 4 as weight-bearing screws.

      3) Using three people, lift the enclosure from the rails and place it carefully in the space that you cleared. If the enclosure cannot be lifted because it is still attached to the rails, return to step "6" on page 4 to identify more screws that might need to be removed.

      4) Continue with step "12" on page 6.

   b. If you do not have the original rail-mounting guides and screws that were used during the installation of the enclosure, complete the following steps:

      1) Position three people at the front and sides of the enclosure to bear its weight and hold it steady during the removal of weight-bearing screws.

      2) Remove the screws that you identified in the Exception note of step "6.a" on page 4 as weight-bearing screws in the slide-out rails. Order the removal of screws so that the last two screws to be removed are ones that are installed at diagonal points on opposite rails.

      3) Using the same three people who are holding the enclosure, lift the enclosure from the rails and place it carefully in the space that you cleared. If the enclosure cannot be lifted because it is still attached to the rails, return to step "6" on page 4 to identify more screws that might need to be removed.

      4) Continue with step "12" on page 6.

8. If the enclosure is installed in a shell, complete the following steps:

   a. If a cable retention bracket is present, remove the thumb screw that attaches the bracket to the shell, and remove the bracket.

   b. Remove any securing screws that fasten the enclosure to the shell.

   c. Slide the enclosure into a position where it can be removed. Using one or two people to handle the enclosure safely, slide the enclosure out from the shell.

   d. If more enclosures must be removed from the shell, repeat steps "8.a" on page 5 through "8.c" on page 5 to remove the enclosures.

   e. Remove all remaining securing screws that fasten the shell to the rack or rails.

   f. Lift the shell out from the rack and place it carefully in the space that you cleared.

   g. Continue with step "12" on page 6.

9. Remove all screws that you identified in step "6.a" on page 4 as securing screws.

   When this step is complete, the enclosure is no longer secured to the rack or to any mounting hardware.

CAUTION: Be careful in this step to remove only the screws that prevent the enclosure from being detached from the rack or mounting hardware. If you believe that a particular screw might be weight-bearing, do not remove it.

10. Perform a test lift of the enclosure with three people to determine how many people are required to handle the enclosure safely.

    CAUTION: The heaviest of enclosures require three people for safe lifting. Using fewer people than are required to lift an enclosure can result in injury.

11. Slide the enclosure into a position where it can be removed.

    Lift the enclosure out from the rack and place it carefully in the space that you cleared. If the enclosure is still attached, return to step "6" on page 4 to identify more screws that might need to be removed.

    Note: Depending on the method of attachment, you might be required to open latches to fully detach the enclosure from the rack and mounting hardware.

12. If you are required to remove the rails, you can remove them safely now.

    The procedure to remove rails includes some of the following common steps at one or both ends of the rail:

    a. Fold down any hinge brackets that are located where the rail attaches to the rack.
    b. Remove all screws that you identified in step "6.b" on page 5 as weight-bearing screws that attach the rail to the rack.
    c. Push any spring-loaded seating pins in the ends of the rails back through their rack holes.
    d. Open latches or loosen fasteners on the rail to detach the rail.
    e. Perform any additional action that is required to retract and remove the rail.

13. Remove any remaining screws that you identified in step "6.c" on page 5, and remove any remaining mounting hardware from the rack.
14. Store all mounting hardware, brackets, bezels, and the shell for future use.

EMX0 PCIe Gen3 I/O expansion drawer

This topic provides users and service providers with installation and maintenance information for the EMX0 PCIe Gen3 I/O expansion drawer (EMX0 PCIe3 expansion drawer).

Overview of the EMX0 PCIe Gen3 I/O expansion drawer

The EMX0 PCIe Gen3 I/O expansion drawer (EMX0 PCIe3 expansion drawer) is a 482.6 mm (19 in), 4U PCIe Gen3 I/O drawer. Each EMX0 PCIe3 expansion drawer provides up to 12 PCIe Gen3 adapter slots.

The EMX0 PCIe3 expansion drawer is connected to a system via one or more expansion drawer cable pairs. Each pair provides a single x16 PCIe Gen3 link between the system and the EMX0 PCIe3 expansion drawer. The number of extra PCIe slots that are provided and the number of expansion drawer cable pairs needed depends on the I/O module configuration of the EMX0 PCIe3 expansion drawer.

Ensure that a PCIe3 cable adapter is installed in the host system before you install the EMX0 PCIe3 expansion drawer.

If you are working on a POWER9 processor-based system: For all systems except the 9040-MR9 or 9080-M9S, you must power off the system to install the PCIe3 cable adapter.

If you are working on a POWER8® processor-based system: For all systems except the 8408-44E or 8408-E8E (with system firmware FW860.10 or later installed), or 9080-MHE, 9080-MME, 9119-MHE, or 9119-MME (with system firmware FW840.xx or later installed), you must power off the system to install the PCIe3 cable adapter.

To install a PCIe3 cable adapter to accommodate an EMX0 PCIe3 expansion drawer, see the following procedures:

- If your system is managed by an HMC, see Installing a part by using the HMC (http://www.ibm.com/support/knowledgecenter/POWER9/p9haj/hmcinstall.htm).
- If your system is **not** managed by an HMC, see PCIe adapters (http://www.ibm.com/support/knowledgecenter/POWER9/p9hak/pciadapters.htm).
- For PCIe adapter placement rules and slot priorities for your system or expansion drawer, see PCIe adapter placement rules and slot priorities (http://www.ibm.com/support/knowledgecenter/POWER9/p9hak/p9hak_pciadapters_slot_all_mtms.htm).

Note: To remove or relocate an EMX0 PCIe3 expansion drawer, the system power must be turned off for all configurations.

Installing an EMX0 PCIe Gen3 I/O expansion drawer

Find information about installing an EMX0 PCIe Gen3 I/O expansion drawer (EMX0 PCIe3 expansion drawer).

Before you begin

Notes:

- If you have a POWER9 processor-based 9080-M9S system and it is being installed at the same time as your EMX0 PCIe3 expansion drawer, the service provider completes the installation of the EMX0 PCIe3 expansion drawer. If you already have the 9080-M9S system that is installed, and you ordered an EMX0 PCIe3 expansion drawer, the installation and setup of the EMX0 PCIe3 expansion drawer is a customer task. You can complete this task yourself, or contact a service provider to complete the task for a fee.
- If you have a POWER8 processor-based 9080-MHE, 9080-MME, 9119-MHE, or 9119-MME system and it is being installed at the same time as your EMX0 PCIe3 expansion drawer, the service provider completes the installation of the EMX0 PCIe3 expansion drawer. If you already have the 9080-MHE, 9080-MME, 9119-MHE, or 9119-MME system that is installed, and you ordered an EMX0 PCIe3 expansion drawer, the installation and setup of the EMX0 PCIe3 expansion drawer is a customer task. You can complete this task yourself, or contact a service provider to complete the task for you for a fee.
- If you have any other type of system, the installation and setup of the EMX0 PCIe3 expansion drawer is a customer task. You can complete this task yourself, or contact a service provider to complete the task for you for a fee.

About this task

To learn how to install the EMX0 PCIe3 expansion drawer, refer to Installing an EMX0 PCIe Gen3 I/O expansion drawer http://www.ibm.com/support/knowledgecenter/POWER9/p9egp/p9egp_kickoff.htm).

You can also refer to the installation guide that came with the EMX0 PCIe3 expansion drawer.

Removing an EMX0 PCIe Gen3 I/O expansion drawer from an existing configuration

Learn how to remove an EMX0 PCIe Gen3 I/O expansion drawer (EMX0 PCIe3 expansion drawer) from an existing configuration when the system power is turned off.

Before you begin

Important: Removing or relocating an EMX0 PCIe3 expansion drawer must be completed with the system powered off for all configurations.

To complete this task, you need the following items:

- #1 and #2 Phillips screwdrivers
- Flat-head screwdriver
- Three people to physically lift and move the EMX0 PCIe3 expansion drawer
- A clear space to place the EMX0 PCIe3 expansion drawer and mounting hardware that you are removing

Important: This procedure provides the conceptual removal steps. Supplement each step of this procedure with detailed information about the installation of the EMX0 PCIe3 expansion drawer, when possible. Before you begin this procedure, check to see whether the following information is available about the EMX0 PCIe3 expansion drawer that you are removing:

- The inventory list of parts that are provided with the delivery of your EMX0 PCIe3 expansion drawer.
- Installation documentation about your EMX0 PCIe3 expansion drawer provided online or with the delivery of your EMX0 PCIe3 expansion drawer.

About this task

To remove an EMX0 PCIe3 expansion drawer from the system configuration when the system powered is turned off, complete the following steps:

Procedure

1. Record the time that you start this procedure. The time is referenced later during error log analysis.
2. Optional: Identify the system that you are working on. For instructions, see Enabling enclosure or server indicators by using the ASMI (www.ibm.com/support/knowledgecenter/POWER9/p9haj/p9haj_enclosure_leds.htm).

   Use the blue identify LED on the enclosure to locate the system. Ensure that the serial number of the system matches the serial number to be serviced.
3. If the system is powered on, power it off.
4. Choose one of the following options:
   - If the system is not in manufacturing default configuration (MDC), continue with step “5” on page 8.
   - If the system is in MDC, continue with step “6” on page 8.
5. If the system is not in MDC, you can remove the I/O resources from logical partitions before you remove the EMX0 PCIe3 expansion drawer, or you can remove the EMX0 PCIe3 expansion drawer and then be prompted by the Hardware Management Console (HMC) to remove the I/O resources from the logical partitions.

   If you remove the I/O resources before you remove the EMX0 PCIe3 expansion drawer, find the profiles that include resources in the EMX0 PCIe3 expansion drawer that is being removed, select the profiles to edit, remove the resources in the EMX0 PCIe3 expansion drawer, and click **Save**.

   Note: If you do not remove the I/O resources before you remove the EMX0 PCIe3 expansion drawer, when a profile is activated or edited that includes resources in the EMX0 PCIe3 expansion drawer that was removed, the HMC displays a message about missing resources. Then, you can choose the option to automatically remove the missing I/O resources from the profile by using the HMC.
6. Remove AC power from the EMX0 PCIe3 expansion drawer that you are removing by disconnecting the AC cables from the power supplies on the EMX0 PCIe3 expansion drawer.
7. Remove the expansion drawer cables from the EMX0 PCIe3 expansion drawer and the system.
8. Optional: Remove the PCIe3 cable adapter from the system.

   For instructions, see PCIe adapters. Select the appropriate model and follow the removal instructions.
9. Disconnect the EMX0 PCIe3 expansion drawer from all devices and power supplies.

   At the rear of the EMX0 PCIe3 expansion drawer, disconnect power cords, expansion drawer cables, cables attached to the I/O adapters in the EMX0 PCIe3 expansion drawer, and the cable management bracket, if installed.
10. Note the location of all screws that provide for the attachment of the EMX0 PCIe3 expansion drawer, the mounting hardware, and the rack to each other.

    If the cover is blocking screws on the left and right ends of the front EMX0 PCIe3 expansion drawer panel, remove those covers.

11. Identify which screws secure the EMX0 PCIe3 expansion drawer in position, which screws are weight-bearing screws, and which screws serve more purposes.

    To remove the EMX0 PCIe3 expansion drawer safely, you must understand the functions of all screws that are used to install the EMX0 PCIe3 expansion drawer. Evaluate the screws in the following order:

    a. Make a note of which screws are securing screws. You can identify a securing screw as any screw that fastens the EMX0 PCIe3 expansion drawer chassis to any other fixture, such as the rack or a rail. Even if a screw attaches the chassis to another fixture that bears weight, it remains a securing screw and not a weight-bearing screw. If a screw secures only a mounting hardware item to the rack, it is not a securing screw. Check both the front and rear of the EMX0 PCIe3 expansion drawer for securing screws. During the EMX0 PCIe3 expansion drawer installation task, screws to secure the EMX0 PCIe3 expansion drawer were the last screws to be installed. Therefore, they are the first screws that you are directed to remove later in this task to enable the detachment of the EMX0 PCIe3 expansion drawer.

    b. Make a note of which screws are weight-bearing screws. You can identify a weight-bearing screw as any screw that fastens a rail to the rack, unless the screw is already identified as a securing screw. The type of rail, such as a stationary rail or a slide-out rail, is not a factor in identifying weight-bearing screws. During the EMX0 PCIe3 expansion drawer installation task, screws to attach weight-bearing mounting hardware to the rack were installed before the EMX0 PCIe3 expansion drawer was lifted onto the rails and secured. Therefore, you will be directed to remove them later in this task only after the EMX0 PCIe3 expansion drawer is safely removed.

    c. Make a note of any remaining screws that are used in the installation of the EMX0 PCIe3 expansion drawer. These screws serve other purposes and are the last screws that you are directed to remove later in this task.

12. Remove all screws that you identified in step “11.a” on page 9 as securing screws.

    When this step is complete, the EMX0 PCIe3 expansion drawer is no longer secured to the rack or to any mounting hardware.

    CAUTION: Be careful in this step to remove only the screws that prevent the drawer from being detached from the rack or mounting hardware. If you believe that a particular screw might be a weight-bearing screw, do not remove it.

13. Perform a test lift of the EMX0 PCIe3 expansion drawer with three people to determine how many people are required to handle the EMX0 PCIe3 expansion drawer safely.

    CAUTION: The heaviest of drawers require three people for safe lifting. Using fewer people than are required to lift a drawer can result in injury.

14. Slide the EMX0 PCIe3 expansion drawer into a position where it can be removed.

    Lift the EMX0 PCIe3 expansion drawer out from the rack and place it carefully in the space that you cleared. If the EMX0 PCIe3 expansion drawer is still attached, return to step “11” on page 9 to identify more screws that might need to be removed.

    Note: Depending on the method of attachment, you might be required to open latches to fully detach the EMX0 PCIe3 expansion drawer from the rack and mounting hardware.

15. If you need to remove the rails, you can remove them safely now.

    The procedure to remove rails includes some of the following common steps at one or both ends of the rail:

    a. Fold down any hinge brackets that are located where the rail attaches to the rack.

    b. Remove all screws that you identified in step “11.b” on page 9 as weight-bearing screws that attach the rail to the rack.

    c. Push any spring-loaded seating pins in the ends of the rails back through the rack holes.

    d. Open latches or loosen fasteners on the rail to detach the rail.

    e. Perform any additional action that is needed to retract and remove the rail.

16. Remove any remaining screws that you identified in step “11.c” on page 9, and remove any remaining mounting hardware from the rack.
17. Store all mounting hardware, brackets, covers, and the shell for future use.
18. Power on the system but do not start the logical partitions.
19. Check for new serviceable events that are created after you start the system. Choose from the following options:
    - If the system is managed by an HMC, complete the following steps:
        a. In the navigation area, click the **Serviceability** icon, and then select **Serviceable Events Manager**.
        b. Specify event criteria that includes events that were generated during this procedure.
        c. Perform problem analysis on any open serviceable events that are generated during this procedure.
        d. Continue with step “20” on page 10.
    - If the system is not managed by an HMC, use the Advanced System Management Interface (ASMI) to check and handle new serviceable events by completing the following steps:
        a. In the ASMI navigation area, expand **System Service Aids**.
        b. Click **Error/Event Logs**.
        c. In the Serviceable/Customer attention events table, look for events that were generated during this procedure.
        d. Perform problem analysis on any open serviceable events that are generated during this procedure.
20. Start the logical partitions.

Common procedures for the EMX0 PCIe Gen3 I/O expansion drawer

This section contains all the common procedures related to managing the EMX0 PCIe Gen3 I/O expansion drawer (EMX0 PCIe3 expansion drawer).

Refer to the following topics for related information about the EMX0 PCIe3 expansion drawer:

1. Powering on an EMX0 PCIe3 expansion drawer
2. Powering off an EMX0 PCIe3 expansion drawer
3. Verifying the PCIe hardware topology with an HMC
4. Verifying the PCIe hardware topology without an HMC
5. Labeling the expansion drawer cables

Powering on an EMX0 PCIe3 expansion drawer

Learn how to power on an EMX0 PCIe3 expansion drawer.

Before you begin

Before you begin, read this entire procedure. If there are procedural steps that cannot be completed now, the procedure must be delayed until a later time.

Attention: If the server is not managed by a Hardware Management Console (HMC), the EMX0 PCIe3 expansion drawer cannot be powered on with the server powered on. To power on the EMX0 PCIe3 expansion drawer without an HMC, power off the server and then power on the server. The EMX0 PCIe3 expansion drawer will power on automatically when the server powers on.

About this task

Attention: Do *not* use this procedure to power on the system unit. To power on a system, see Starting the system or logical partition.

To power on the EMX0 PCIe3 expansion drawer, complete the following steps:

Procedure

1. Is your system managed by an HMC?
   - **Yes**: Continue with step “2” on page 11.
   - **No**: To power on the EMX0 PCIe3 expansion drawer without an HMC, you must power on the server. When the server powers on, the EMX0 PCIe3 expansion drawer will power on automatically. For instructions, see Starting the system or logical partition.
2. If the AC power cords were disconnected when the EMX0 PCIe3 expansion drawer was powered off and you have not reconnected them, reconnect them now.

   If they are already connected, continue with the next step.
3. To use the Power On/Off Unit utility from the HMC, complete the following steps:
   a. In the navigation area, click the **Resources** icon  , and then select **All Systems**.
   b. To view the actions for that server, select the server name of the required server.
   c. In the navigation area, select **Serviceability** > **Serviceability**.
   d. In the **Hardware Operations** section of the **Serviceability** window, select **Power On/Off Unit**.
   e. In the Power On/Off Unit window, expand the managed system and select the appropriate unit.
   f. Click **Power On**.
4. Wait 3 minutes for the I/O resources in the EMX0 PCIe3 expansion drawer to become fully operational.
5. Reconfigure any I/O resources that were unconfigured when the EMX0 PCIe3 expansion drawer was powered off. Then, go to the next step.
6. Return to the procedure that sent you here.

Powering off an EMX0 PCIe3 expansion drawer
Learn how to power off an EMX0 PCIe3 expansion drawer.

Before you begin
Before you begin, read this entire procedure. If you cannot complete the entire procedure now, the procedure must be delayed until a later time.

Attention: If the server is not managed by a Hardware Management Console (HMC), the EMX0 PCIe3 expansion drawer must be powered off by powering off the host server. To power off the EMX0 PCIe3 expansion drawer without an HMC, power off the server. The EMX0 PCIe3 expansion drawer powers off automatically when the server powers off.

About this task

Attention: Do *not* use this procedure to power off the system unit. To stop the system, see Stopping the system or logical partition.

To power off the EMX0 PCIe3 expansion drawer, complete the following steps:

Procedure

1. Record the EMX0 PCIe3 expansion drawer location code and machine type-model-serial numbers (MTMs).
2. Is the server managed by an HMC?

   No: The EMX0 PCIe3 expansion drawer must be powered off by powering off the server. For instructions, see Stopping the system or logical partition. Then, return to the procedure that sent you here.

Yes: The EMX0 PCIe3 expansion drawer can be powered off with the server power turned on. Continue with the next step.

3. Verify that the EMX0 PCIe3 expansion drawer being powered off is the correct one. You can activate the identify indicator on the EMX0 PCIe3 expansion drawer. To activate the identify indicator on the EMX0 PCIe3 expansion drawer, complete the following steps for your particular interface:
   - To use the ASMI to activate or deactivate an identify LED, see Identifying a part by using the ASMI.
   - To use an HMC to activate an identify LED, complete the following steps:
     a. In the navigation area, click the **Resources** icon  , and then click **All Systems**.
     b. To view the actions for that server, select the server name.
     c. In the navigation area, click **System Actions** > **Attention LED** > **Identify Attention LED**.
     d. Select the wanted EMX0 PCIe3 expansion drawer and click **Activate LED**. Click **Deactivate LED** to turn off the LED.
4. Are you powering off the correct EMX0 PCIe3 expansion drawer?

   No: Determine the correct EMX0 PCIe3 expansion drawer. Then, complete this procedure again.
   Yes: Continue with the next step.
5. To power off an EMX0 PCIe3 expansion drawer with the server power turned on, complete the following steps from the HMC:
   a. In the navigation area, click the **Resources** icon  , and then click **All Systems**.
   b. To view the actions for that server, select the server name.
   c. In the navigation area, click **Serviceability** > **Serviceability**.
   d. In the **Hardware Operations** section of the **Serviceability** window, click **Power On/Off Unit**.
   e. In the Power On/Off Unit window, expand the managed system and select the appropriate unit.
   f. Click **Power Off**.

   Notes:
   - Wait for the EMX0 PCIe3 expansion drawer to power off. This action might take up to 15 minutes depending on the configuration.
   - When the utility displays notification that the power off is complete, ensure that the EMX0 PCIe3 expansion drawer is powered off by verifying that the power LED/indicator on the EMX0 PCIe3 expansion drawer control panel is off or flashing.
   - If the EMX0 PCIe3 expansion drawer does not power off after more than 15 minutes, the system might be hung. If this action occurs, contact your service provider for assistance.
6. Were you directed here to power off the EMX0 PCIe3 expansion drawer to set the configuration ID, feature code, or serial number of the EMX0 PCIe3 expansion drawer?

   No: Continue with the next step.
   Yes: Return to the procedure that sent you here.
7. Does the procedure that sent you here instruct you to remove the AC power from the EMX0 PCIe3 expansion drawer?

   No: Return to the procedure that sent you here.
   Yes: Continue with the next step.
8. Disconnect the AC power cords from the EMX0 PCIe3 expansion drawer.

Verifying the PCIe hardware topology with an HMC

Learn how to verify that failed or degraded PCIe links do not exist by using a Hardware Management Console (HMC).

About this task

To use an HMC to verify that failed or degraded PCIe links do not exist, complete the following steps with the system that is powered on:

Procedure

1. Verify that serviceable events do not list B7006A*xx* reference codes (where *x* is any character 0 - 9 or A - F) by completing the following steps:
   a. In the navigation area of the HMC, click **Serviceability**, and then select **Serviceable Events Manager**.
   b. In the Manage Serviceable Events window, complete the following steps:
      1) Select **Open** for the **Serviceable event status** field.
      2) Select the machine type, model, and serial number (MTMS) of the server you are working with for the **Reporting MTMS** field.
      3) Click **ALL** for all other fields, and click **OK**.
   c. Scan for any serviceable events that include B7006A*xx* reference codes, and choose one of the following options:
      - If serviceable events do not list B7006A*xx* reference codes, close the Manage Serviceable Events window.
      - If serviceable events does list B7006A*xx* reference codes, the PCIe hardware topology might have a problem. Complete problem analysis on the serviceable events to correct the problems before you continue. If you need assistance, contact your next level of support.
2. Verify the status of the PCIe links by completing the following steps:
   a. In the navigation area, click **Resources**, and then select **All Systems**.
   b. Select the server that you want to work with and click **Actions** > **View System Partitions**.
   c. In the menu pod, expand **Serviceability** and then click **PCI Configuration**.
   d. Scan the PCIe Hardware Topology data to identify rows that have a link status of `Failed` or `Degraded`.
   e. If you identified links in step “2.d” on page 13 that have a link status of `Failed` or `Degraded`, the links must be repaired before you continue. To repair the links, repeat step “1” on page 13. If you already completed step “1” on page 13 or need assistance, contact your next level of support.

Verifying the PCIe hardware topology without an HMC

Learn how to verify that failed or degraded PCIe links do not exist by using the AIX, Virtual I/O Server (VIOS), IBM i, or Linux operating system.

About this task

To verify that failed or degraded PCIe links do not exist by using the AIX, Virtual I/O Server (VIOS), IBM i, or Linux operating system, complete the following steps with the system powered on:

Procedure

1. Choose the operating system that best applies to your configuration.

   Important: Multiple options might apply to your configuration. Choose only the first option that applies.

- If your system has a partition running the Virtual I/O Server operating system, continue with step “2” on page 14.
- If your system has a partition running the AIX operating system, continue with step “3” on page 14.
- If your system has a partition running the IBM i operating system, continue with step “4” on page 15.
- If your system has a partition running the Linux operating system, continue with step “5” on page 15.

2. Use the VIOS error log to verify that it does not list B7006A*xx* errors (where *x* is any character 0 - 9 or A - F) by completing the following steps.
   a. Log in to the operating system with admin or service level authority. If you need assistance, contact the system administrator.
   b. At the VIOS command prompt, type `diagmenu -d sysplanar0 -E xx` and press Enter, where xx is any number in the range 1 - 60 that specifies the most recent number of days for which results are returned. The recommended value is 30 days.
   c. Highlight the **Problem Determination** option in the DIAGNOSTIC MODE SELECTION display, and then press Enter.
   d. Search the results that are displayed to identify problems with B7006A*xx* reference codes. You might need to scroll down in the display to see all of the results.

      Note: If the Problem Determination results contain serviceable events that have already been reported, a PREVIOUS DIAGNOSTICS RESULTS display is shown. Respond to the **Do you want to review these previously reported errors?** prompt by highlighting the YES response, and then press Enter.
   e. Based on the results of your search, choose one of the following options:
      - If problems that have B7006A*xx* reference codes are not displayed, press Enter to return to the command line.
      - If problems that have B7006A*xx* reference codes are displayed, the PCIe hardware topology might have a problem. Complete problem analysis to correct the problems before continuing. If you need assistance, contact your next level of support.
   f. Go to step “6” on page 15.
3. Use the AIX error log to verify that it does not list B7006A*xx* errors (where *x* is any character 0 - 9 or A - F) by completing the following steps.
   a. Log in to the operating system with admin or service level authority. If you need assistance, contact the system administrator.
   b. At the AIX command prompt, type `diag -d sysplanar0 -E xx` and press Enter, where xx is any number in the range 1 - 60 that specifies the number of days. This command returns results for the most recent number of days specified. The recommended value is 30 days.
   c. Highlight the **Problem Determination** option in the DIAGNOSTIC MODE SELECTION display, and then press Enter.
   d. Search the results that are displayed to identify problems with B7006A*xx* reference codes. You might need to scroll down in the display to see all of the results.

      Note: If the Problem Determination results contain serviceable events that have already been reported, a PREVIOUS DIAGNOSTICS RESULTS display is shown. Respond to the **Do you want to review these previously reported errors?** prompt by highlighting the YES response, and then press Enter.
   e. Based on the results of your search, choose one of the following options:
      - If problems that have B7006A*xx* reference codes are not displayed, press Enter to return to the command line.

- If problems that have B7006A*xx* reference codes are displayed, the PCIe hardware topology might have a problem. Complete problem analysis to correct the problems before continuing. If you need assistance, contact your service provider.

f. Go to step "6" on page 15.

4. Use the IBM i service action event log to verify that it does not list B7006A*xx* errors (where *x* is any character 0 - 9 or A - F) by completing the following steps:
   a. Log in to the operating system with admin or service level authority. If you need assistance, contact the system administrator.
   b. At the IBM i command prompt, type `strsst`, and then press Enter.
   c. Type your service tools user ID and service tools password on the System Service Tools (SST) Sign On display, and then press Enter.
   d. Click **Start a service tool**, and then press Enter.
   e. Click **Hardware service manager**, and then press Enter.
   f. Click **Work with service action log**, and then press Enter.
   g. On the **Select Timeframe** display, change the **From: Date and Time** to the desired date and time range. The recommended value is 30 days.
   h. Search for serviceable events with B7006A*xx* reference codes, and choose one of the following options:
      - If serviceable events that have B7006A*xx* reference codes are not displayed, press F3 (Exit) to return to the Hardware Service Manager display.
      - If serviceable events that have B7006A*xx* reference codes are displayed, the PCIe hardware topology might have a problem. Complete problem analysis to correct the problems before continuing. If you need assistance, contact your service provider.
   i. Go to step "6" on page 15.
5. Use the Linux error log to verify that it does not list B7006A*xx* errors (where *x* is any character 0 - 9 or A - F) by completing the following steps.
   a. Log in as the root user. If you need assistance, contact the system administrator.
   b. At the Linux command prompt, type `servicelog --query='refcode like "B7006A%" AND serviceable=1 AND closed=0'`, and then press Enter.
   c. Search the results that are displayed for problems that have B7006A*xx* reference codes and for statuses that are open. If problems that have B7006A*xx* reference codes are displayed, the PCIe hardware topology might have a problem. Complete problem analysis to correct the problems before continuing. If you need assistance, contact your service provider.

      Note: You might need to scroll down in the display to see all of the results.
   d. Go to step "6" on page 15.
6. Check for failed or degraded PCIe links by completing the following steps:
   a. Access the Advanced System Management Interface (ASMI) by using an authority level of administrator or authorized service provider. For details about using the ASMI, see Managing the Advanced System Management Interface (https://www.ibm.com/support/knowledgecenter/POWER9/p9hby/p9hby_kickoff.htm).
   b. In the ASMI navigation area, expand **System Configuration**.
   c. Click **PCIe Hardware Topology**.
   d. Scan the PCIe Hardware Topology data to identify rows that have a link status of `Failed` or `Degraded`.
   e. If you identified links in step "6.d" on page 15 that have a link status of `Failed` or `Degraded`, the links must be repaired before you continue. To repair the links, repeat step "1" on page 13. If you already completed step "1" on page 13 or need assistance, contact your next level of support.

Labeling the expansion drawer cables

Find information about labeling the expansion drawer cables.

Before you begin

Note: You only need to label the expansion drawer cables for the following systems:

- POWER9 processor-based 9080-M9S system.
- POWER8 processor-based 9080-MHE, 9080-MME, 9119-MHE , or 9119-MME system.

About this task

To label the expansion drawer cables, complete the following steps:

Note: If you are labeling a replacement expansion drawer cable, you might need to move the original label to the new cable or create your own label. Use these instructions as a general guideline.

Procedure

1. Locate the following items that you need later in the procedure:
   - Expansion drawer cable pairs
   - Host system label sheet
   - EMX0 PCIe3 expansion drawer label sheet
   - Labeling diagram
2. Determine the expansion drawer cable pair that can be used to connect the system to the EMX0 PCIe3 expansion drawer.
   - Each cable pair must be the same length. You can verify the cable lengths by viewing the length labels that are on the plug ends or near the pull tabs on each cable.
   - If your system and EMX0 PCIe3 expansion drawer are in the same rack and the system uses a cable management bracket, use the 2-meter cables.
   - If your system and EMX0 PCIe3 expansion drawer are in the same rack and the system uses a cable management arm, use the 3-meter cables.
   - If your system and EMX0 PCIe3 expansion drawer are in separate racks, use the 10-meter cables.
   - If you have a POWER9 processor-based 9080-M9S system and the EMX0 PCIe3 expansion drawer is in a separate rack, you might need to use the 20-meter cables.
   - If you have a POWER8 processor-based 9080-MHE, 9080-MME, 9119-MHE, or 9119-MME system and the EMX0 PCIe3 expansion drawer is in a separate rack, you might need to use the 20-meter cables.
3. Ensure that you have the electrostatic discharge (ESD) wrist strap on and that the ESD clip is plugged into a ground jack or connected to an unpainted metal surface. If not, do so now.
4. Carefully remove the expansion drawer cable pair from the packaging. Do not remove the protective covers now.
5. Attach the host system location labels to the expansion drawer cable.

   While you are completing these steps, refer to the following figure as a reference.

   a) Locate the host system **(A)** that you are attaching to the EMX0 PCIe3 expansion drawer.

   b) Locate the host system serial number label sheet **(B)**.

   c) Match the host system serial number **(C)** to the serial number shown on the host system label sheet.

   d) Determine the location of the PCIe3 cable adapter on the host system where you attach the first expansion drawer cable pair.

   e) Locate the labels on the host system label sheet **(B)** that correspond to the location of the PCIe3 cable adapter on the host system.

f) Select one of the expansion drawer cables as the top cable **(D)** that you will attach to port T1.

g) Attach the leftmost Cx-T1 label to the connector end of the cable **(E)**.

Wrap the label with the blank end first so that the location information **(F)** is visible.

h) Take the second label Cx-T1 from the host system label sheet **(B)** and place it on the opposite end of the cable that attaches to the EMX0 PCIe3 expansion drawer. Ensure that the label is placed more than 100 mm (4 in) from the end of the cable **(G)**.

i) Leave the cable near where it will be plugged.

j) Route the other end of the cable to the EMX0 PCIe3 expansion drawer to which it attaches.

k) Leave the cable near where it will be plugged.

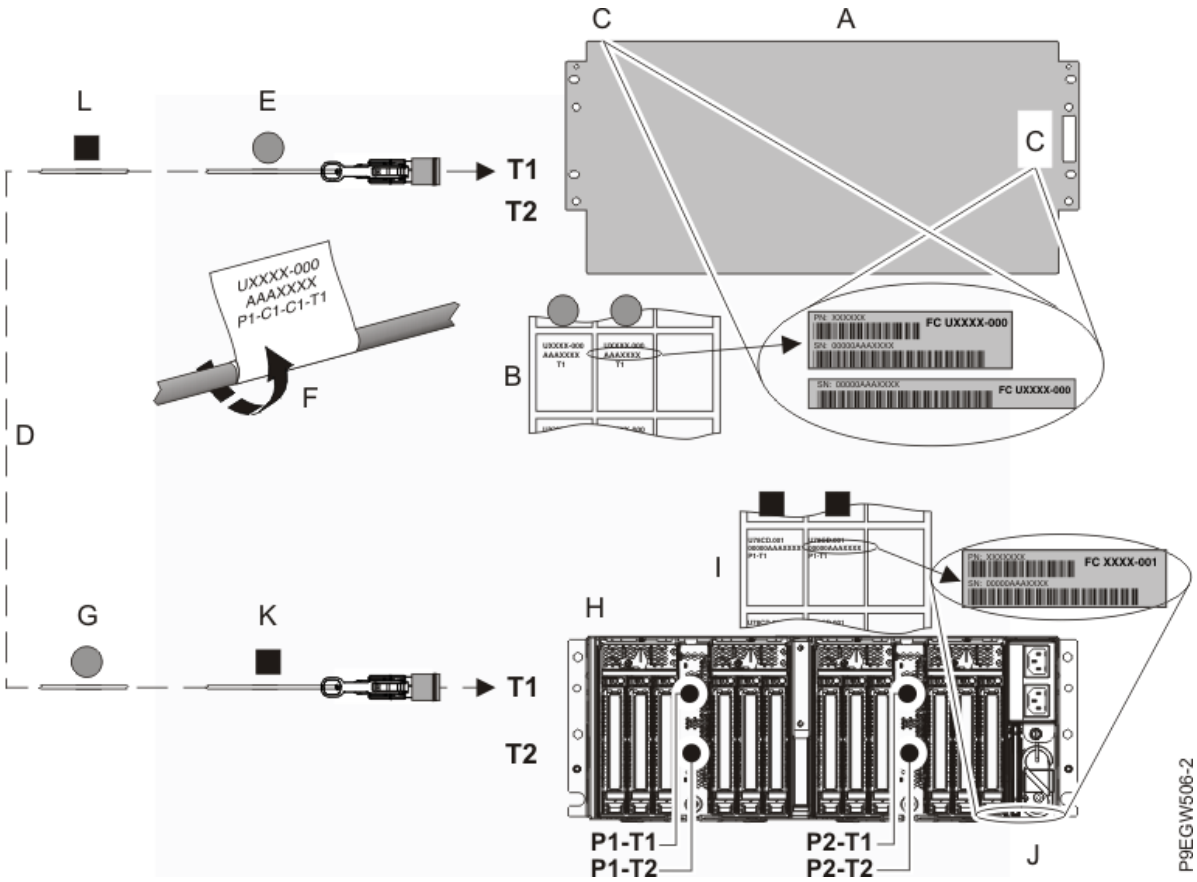

Figure 1. Labeling an expansion drawer cable

6. Attach the EMX0 PCIe3 expansion drawer location labels to the expansion drawer cable:

a) Locate the EMX0 PCIe3 expansion drawer **(H)** that you are connecting to the host system.

b) Locate the EMX0 PCIe3 expansion drawer serial number label sheet **(I)**.

c) Match the EMX0 PCIe3 expansion drawer serial number **(J)** to the serial number shown on the EMX0 PCIe3 expansion drawer label sheet **(I)**.

d) Determine the location of the I/O module on the EMX0 PCIe3 expansion drawer where you will attach the first cable pair.

e) Locate the labels on the EMX0 PCIe3 expansion drawer label sheet that correspond to the I/O module location.

f) Attach the leftmost Px-T1 label to the connector end of the cable **(K)**.

Wrap the label with the blank end first so that the location information **(F)** is visible.

g) Take the second Px-T1 label from the expansion drawer label sheet and place it on the opposite end of the cable greater than 100 mm (4 in) from the end of the cable **(L)**.

h) Select the top cable that will be attached to port P1-T1.

i) Leave the cable near where it will be plugged.

7. Place and route the labeled cable:

   Remember: Do not connect the cable now.

   a) Locate the connector end of the cable with the host system Cx-T1 label **(E)** and place it near the T1 port on the PCIe3 cable adapter on the host system.

      Record this port for later.

   b) Route the cable and place the connector end **(K)** near the I/O module on the EMX0 PCIe3 expansion drawer.

8. If necessary, repeat steps "5" on page 16 and "6" on page 17 for the T2 cable of the pair.
9. If you were directed here from another procedure, return to that procedure now.

ESLL and ESLS storage enclosures

This topic provides users and service providers with installation and maintenance information for the ESLL storage enclosure (IBM EXP12SX SAS Storage Enclosure) and ESLS storage enclosure (IBM EXP24SX SAS Storage Enclosure).

Overview for the ESLL and ESLS storage enclosures

The ESLL and ESLS storage enclosures provide extra disk drives. The ESLS also provides extra solid-state drives.

The ESLL and ESLS storage enclosures are connected to system units via a serial-attached SCSI (SAS) port. The ESLL storage enclosure can hold up to 12 large form factor (LFF) drives. The ESLS storage enclosure can hold up to 24 small form factor (SFF) drives. The enclosures can be split logically into one, two, or four independent groups. The SAS storage enclosures support the following operating systems:

- AIX
- IBM i (The ESLL is not supported by IBM i)
- Linux
- VIOS

Installing an ESLL or ESLS storage enclosure

Learn how to install an ESLL storage enclosure (IBM EXP12SX SAS Storage Enclosure) and ESLS storage enclosure (IBM EXP24SX SAS Storage Enclosure).

About this task

To learn how to install the ESLL or ESLS storage enclosure, refer to Installing an ESLL or ESLS storage enclosure (http://www.ibm.com/support/knowledgecenter/POWER9/p9eiu/p9eiu_kickoff.htm).

You can also refer to the installation guide that came with the ESLL or ESLS storage enclosure.

Removing an ESLL or ESLS storage enclosure from a rack

Use this procedure to help you physically remove an ESLL or ESLS storage enclosure that is mounted in a rack.

Before you begin

To complete this task, you need the following items:

- A Phillips-head screwdriver or an 8 mm socket wrench
- Two people to physically lift and move the enclosure
- A clear space to place the enclosure and mounting hardware that you are removing

Important: Supplement each step of this procedure with detailed information about the installation of the enclosure, when possible. Before you begin this procedure, check to see whether the following information is available about the enclosure that you are removing:

- The inventory list of parts that are provided with the delivery of your enclosure.
- Installation documentation about your enclosure model provided online or with the delivery of your enclosure.

About this task

To remove an enclosure from the rack, complete the following steps:

Procedure

1. Power off the enclosure.
2. At the rear of the enclosure, note the locations, label, and disconnect the serial-attached SCSI (SAS) cables from the enclosure services manager (ESM).
3. At the front of the rack, remove the left side cover **(A)** and the right side cover **(B)** to show the mounting brackets. Pinch the release to rotate the cover up and off from the chassis flange as shown in Figure 2 on page 19.

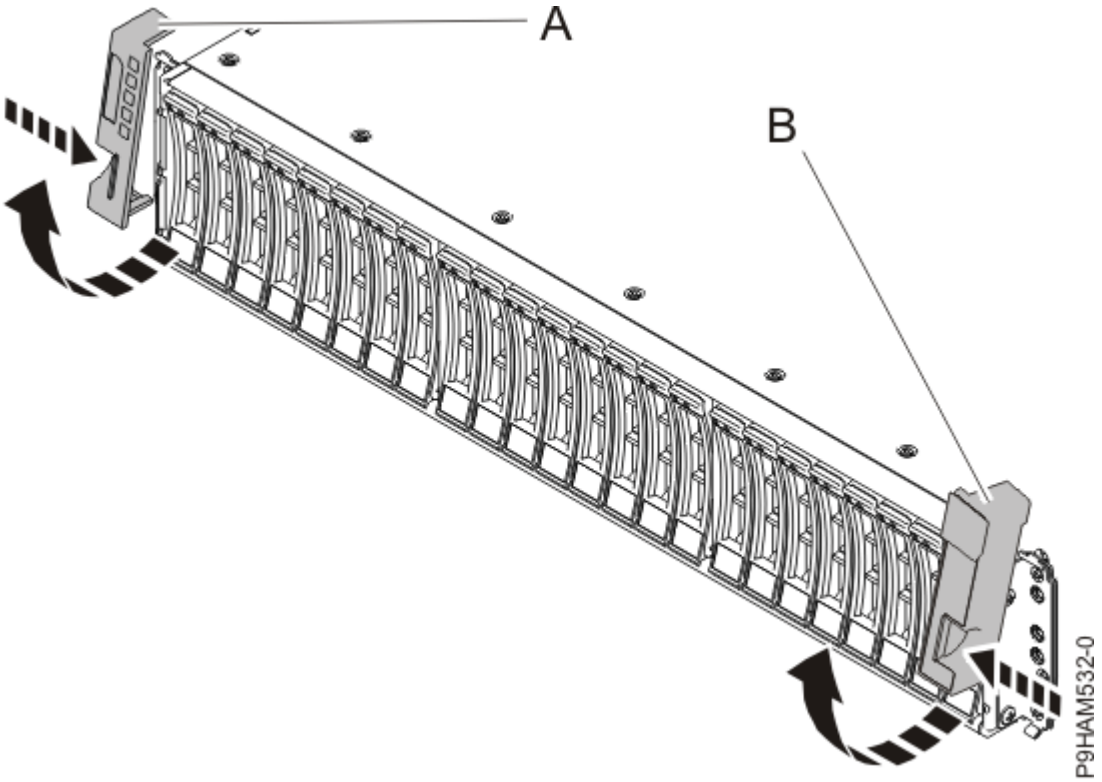

Figure 2. Removing the side covers

4. Remove the M5 screws in the top holes in the mounting brackets.
5. Perform a test lift of the enclosure with two people to determine how many people are required to handle the enclosure safely.

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

6. Slide the enclosure into a position where it can be removed.

   Lift the enclosure out from the rack and place it carefully in the space that you cleared.
7. If you are required to remove the rails, you can remove them safely now.

   a. At the rear of the rack, remove the M5 screw that attaches the rail to the rack.

b. Open the hinge bracket on each end of the rail.
c. At the front of the rack, grasp the support rail and push it inwards and lift it out of the rack.
d. Repeat for the other support rail.

8. Store all mounting hardware, brackets, and covers for future use.

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Accessibility features for IBM Power Systems servers

Accessibility features assist users who have a disability, such as restricted mobility or limited vision, to use information technology content successfully.

Overview

The IBM Power Systems servers include the following major accessibility features:

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

The IBM Power Systems servers use the latest W3C Standard, WAI-ARIA 1.0 (www.w3.org/TR/wai-aria/), to ensure compliance with US Section 508 (www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-section-508-standards/section-508-standards) and Web Content Accessibility Guidelines (WCAG) 2.0 (www.w3.org/TR/WCAG20/). To take advantage of accessibility features, use the latest release of your screen reader and the latest web browser that is supported by the IBM Power Systems servers.

The IBM Power Systems servers online product documentation in IBM Knowledge Center is enabled for accessibility. The accessibility features of IBM Knowledge Center are described in the Accessibility section of the IBM Knowledge Center help (www.ibm.com/support/knowledgecenter/doc/kc_help.html#accessibility).

Keyboard navigation

This product uses standard navigation keys.

Interface information

The IBM Power Systems servers user interfaces do not have content that flashes 2 - 55 times per second.

The IBM Power Systems servers web user interface relies on cascading style sheets to render content properly and to provide a usable experience. The application provides an equivalent way for low-vision users to use system display settings, including high-contrast mode. You can control font size by using the device or web browser settings.

The IBM Power Systems servers web user interface includes WAI-ARIA navigational landmarks that you can use to quickly navigate to functional areas in the application.

Vendor software

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Related accessibility information

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TTY service
800-IBM-3383 (800-426-3383)
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Warning: This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.

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Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:
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New Orchard Road
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Tel: 914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
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Technical Relations Europe, Abteilung M456
IBM-Allee 1, 71139 Ehningen, Germany

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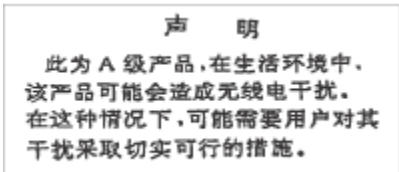

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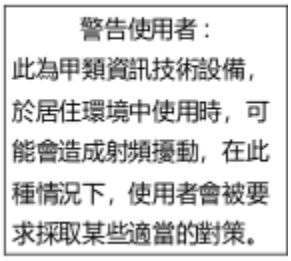

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取扱説明書に従って正しい取り扱いをして下さい。　VCCI－B

Taiwan Notice

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

United States Federal Communications Commission (FCC) Notice

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

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

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

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

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

Responsible Party:

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

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