

# Service procedures for the PCIe storage enclosure

ESCALA Power7



REFERENCE  
86 A1 25FK 01



# Service procedures for the PCIe storage enclosure

The ESCALA Power7 publications concern the following models:

- Bull Escala E1-700 (Power 710 / 8231-E2B)
- Bull Escala E1-705 (Power 710 / 8231-E1C)
- Bull Escala E2-700 / E2-700T (Power 720 / 8202-E4B)
- Bull Escala E2-705 / E2-705T (Power 720 / 8202-E4C)
- Bull Escala E3-700 (Power 730 / 8231-E2B)
- Bull Escala E3-705 (Power 730 / 8231-E2C)
- Bull Escala E4-700 / E4-700T (Power 740 / 8205-E6B)
- Bull Escala E4-705 (Power 740 / 8205-E6C)
- Bull Escala E5-700 (Power 750 / 8233-E8B)
- Bull Escala M6-700 (Power 770 / 9117-MMB)
- Bull Escala M6-705 (Power 770 / 9117-MMC)
- Bull Escala M6-715 (Power 770 / 9117-MMD)
- Bull Escala M7-700 (Power 780 / 9179-MHB)
- Bull Escala M7-705 (Power 780 / 9179-MHC)
- Bull Escala M7-715 (Power 780 / 9179-MHD)

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

## Hardware

November 2012

BULL CEDOC  
357 AVENUE PATTON  
B.P.20845  
49008 ANGERS CEDEX 01  
FRANCE

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**86 A1 25FK 01**

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

### Laser safety information

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

#### Laser compliance

The 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 provided power cord. Do not use the 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.

(D005a)

## DANGER



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

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



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

#### CAUTION

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

(R001)

**CAUTION:**

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

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

(R002)

(L001)



(L002)



(L003)



or



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

**CAUTION:**

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

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

(C026)

**CAUTION:**

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

**CAUTION:**

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

**CAUTION:**

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

**CAUTION:**

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

*Do Not:*

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

Exchange only with the approved part. Recycle or discard the battery as instructed by local regulations. (C003a)

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

The following comments apply to the 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.

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## Service information for the 58/88 or ED/R1 PCIe storage enclosure

This topic provides service information for the 58/88 or ED/R1 PCIe storage enclosure.

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### 58/88 or ED/R1 PCIe storage enclosure service overview

Find information to help you service the 58/88 or ED/R1 PCIe storage enclosure.



The (feature code 58/88 and ED/R1), are 19 inch, rack-mountable 1.8-inch solid-state drive (SSD) optimized PCIe storage enclosures. They attach to supported POWER7<sup>®</sup> servers by using PCI Express generation 2 (PCIe) adapters and cables. The 58/88 or ED/R1 PCIe storage enclosure include the following components:

- Redundant power supplies
- Fans
- Two large cache SAS RAID controllers along with redundant SAS port expanders
- Up to 30 1.8 inch dual ported SAS SSDs

The 58/88 and ED/R1 PCIe storage enclosures contain two redundant enclosure RAID modules (ERMs), which contain a SAS RAID controller, a SAS port expander, and a replaceable fan assembly. Two power supplies provide an N+1 redundant feature that allows one supply to power the entire box if the other is failed or missing.

- The two power supplies have built in fans.
- Fan speed is automatically adjusted as needed to ensure proper enclosure cooling temperatures even when there is a fan failure.

The SAS RAID controllers are always configured in a dual controller (dual storage IOA) configuration. This configuration provides redundant access paths to the SAS devices and mirrored copies of cache data and parity update footprints. The dual controller configuration also allows for increased performance capability when multiple RAID arrays are used in an Active/Active configuration. The SAS RAID controllers support RAID 0, 10, 5, and 6 and hot spare.

The 58/88 or ED/R1 PCIe storage enclosure is a one EIA unit (1U) drawer that mounts in a 19-inch rack. It is designed for light path service with light-emitting diode (LED) indicators on the front and rear of the enclosure chassis. These chassis LED indicators provide status and fault information for:

- Enclosure identification
- Enclosure power
- Enclosure fans
- ERMs
- Enclosure faults
- SSD activity and SSD fault or identification

The PCIe storage enclosure is designed for front and rear service in place (no service position) except for the midplane FRU replacement.

## Introduction to the PCIe storage enclosure infrastructure

Learn how the 58/88 or ED/R1 PCIe storage enclosure is different from previous storage enclosures.

With other IBM® SAS storage enclosure models, connecting disk drives was accomplished by using individual components externally connected to each other:

- Storage enclosures
- Disk drive controllers
- SAS cables for multiple paths to devices and dedicated adapter to adapter connections.

Figure 1 shows an example of a dual storage I/O adapter (IOA) solution by using externally connected components.

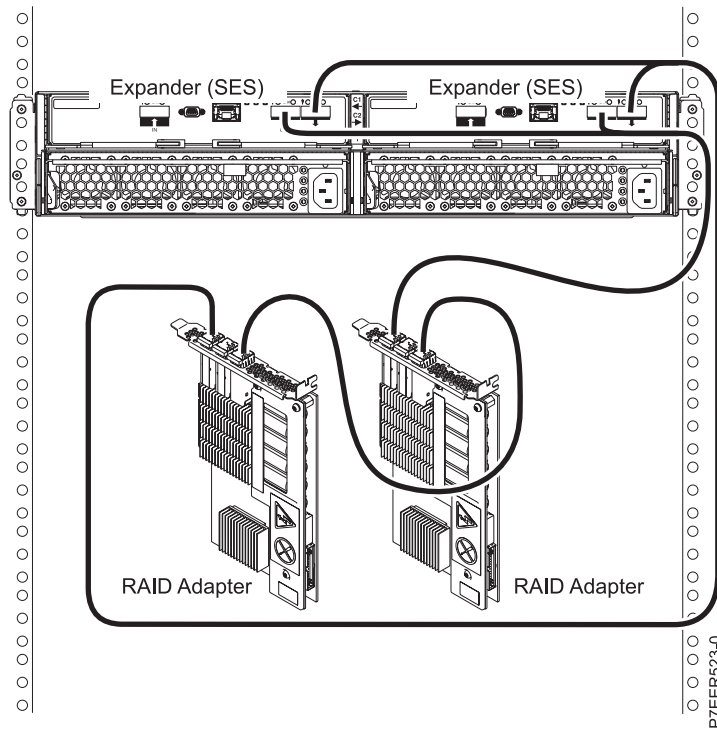


Figure 1. Dual storage IOA solution by using externally connected components

With the 58/88 or ED/R1 PCIe storage enclosures, all of the necessary components are integrated within the storage enclosure.

Figure 2 on page 3 shows a dual storage IOA solution integrated within the 58/88 or ED/R1 PCIe storage enclosure.

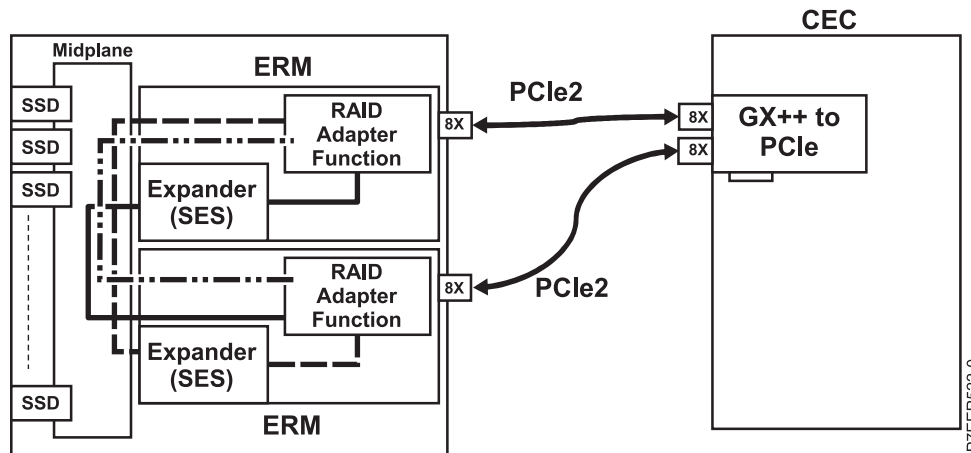


Figure 2. Dual storage IOA solution integrated within the 58/88 or ED/R1 PCIe storage enclosure.

The following components and functions are integrated within the 58/88 or ED/R1 PCIe storage enclosure:

- The enclosure RAID module (ERM) contains the RAID adapter function and the expander function.
- The storage enclosure uses internal wiring to connect components with multiple redundant paths, eliminating the need for external SAS cables.
- Increased number of 1.5-inch solid-state drives (SSDs) (up to 30).

## PCIe storage enclosure features

This table shows the main features of the 58/88 and ED/R1 PCI Express (PCIe) storage enclosures.

Table 1. PCIe storage enclosure features

Feature code	58/88	ED/R1
Description	IBM EXP30 Ultra solid-state drive (SSD) I/O drawer	IBM EXP30 Ultra solid-state drive (SSD) I/O drawer
System connection	x8	x8
Systems supported	31E/2B, 31E/1C, or 31E/2C, 02E/4C, 05E/6C	31E/2B, 31E/1C, or 31E/2C, 02E/4C, 05E/6C
Operating systems supported <sup>1</sup>	AIX®, Linux	AIX, Linux
High availability (HA) two-system redundant array of independent disks (RAID)	Yes	Yes
HA single-system RAID	Yes	Yes
Requires HA RAID configuration	Yes	Yes
JBOD drives supported	No (requires drives formatted 528 bytes/block)	No (requires drives formatted 528 bytes/block)
Internal SSD drive type	1.8-inch small form factor (SFF) 6 GB Dual Ported serial-attached SCSI (SAS) SSD	1.8-inch small form factor (SFF) 6 GB Dual Ported serial-attached SCSI (SAS) SSD
SSD drive feature codes supported	ES02	ES02
Internal SSD drives	Six minimum to 30 maximum	Six minimum to 30 maximum
External HDD drives	None	48 maximum

Table 1. PCIe storage enclosure features (continued)

Feature code	58/88	ED/R1
External SAS enclosures	None	Two 58/87 disk drive enclosures maximum
Drive redundant SAS paths	Two paths from each enclosure RAID module (ERM) (one path through each SAS expander)	Two paths from each enclosure RAID module (ERM) (one path through each SAS expander)
Drive concurrent maintenance	Yes	Yes
Enclosure RAID Module (ERM)	3.1-GB cache RAID SAS enclosure 6 GB x8	3.1-GB cache RAID SAS enclosure 6 GB x8
ERM custom card identification number (CCIN)	57C3	57C3
ERM RAID levels	RAID 0, 5, 6, 10 with hot spare for 5, 6, 10	RAID 0, 5, 6, 10 with hot spare for 5, 6, 10
ERM write cache size	3.1 GB	3.1 GB
ERM external SAS links	None	Two mini SAS HD 4x connectors that contain three physical links each
ERM concurrent maintenance	No	Yes
ERM fan assembly	Two redundant fans per ERM	Two redundant fans per ERM
ERM fan concurrent maintenance	No	Yes
Redundant power supplies	Two	Two
Power supply concurrent maintenance	Yes	Yes
<b>Note:</b> <sup>1</sup> See PCI adapter information by feature type for the 31E/2B, 31E/1C, or 31E/2C		

## Cabling the PCIe storage enclosure

Use this information as a guide for cabling your storage enclosure.

### Cabling the 58/88 PCIe storage enclosure to a 31E/1C or 31E/2C system

Use this as a guide for cabling your PCIe storage enclosure to a 31E/1C or 31E/2C system.

Figure 3 on page 5 shows an example of connecting a 58/88 PCIe storage enclosure to a 31E/1C or 31E/2C system using two FC EJ0H GX adapters.



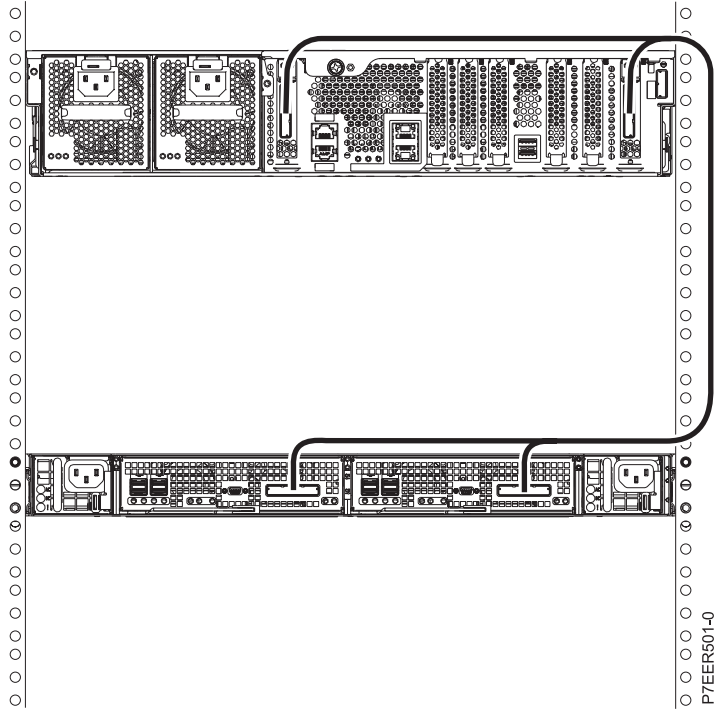


Figure 3. One 58/88 PCIe storage enclosure connected to a 31E/1C or 31E/2C system using two FC EJ0H GX adapters

Figure 4 on page 6 shows one 58/88 PCIe storage enclosure connected to two 31E/1C or 31E/2C systems using two FC EJ0H GX adapters.

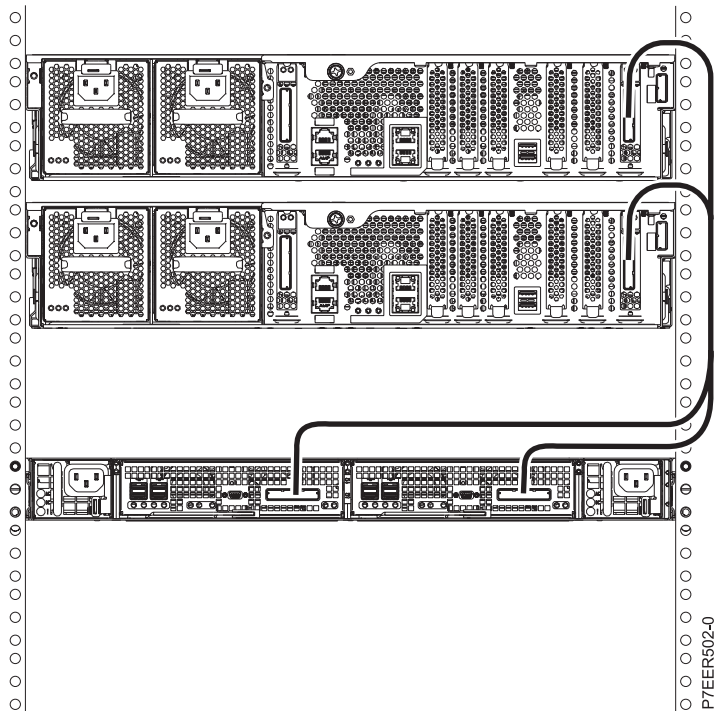


Figure 4. One 58/88 PCIe storage enclosure connected to two 31E/1C or 31E/2C systems using two FC EJ0H GX adapters

Figure 5 shows two 58/88 PCIe storage enclosures connected to two 31E/1C or 31E/2C systems using four FC EJ0H GX adapters.

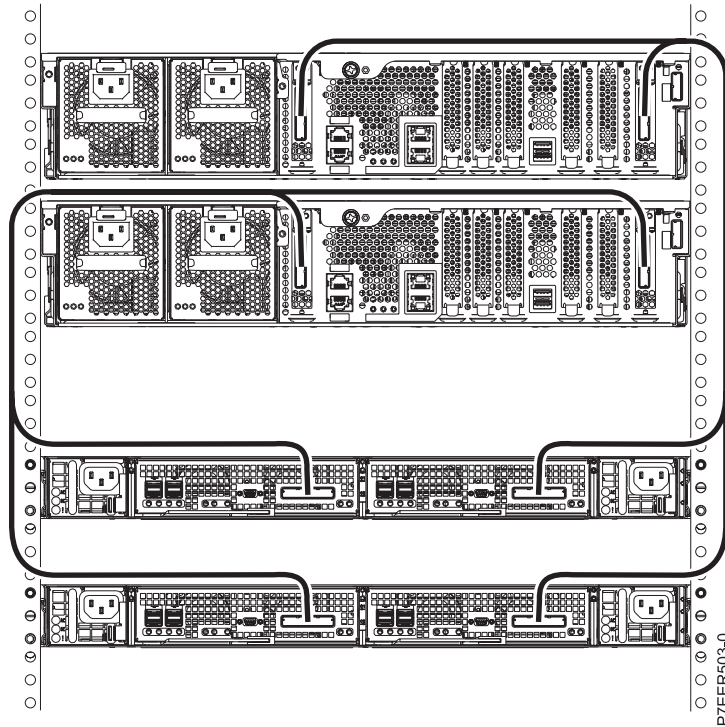


Figure 5. Two 58/88 PCIe storage enclosures connected to two 31E/1C or 31E/2C systems using four FC EJ0H GX adapters

## Cabling the 58/88 PCIe storage enclosure to a 02E/4C or 05E/6C system

Use this reference information as a guide for cabling your PCIe storage enclosure to a 02E/4C or 05E/6C system.

Figure 6 on page 7 shows one 58/88 PCIe storage enclosure connected to a single 02E/4C or 05E/6C system by using one FC EJ03 GX adapter.

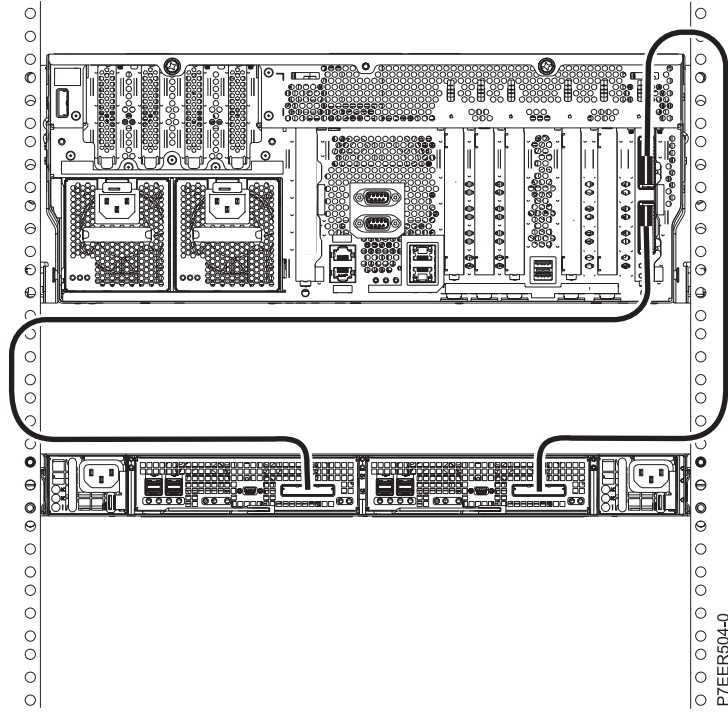


Figure 6. One 58/88 PCIe storage enclosure connected to a single 02E/4C or 05E/6C system by using one FC EJ03 GX adapter

Figure 7 on page 8 shows one 58/88 PCIe storage enclosure connected to a 02E/4C or 05E/6C system by using two FC EJ03 GX adapters.

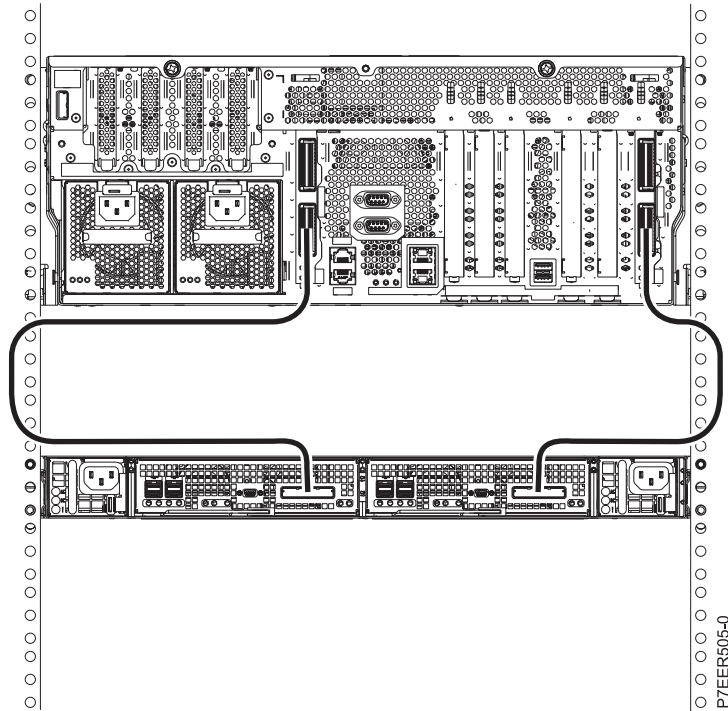


Figure 7. One 58/88 PCIe storage enclosure connected to a single 02E/4C or 05E/6C system by using two FC EJ03 GX adapters

Figure 8 shows two 58/88 PCIe storage enclosures connected to a single 02E/4C or 05E/6C system by using two FC EJ03 GX adapters.

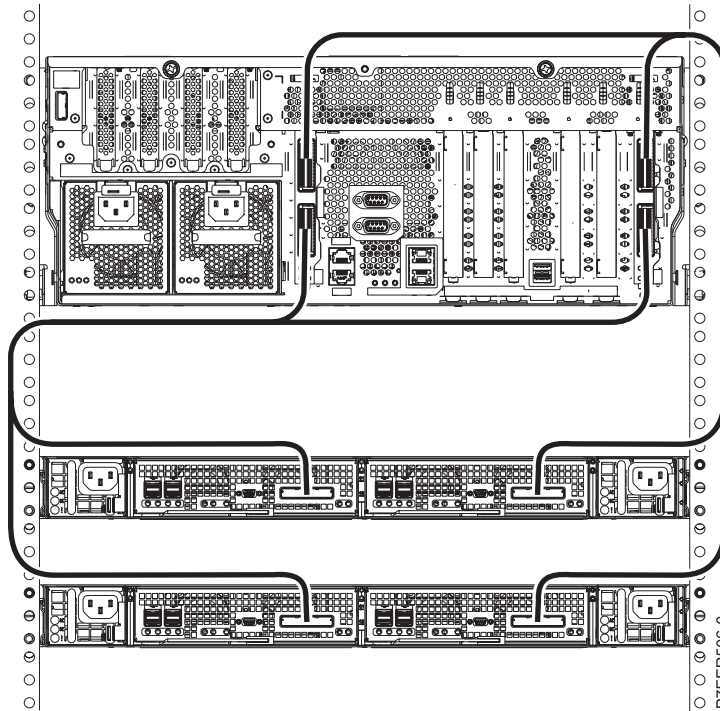


Figure 8. Two 58/88 PCIe storage enclosures connected to a single 02E/4C or 05E/6C system by using two FC EJ03 GX adapters.

Figure 9 on page 9 shows one 58/88 PCIe storage enclosure connected to two 02E/4C or 05E/6C systems by using two FC EJ03 GX adapters.

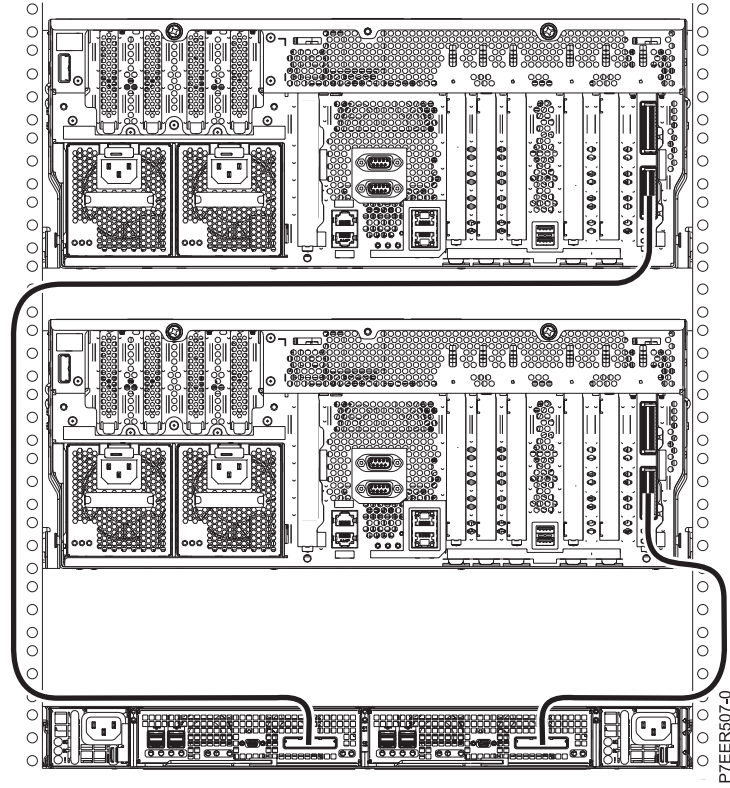


Figure 9. One 58/88 PCIe storage enclosure connected to two 02E/4C or 05E/6C systems by using two FC EJ03 GX adapters.

Figure 10 on page 10 shows two 58/88 PCIe storage enclosures connected to two 02E/4C or 05E/6C systems by using two FC EJ03 GX adapters.

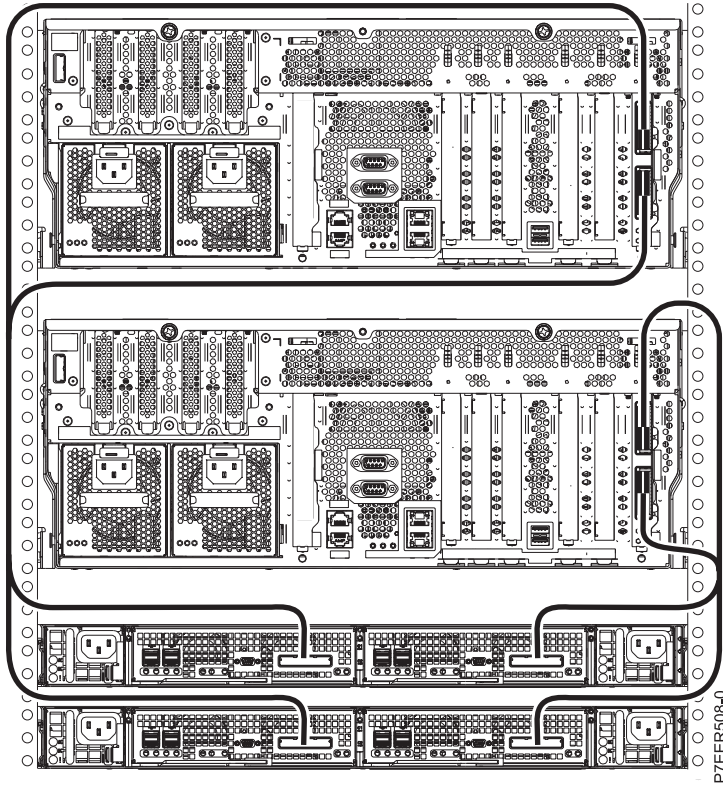


Figure 10. Two 58/88 PCIe storage enclosures connected to two 02E/4C or 05E/6C systems by using two FC EJ03 GX adapters.

Figure 11 on page 11 shows four 58/88 PCIe storage enclosures connected to two 02E/4C or 05E/6C systems by using four FC EJ03 GX adapters.

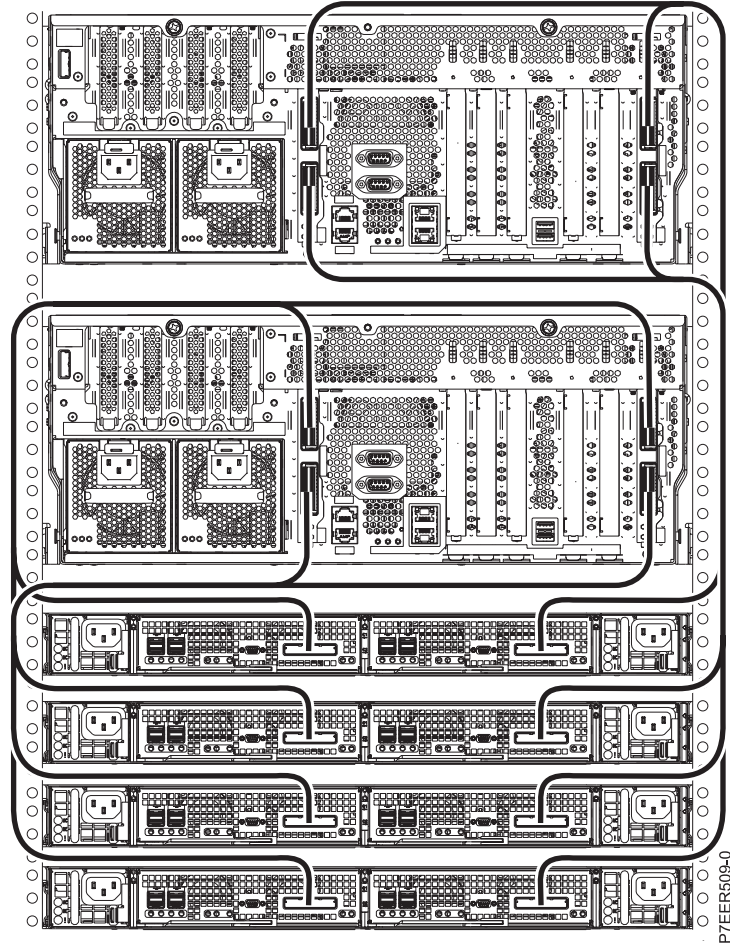


Figure 11. Four 58/88 PCIe storage enclosures connected to two 02E/4C or 05E/6C systems by using four FC EJ03 GX adapters.

## Cabling the ED/R1 PCIe storage enclosure to a 17M/MD or 79M/HD system

Use this reference information as a guide for cabling your PCIe storage enclosure to a 17M/MD or 79M/HD system.

Figure 12 on page 12 shows one ED/R1 PCIe storage enclosure connected to a single 17M/MD or 79M/HD system by using one FC 1914 GX adapter.

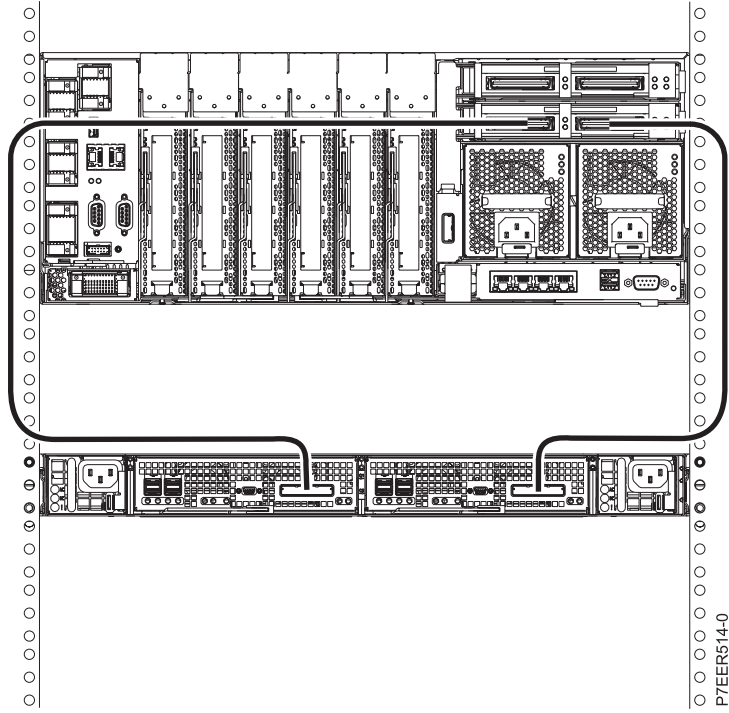


Figure 12. One ED/R1 PCIe storage enclosure connected to a single 17M/MD or 79M/HD system by using one FC 1914 GX adapter

Figure 13 on page 13 shows one ED/R1 PCIe storage enclosure connected to a 17M/MD or 79M/HD system by using two FC 1914 GX adapters.

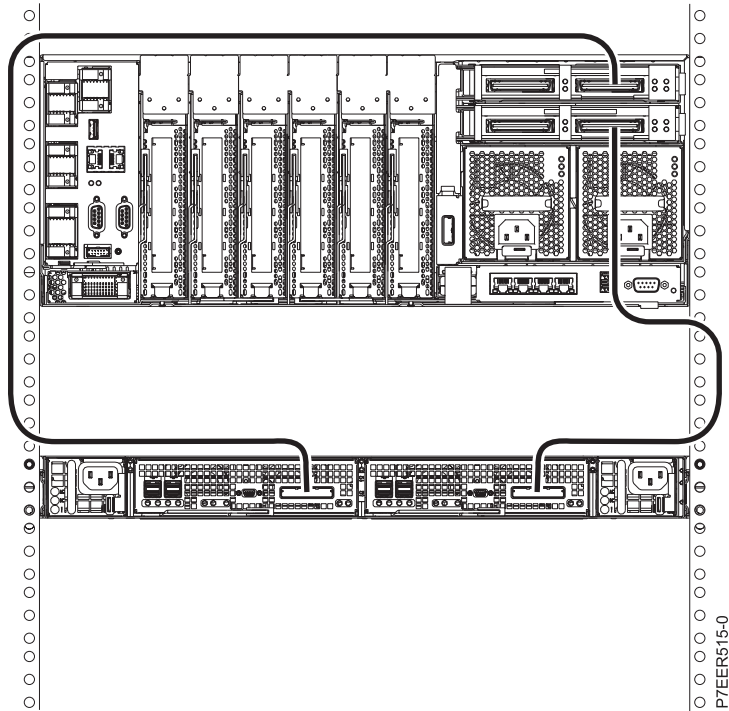




Figure 13. One ED/R1 PCIe storage enclosure connected to a single 17M/MD or 79M/HD system by using two FC 1914 GX adapters

Figure 14 shows two ED/R1 PCIe storage enclosures connected to a single 17M/MD or 79M/HD system by using two FC 1914 GX adapters.

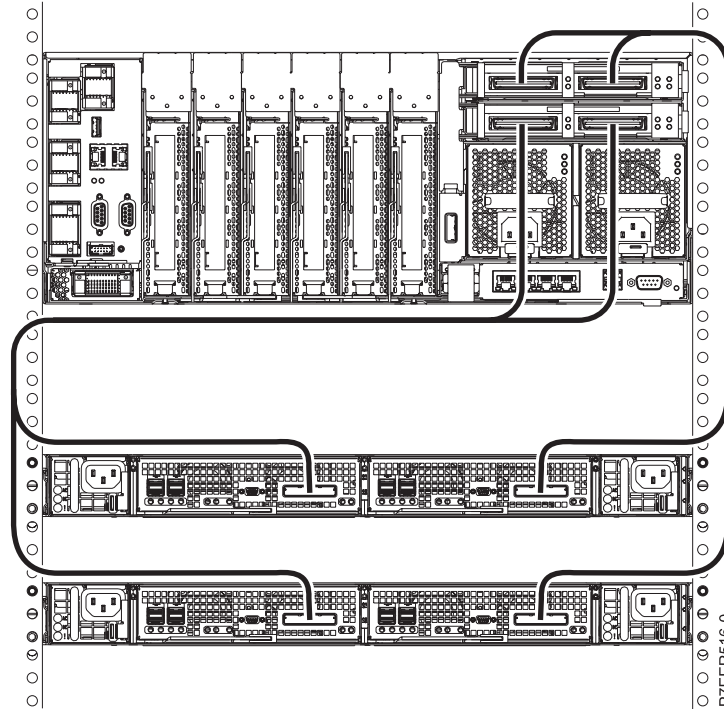


Figure 14. Two ED/R1 PCIe storage enclosures connected to a single 17M/MD or 79M/HD system by using two FC 1914 GX adapters.

Figure 15 on page 14 shows one ED/R1 PCIe storage enclosure connected to two 17M/MD or 79M/HD systems by using two FC 1914 GX adapters.

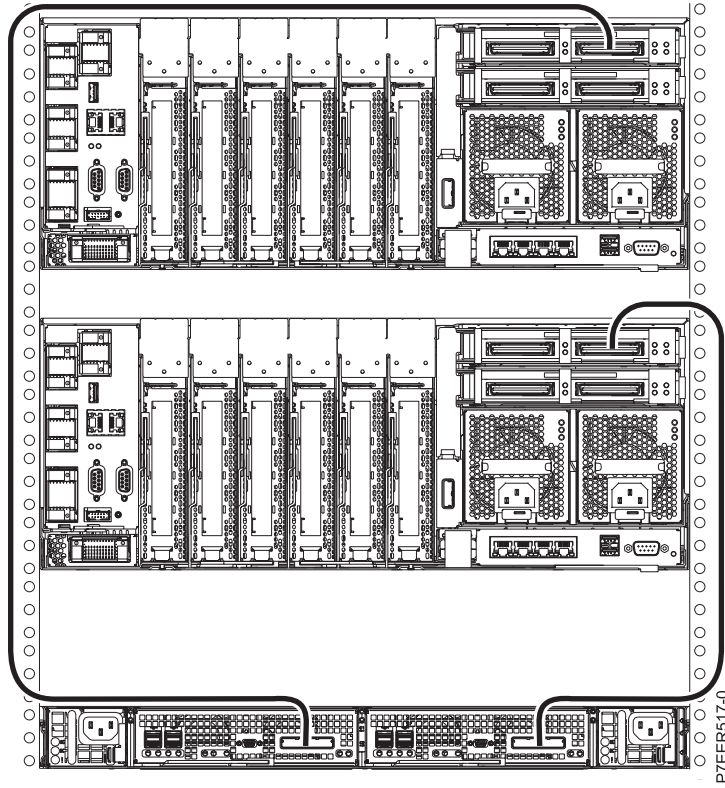


Figure 15. One ED/R1 PCIe storage enclosure connected to two 17M/MD or 79M/HD systems by using two FC 1914 GX adapters.

Figure 16 on page 15 shows two ED/R1 PCIe storage enclosures connected to two 17M/MD or 79M/HD systems by using two FC 1914 GX adapters.

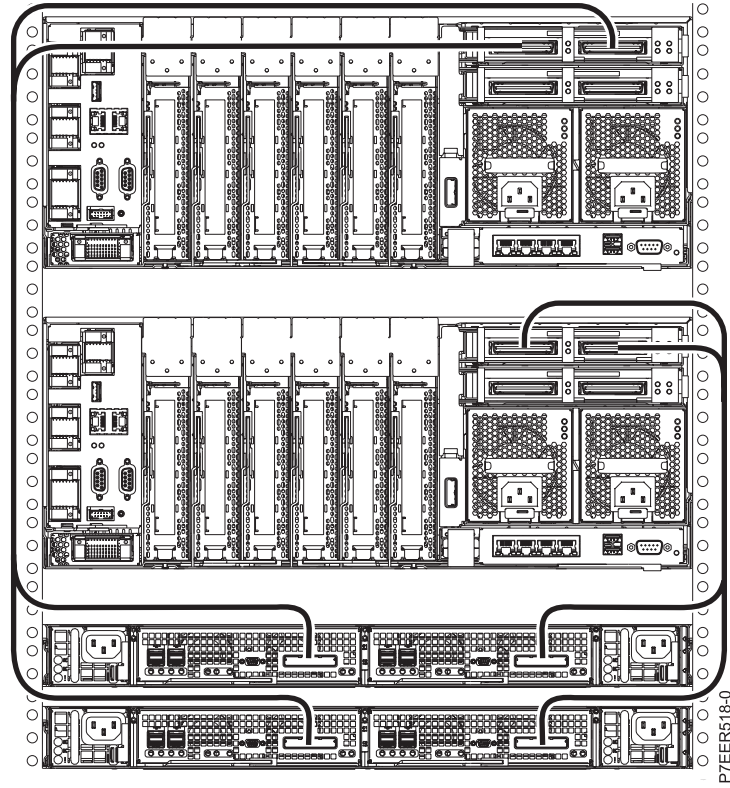


Figure 16. Two ED/R1 PCIe storage enclosures connected to two 17M/MD or 79M/HD systems by using two FC 1914 GX adapters.

Figure 17 on page 16 shows four ED/R1 PCIe storage enclosures connected to two 17M/MD or 79M/HD systems by using four FC 1914 GX adapters.

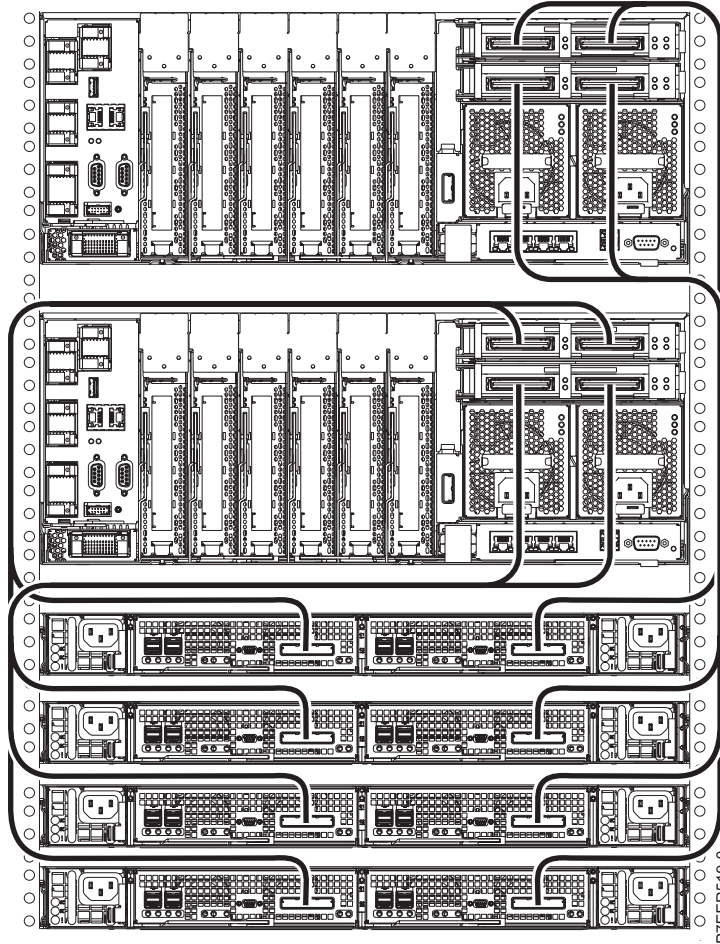


Figure 17. Four ED/R1 PCIe storage enclosures connected to two 17M/MD or 79M/HD systems by using four FC 1914 GX adapters.

## Cabling the 58/87 disk drive enclosure to an ED/R1 PCIe storage enclosure

Use this reference information as a guide for cabling your disk drive enclosure to your PCIe storage enclosure.

Figure 18 on page 17 shows one 58/87 disk drive enclosure connected to one ED/R1 PCIe storage enclosure.

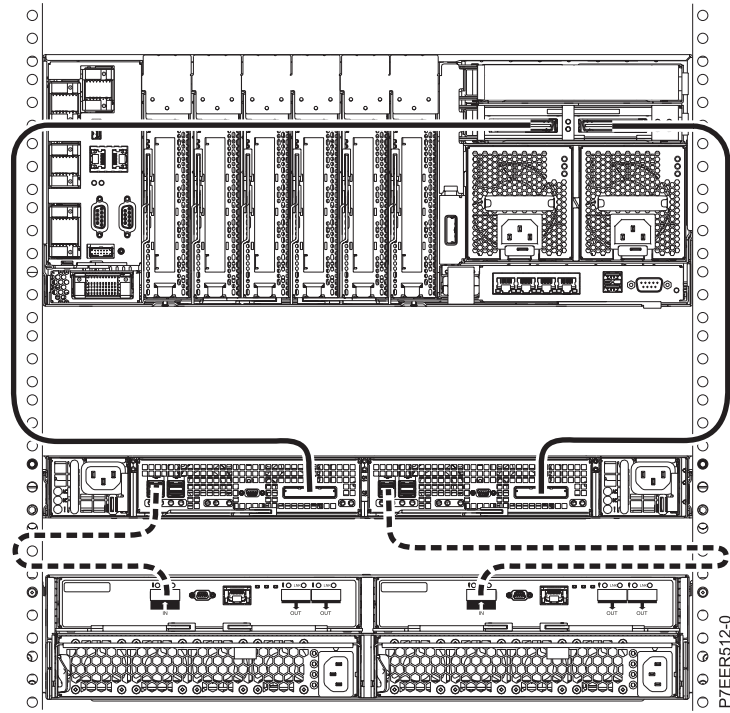


Figure 18. One 58/87 disk drive enclosure connected to a single ED/R1 PCIe storage enclosure.

Figure 19 on page 18 shows four 58/87 disk drive enclosures connected to two ED/R1 PCIe storage enclosures.

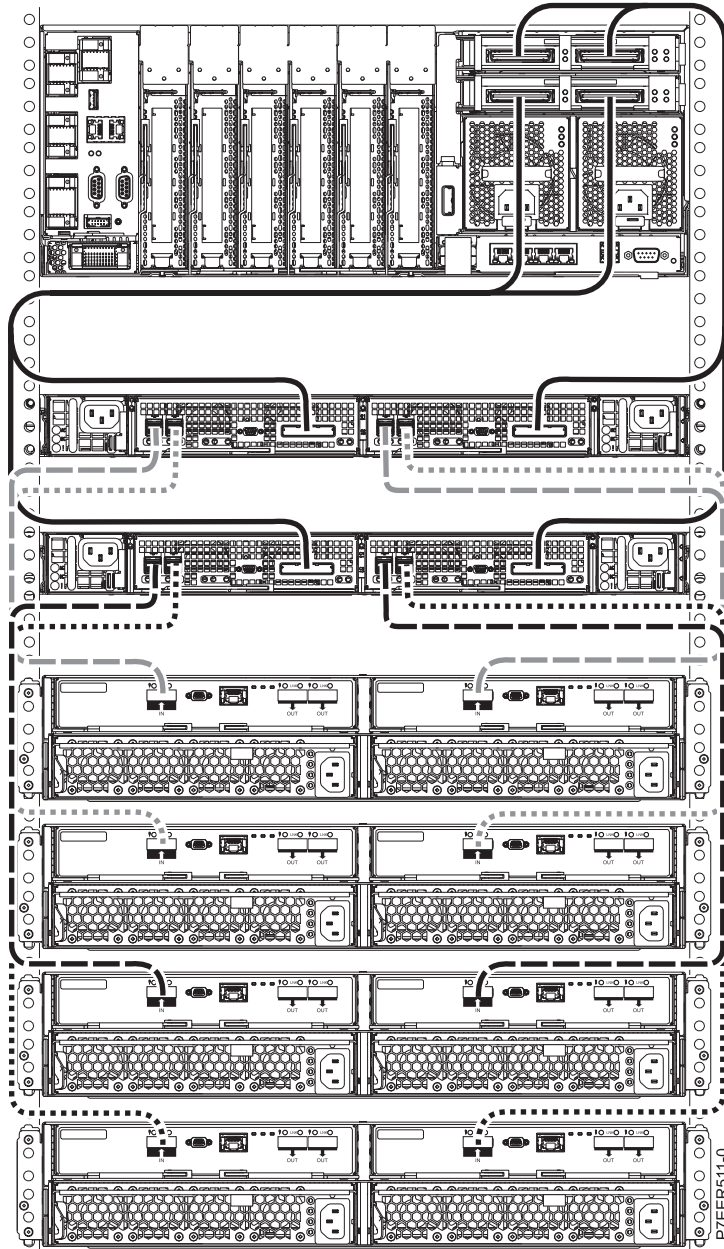


Figure 19. Four 58/87 disk drive enclosures connected to two ED/R1 PCIe storage enclosures

## Overview of problem determination

The error log analysis is performed on errors presented by the components in the 58/88 or ED/R1 PCIe storage enclosure and recommends actions that need to be performed to correct the errors. Sometimes it refers you to an isolation procedure to further determine what actions can be taken to resolve the problem.

The isolation procedures might refer you to service documentation for an external expansion drawer. The information in this topic can be used in those situations.

## LED usage for the 58/88 or ED/R1 PCIe storage enclosure

The components inside the 58/88 or ED/R1 PCIe storage enclosure can be identified by their physical location code. In addition to the location code, most components have an identify light-emitting diode (LED) that can be activated.

For an overview of using location codes, see 58/88 or ED/R1 PCIe storage enclosure.

For details on the 58/88 or ED/R1 locations, see 58/88 or ED/R1 storage enclosure locations.

The identify indicator LEDs can be accessed from the following locations:

- Hardware Management Console (HMC): Select **Operations** > **LED Status** > **Identify LED**
- AIX diagnostics: `diag > Task Selection > Identify and Attention Indicators`
- Linux: `/usr/sbin/usysident -s identify -l<location code>`
- Advanced System Management Interface: Select **System Configuration** > **Service Indicators or Indicators by Location Code**

## RAID controller location code

The RAID controllers are embedded on the enclosure RAID module (ERM) card and connect to the system by using a PCIe cable. All PCIe bus attached I/O controllers or adapters on Power systems inherit the location code of the I/O slot to which they connect.

The location code of an I/O slot generally is based on the enclosure in which the nearest upstream PCI bridge resides. This is normally a PCI slot, but for a RAID controller in an ERM, it is where the PCIe cable is connected on the GX adapter in the system unit. Therefore, the logical PCIe slot location code for the RAID controller is associated with the PCIe cable connector location on the GX adapter in the system. This logical location code represents the fact that the associated RAID controller resource (the L1 indicator below) is what connects to the connector, not the connector itself.

The logical PCIe slot location of the RAID controller in an ERM appears in the following form:

**Utttt.mmm.ssssss-Pw-Cx-Ty-L1 (-T1)**, where:

- Utttt.mmm.ssssss is the type-model-serial number of the system CEC enclosure in which the GX adapter resides
- Pw is the planar in the system CEC enclosure into which the GX adapter plugs
- Cx is the slot on the planar into which the GX adapter plugs
- Ty is the PCIe connector on the GX adapter
- L1 is the logical RAID controller indicator
- T1 might be appended after L1 in some cases, but can be ignored

Note that the slot location code described above will be used to call out failures isolated to the RAID controller or PCIe hardware in the 58/88 or ED/R1 PCIe storage enclosure. The physical path location code of the ERM card will be used to call out failures isolated to other components on the ERM card, such as the SAS expander or SAS enclosure services (SES) device.

## Determine the ERM location from the RAID controller location

You will need to use the RAID controller logical location code to determine the enclosure RAID module (ERM) physical location.

### Determining the ERM location from the RAID controller location when using AIX:

Learn how to use AIX to determine the physical location of the RAID controller on the enclosure RAID module (ERM) when you have the RAID controller logical location code.

Use one of the following options to determine the RAID controller physical location:

- “Use the adapter VPD information”
- “Find the port of the GX adapter”
- “Use the operating system tools”

### Use the adapter VPD information

You can display the adapter vital product data (VPD) to determine whether the FRU label field contains a location. In some instances, this field might be blank and one of the other options will need to be used to determine the ERM physical location.

As an example, to find the physical location for RAID controller `sisas2` resource, you would follow this procedure.

1. Use the AIX `lscfg` command to display the VPD of the RAID controller:

```
lscfg -v1 sissas2
```

Information similar to the following is displayed:

```
sisas2          U78AA.001.WZSGAHJ-P1-C1-T2-L1-T1  PCIe2 3.6GB Cache RAID SAS Enclosure 6Gb
```

```
PCIe2 3.1GB Cache RAID SAS Enclosure 6Gb x8 :
```

```
Part Number.....00J0587
FRU Number.....00J0586
Serial Number.....YL30BG19P023
Manufacture ID.....00BG
EC Level.....0
ROM Level.(alterable).....03500019
Customer Card ID Number.....57C3
Product Specific.(Z1).....5
Product Specific.(Z2).....2D24
Feature Code/Marketing ID...5888-001
Machine/Cabinet Serial No...G1AM00E
FRU Label.....P1-C1-T3
Hardware Location Code.....U78AA.001.WZSGAHJ-P1-C1-T2-L1-T1
```

2. Find the FRU label field in the controller VPD which is the ERM physical location code within the feature code and machine/cabinet shown.

### Find the port of the GX adapter

Find the port off the GX adapter in the system unit identified by the RAID controller logical location code (the `-Ty` in the example `Utttt.mmm.ssssss-Pw-Cx-Ty-L1(-T1)`.) Trace the cable from that port to the PCIe storage enclosure to identify the physical ERM. You can also use the Advanced System Management Interface to identify the light-emitting diode (LED) for the ERM.

### Use the operating system tools

Use the operating system tools to find the SAS enclosure service (SES) resource that has the same serial number as the RAID controller. After the matching SES is found, the Hardware Location Code in the SES VPD is the ERM physical location code corresponding to the RAID Controller.

Use the following steps to find the physical location for RAID Controller resource to be replaced (`sisas2` in this example.)

1. Use the AIX `sisasraidmgr` command to find all the SES resources connected to the specified RAID Controller.

```
# sissasraidmgr -l1 sissas2 -j3
```



Information similar to the following is displayed:

```

-----
Name      Resource State      Description                               Size
-----
sissas2   FEFFFFFF Secondary PCIe2 3.6GB Cache RAID SAS Enclosure 6Gb
sissas1   FEFFFFFF HA Linked Remote adapter SN 0019P00J

pdisk0    000000FF RWProtected SSD Array Candidate           N/A
pdisk1    000006FF RWProtected SSD Array Candidate           N/A
pdisk2    000007FF RWProtected SSD Array Candidate           N/A
pdisk4    000009FF RWProtected SSD Array Candidate           N/A
pdisk3    000008FF Active      SSD Array Candidate           N/A
pdisk5    00000AFF Active      SSD Array Candidate           N/A
pdisk6    00000BFF Active      SSD Array Candidate           N/A

ses3      00002CFF Available SAS Enclosure Service           N/A
ses2      00042CFF Available SAS Enclosure Service           N/A
tmcscli1  FB0000FF Available SAS I/O Controller In         N/A

```

- Use the AIX **lscfg** command to find the serial number of the RAID Controller.

```
lscfg -vl sissas2
```

Information similar to the following is displayed:

```

sissas2      U78AA.001.WZSGAHJ-P1-C1-T2-L1-T1  PCIe2 3.6GB Cache RAID SAS Enclosure 6Gb

PCIe2 3.1GB Cache RAID SAS Enclosure 6Gb x8 :
Part Number.....00J0587
FRU Number.....00J0586
Serial Number.....YL30BG19P023
Manufacture ID.....00BG
EC Level.....0
ROM Level.(alterable).....03500019
Customer Card ID Number....57C3
Product Specific.(Z1).....5
Product Specific.(Z2).....2D24
Feature Code/Marketing ID...
Machine/Cabinet Serial No...
FRU Label.....
Hardware Location Code.....U78AA.001.WZSGAHJ-P1-C1-T2-L1-T1

```

- Use the AIX **lscfg** command to find which SES serial number matches the RAID controller serial number.

```
lscfg -vl ses3
```

Information similar to the following is displayed:

```

ses3          U5888.001.G1AM00E-P1-C1  SAS Enclosure Services Device

SAS Expander:
FRU Number.....00J0383
Serial Number.....YL30BG19P023
Customer Card ID Number....57C3
ROM Level.(alterable).....66r5
Hardware Location Code.....U5888.001.G1AM00E-P1-C1

```

- Use the hardware location code in the matching SES to identify the physical location of the RAID controller.

## Determining the ERM location from the RAID controller location when using Linux:

Learn how to use Linux to determine the physical location of the RAID controller on the enclosure RAID module (ERM) when you have the RAID controller logical location code.

Use one of the following options to determine the RAID controller physical location:

- “Find the port of the GX adapter”
- “Use the operating system tools”

### Find the port of the GX adapter

Find the port off the GX adapter in the system unit identified by the RAID controller logical location code (the -Ty in the example Uttt.mmm.ssssss-Pw-Cx-Ty-L1(-T1).) Trace the cable from that port to the PCIe storage enclosure to identify the physical ERM. You can also use the Advanced System Management Interface to identify the light-emitting diode (LED) for the ERM.

### Use the operating system tools

Use the operating system tools to find the SAS enclosure service (SES) resource that has the same serial number as the RAID controller. After the matching SES is found, the Hardware Location Code in the SES VPD is the ERM physical location code corresponding to the RAID Controller.

Use the following steps to find the physical location for RAID Controller resource to be replaced.

1. Type **iprconfig** on the command line of the Linux session and press Enter. The IBM Power® RAID Configuration Utility display is shown.
2. Select **Work with disk unit recovery** from the IBM Power RAID Configuration Utility display. Press Enter.
3. Select **Work with disk enclosures** from the Work with Disk Unit Recovery display. Press Enter. Information similar to the following is displayed for screen 1:

Work with disk enclosures

Type options, press Enter

- 1=Display disk enclosure details
- 2=Suspend disk enclosure path
- 3=Resume disk enclosure path

OPT Name	PCI/Host/Resource Path	Serial Number	Status
sg21	0000:01:00.0/1	YL10BG21700X	Operational
sg10	0000:01:00.0/1/00-04-2C	YL10BG21G004	Active
sg9	0000:01:00.0/1/00-00-2C	YL10BG21700X	Active
sg42	0001:01:00.0/2	YL10BG21G004	Operational
sg22	0001:01:00.0/2/00-00-2C	YL10BG21G004	Active
sg23	0001:01:00.0/2/00-04-2C	YL10BG21700X	Active

e=Exit q=Cancel t=Toggle

4. Type **t** to toggle to the next screen.

Information similar to the following is displayed for screen 2:

## Work with disk enclosures

Type options, press Enter

1=Display disk enclosure details

2=Suspend disk enclosure path

3=Resume disk enclosure path

OPT Name	Physical Location	Production ID	Status
sg21	U2C4B.001.DBJ8855-P1-C3-T2-L1	57C3001SISI0A	Operational
sg10	U5888.001.G227005-P1-C2	5888	Active
sg9	U5888.001.G227005-P1-C1	5888	Active
sg42	U2C4B.001.DBJ8855-P1-C3-T1-L1	57C3001SISI0A	Operational
sg22	U5888.001.G227005-P1-C2	5888	Active
sg23	U5888.001.G227005-P1-C1	5888	Active

e=Exit q=Cancel t=Toggle

5. Use screen 1 to find the serial number of the RAID controller.
6. Use screen 1 to find which SES serial number matches the serial number of the RAID controller. (There are two SES entries under each RAID controller.)
7. Use the matching SES in screen 1 to find out the physical location of the RAID controller in screen 2.

## Updating microcode for PCIe storage enclosure components

The 58/88 or ED/R1 PCIe storage enclosure have hardware components that require microcode updates.

The following hardware components can be updated concurrently:

- The solid-state drives (SSD) of the SSD assemblies
- The SAS expander of the enclosure RAID module (ERM)
- The PCIe RAID adapter of the ERM

To update the microcode for the PCIe storage enclosure hardware components, see Updating the SAS RAID controller microcode.

## FRUs for the 58/88 or ED/R1 PCIe storage enclosure

The following parts of the IBM EXP 30 Ultra I/O Drawer are field replaceable units (FRUs). Most of these parts are concurrently maintainable.

The FRUs include:

- Solid state drive (SSD) assembly
- Enclosure RAID module (ERM)
- ERM fan assembly
- Midplane
- Power supply (PSU)

Use Table 2 on page 24 to find links to specific information about the PCIe storage enclosure you are working on.

Table 2. Detailed links for PCIe storage enclosures

Details	58/88 or ED/R1 PCIe storage enclosure
System parts	System parts
Part locations and location codes	Locations
Device addresses	Device addresses
FRU removal and replacement procedures	58/88 PCIe storage enclosure removal and replacement procedures, ED/R1 PCIe storage enclosure removal and replacement procedures
Connector locations	58/88 connector locations, ED/R1 connector locations

## Identifying a 58/88 or ED/R1 PCIe storage enclosure SAS fabric FRU

There are multiple isolation procedures associated with errors logged by the RAID controller in the enclosure RAID module (ERM) that are caused by a failing connection or component in the SAS fabric.

Follow the isolation procedures carefully and use this procedure only when directed to do so by the isolation procedure.

These isolation procedures might require reseating or replacing the ERM, mid-plane assembly, or device. Pay careful attention to the 58/88 or ED/R1 SAS resource location information when identifying the possible causes from the isolation procedure that sent you here. Also note that the isolation procedure might specify either that the RAID controller or disk drive are not likely the cause and therefore another possible component should be tried.

Use Table 3 to correlate a component described in the isolation procedure to the possible FRU in the 58/88 or ED/R1 PCIe storage enclosure that contains the component.

Table 3. Isolation procedure component with FRU name and location

Isolation procedure component	58/88 or ED/R1 FRU	58/88 or ED/R1 Location
SAS controller	Enclosure RAID module assembly	U5888.001.ssssss-P1-Cx
SAS cable	Enclosure RAID module assembly	U5888.001.ssssss-P1-Cx
Device enclosure	Mid-plane assembly	U5888.001.ssssss-P1
SAS expander	Enclosure RAID module assembly	U5888.001.ssssss-P1-Cx
Disk drive	Solid-state drive (SSD) assembly	U5888.001.ssssss-P1-Dx
<p><b>Note:</b> It is important to determine which of the redundant ERMs is the cause of a problem. To determine the ERM physical location to ensure that the correct physical components are identified. See "RAID controller location code" on page 19.</p>		

## Storage enclosure topology

Find information to help you locate components within the 58/88 or ED/R1 PCIe storage enclosure.

Figure 20 on page 25 shows the location of components within the 58/88 or ED/R1 PCIe storage enclosure.

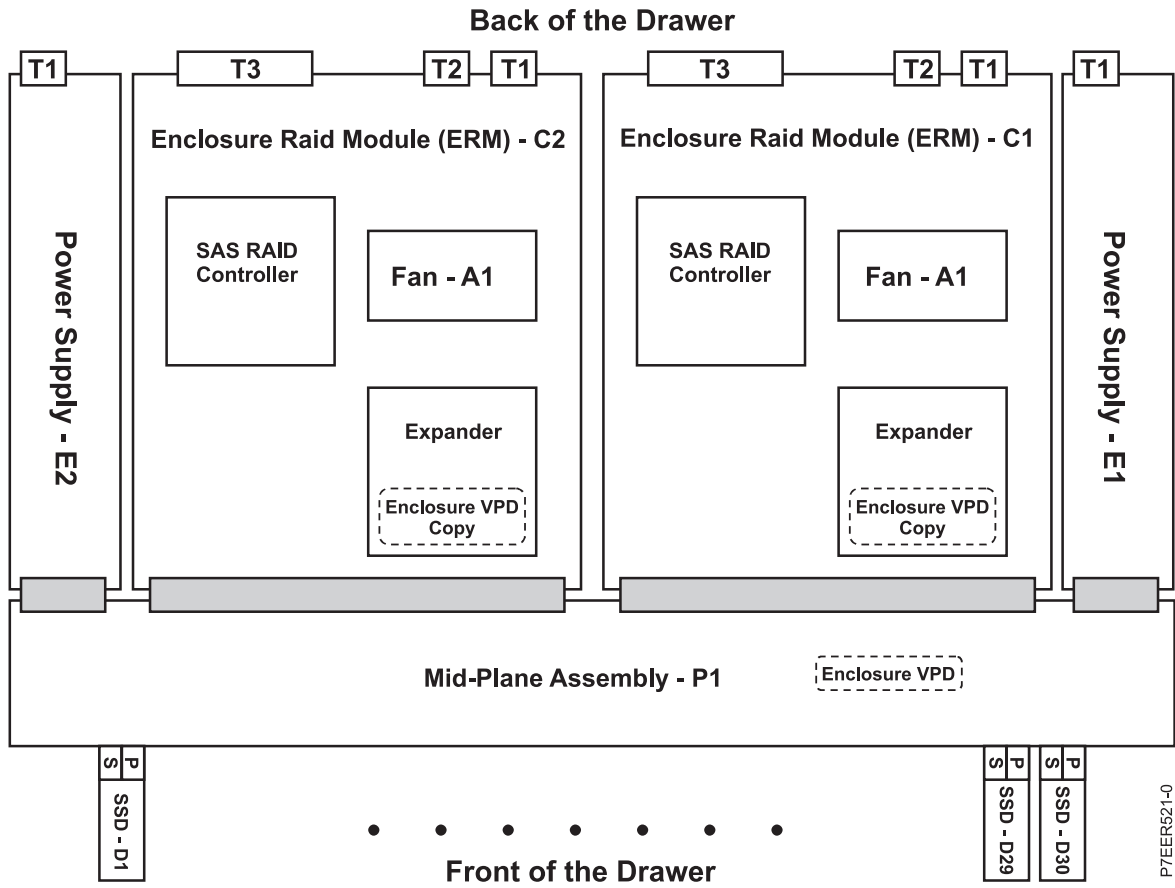
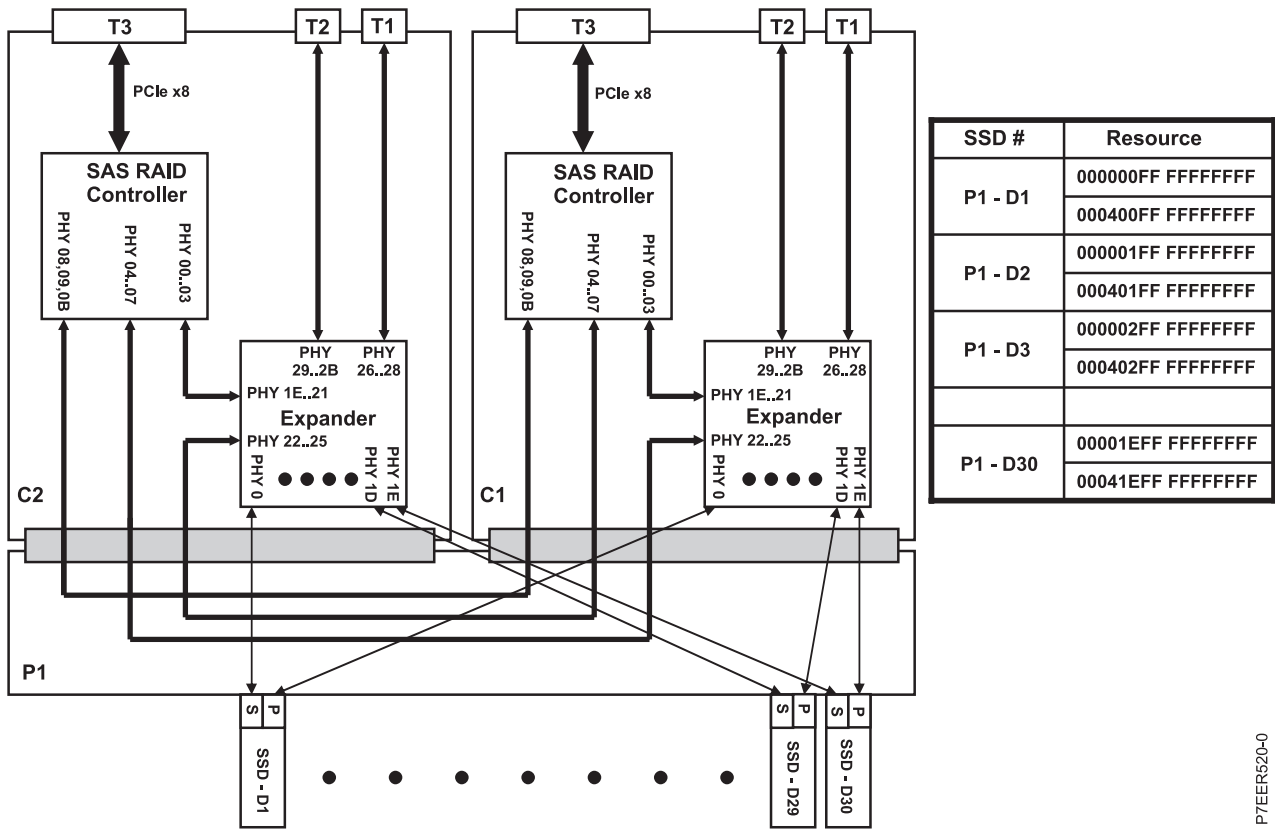


Figure 20. Component locations

Figure 21 on page 26 shows the SAS physical links (phys) of components within the 58/88 or ED/R1 PCIe storage enclosure.



P7EER520-0

Figure 21. SAS physical links

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## Electronic emission notices

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

## Class A Notices

The following Class A statements apply to the servers.

## 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.

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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 7032 15 2941  
email: lugi@de.ibm.com

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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

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高調波ガイドライン準用品

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**声 明**

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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.

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**警告使用者：**

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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。

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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.

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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 7032 15 2941

email: lugi@de.ibm.com

Generelle Informationen:

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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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## VCCI Statement - Japan

この装置は、クラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。 VCCI-B

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

高調波ガイドライン適合品

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

高調波ガイドライン準用品

## Electromagnetic Interference (EMI) Statement - Korea

이 기기는 가정용(B급)으로 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

## Germany Compliance Statement

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

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

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.

### Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

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

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

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

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:  
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New Orchard Road  
Armonk, New York 10504  
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Der verantwortliche Ansprechpartner des Herstellers in der EU ist:  
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Technical Regulations, Abteilung M372  
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Generelle Informationen:

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

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