

SAS subsystem for the E1-700 or E3-700

ESCALA Power7



REFERENCE  
86 A1 05FG 06



# ESCALA Models Reference

The ESCALA Power7 publications concern the following models:

Bull Escala E1-700 / E3-700	(31E/2B ,8231-E2B)
Bull Escala E1-705	(31E/1C, 8231-E1C)
Bull Escala E1-715	(31E/1D, 8231-E1D)
Bull Escala E3-705	(31E/2C, 8231-E2C)
Bull Escala E3-715	(31E/2D, 8231-E2D)
Bull Escala E2-700 / E2-700T	(02E/4B, 8202-E4B)
Bull Escala E2-705 / E2-705T	(02E/4C, 8202-E4C)
Bull Escala E2-715 / E2-715T	(02E/4D, 8202-E4D)
Bull Escala E4-700 / E4-700T	(05F/6B, 8205-E6B)
Bull Escala E4-705	(05E/6C, 8205-E6C)
Bull Escala E4-715	(05E/6D, 8205-E6D)
Bull Escala E5-700	(33E/8B, 8233-E8B)
Bull Escala E5-715	(08E/8D, 8408-E8D)
Bull Escala M5-715	(09R/MD, 9109-RMD)
Bull Escala M6-700	(17M/MB, 9117-MMB)
Bull Escala M6-705	(17M/MC, 9117-MMC)
Bull Escala M6-715	(17M/MD, 9117-MMD)
Bull Escala M7-700	(79M/HB, 9179-MHB)
Bull Escala M7-705	(79M/HC, 9179-MHC)
Bull Escala M7-715	(79M/HD, 9179-MHD)
Bull Escala H9-700	(19F/HB, 9119-FHB)

References to 8236-E8C models are irrelevant.

## Hardware

February 2013

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# Contents

<b>Safety notices</b> . . . . .	<b>v</b>
<b>SAS subsystem for the 31E/2B</b> . . . . .	<b>1</b>
SAS architecture . . . . .	1
31E/2B SAS subsystem overview . . . . .	1
31E/2B SAS storage configurations . . . . .	5
31E/2B SAS subsystem base configuration . . . . .	6
31E/2B SAS subsystem configuration with tape storage . . . . .	7
31E/2B SAS dual-RAID subsystem . . . . .	8
31E/2B SAS subsystem service considerations . . . . .	10
Service considerations for the cache battery pack . . . . .	11
Problem determination and recovery . . . . .	13
<b>Notices</b> . . . . .	<b>15</b>
Trademarks . . . . .	16
Electronic emission notices . . . . .	16
Class A Notices . . . . .	16
Class B Notices . . . . .	20
Terms and conditions . . . . .	22



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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.

### German safety information

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

### Laser safety information

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

### Laser compliance

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

## DANGER

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

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

- Connect power to this unit only with the 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 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.

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## SAS subsystem for the 31E/2B

Review the SAS subsystem features, configurations, and limitations for the 31E/2B system.

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### SAS architecture

Serial-attached SCSI (SAS) architecture describes a serial device interconnection and transportation protocol that defines the rules for information exchange between devices.

SAS is an evolution of the parallel SCSI device interface into a serial point-to-point interface. SAS physical links are a set of four wires used as two differential signal pairs. One differential signal transmits in one direction, while the other differential signal transmits in the opposite direction. Data can be transmitted in both directions simultaneously. Physical links are contained in SAS ports, which contain one or more physical links. A port is a wide port if there are more than one physical link in the port. If there is only one physical link in the port, it is a narrow port. A port is identified by a unique SAS worldwide name (also called SAS address).

A *SAS adapter* contains one or more SAS ports. A *path* is a logical point-to-point link between a SAS initiator port in the adapter and a SAS target port in the I/O device (for example, a disk). A *connection* is a temporary association between an adapter and an I/O device through a path. A connection enables communication to a device. The adapter can communicate to the I/O device over this connection by using either the SCSI command set or the Advanced Technology Attachment (ATA) and Advanced technology Attachment Packet Interface (ATAPI) command set depending on the device type.

A *SAS expander* enables connections between an adapter port and multiple I/O device ports by routing connections between the expander ports. Only a single connection through an expander can exist at any given time. Using expanders creates more nodes in the path from the adapter to the I/O device. If an I/O device supports multiple ports, more than one path to the device can exist when there are expander devices included in the path.

A *SAS fabric* refers to the summation of all paths between all SAS adapter ports and all I/O device ports in the SAS subsystem including cables, enclosures, and expanders.

### 31E/2B SAS subsystem overview

Review SAS subsystem features and locations for the 31E/2B system.

Use this information with your specific system unit and operating system documentation. General information is intended for all users of this product. Service information is intended for a service representative specifically trained on the system unit and subsystem being serviced.

**Note:** All SAS subsystem features for 31E/2B systems share the same integrated base system board (CCIN 2BFB/2BFC), physical location code Un-P1.

#### Feature locations

Review the supported SAS features and their system locations. For detailed configuration information, see “31E/2B SAS storage configurations” on page 5.

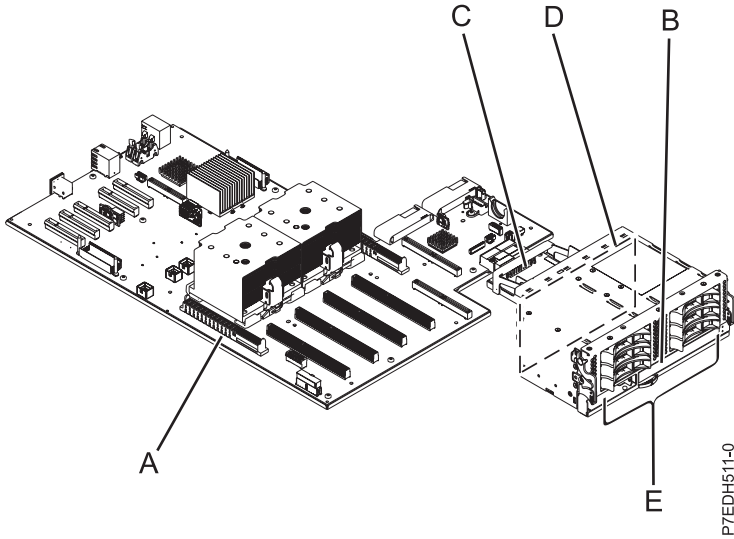


Figure 1. SAS base subsystem overview

**Note:** To order parts for your SAS subsystem, access the applicable FRU part number at 31E/2B system parts.

Table 1. SAS base subsystem (Feature code 5267) components

Diagram location	Part name	CCINs	Physical location codes
A	Base backplane <sup>1</sup>	2BFB, 2BFC	Un-P1
B	DVD drive <sup>1</sup>		Un-P3-D7
C	Base storage interposer	2D1E	Un-P2
D	Base storage backplane	2BD7	Un-P3
E	Disk bays (6 SFF drive disk bays)		Un-P3-D1 through Un-P3-D6

<sup>1</sup> Part of the SAS subsystem but separate from feature code 5618.

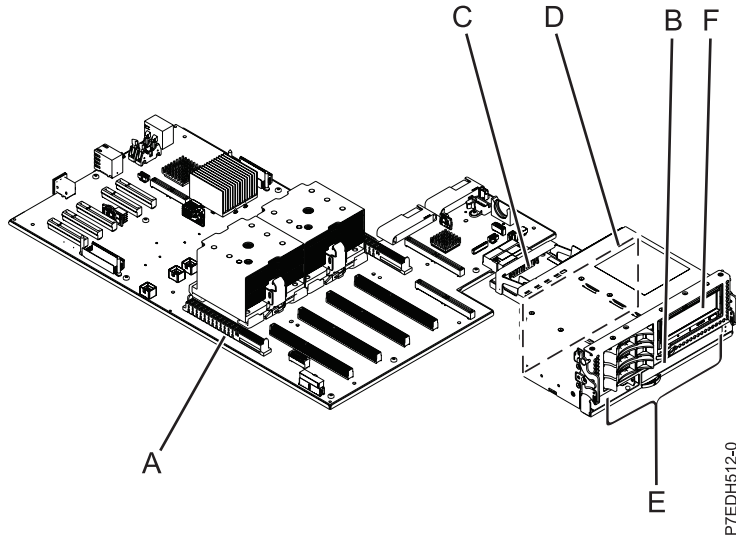


Figure 2. SAS base subsystem with tape storage

**Note:** To order parts for your SAS subsystem, access the applicable FRU part number at 31E/2B system parts.

Table 2. SAS base subsystem with tape storage (Feature Code 5263) components

Diagram location	Part name	CCINs	Physical location codes
A	Base backplane <sup>1</sup>	2BFB, 2BFC	Un-P1
B	DVD drive <sup>1</sup>		Un-P3-D7
C	Base storage interposer	2D1E	Un-P2
D, F	Base storage backplane with tape bay	2BE7	Un-P1-D1 (SAS), Un-P1-D2 (USB)
E	Disk drives (JBOD)		Un-P2-D1 through Un-P2-D3

<sup>1</sup> Part of the SAS subsystem but separate from feature code 5263.

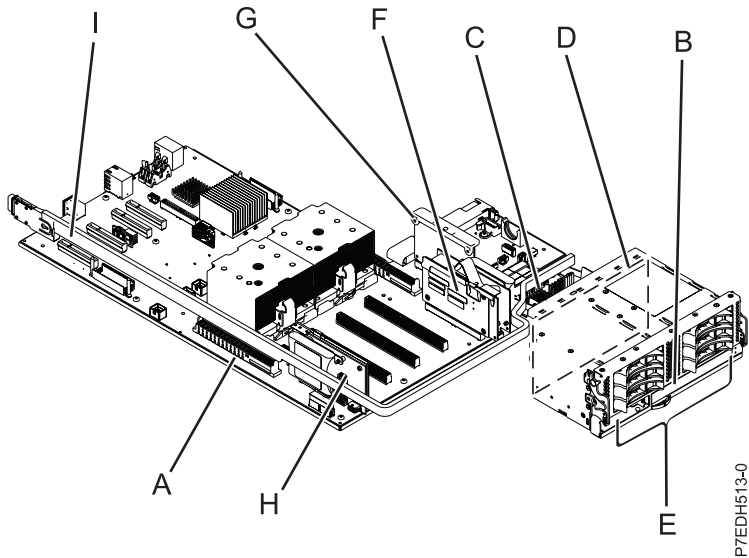


Figure 3. SAS dual-RAID subsystem overview

**Note:** To order parts for your SAS subsystem, access the applicable FRU part number at 31E/2B system parts.

Table 3. SAS dual-RAID subsystem (Feature Code 5268) components

Diagram location	Part name	CCINs	Physical location codes
A	Base backplane <sup>1</sup>	2BFB, 2BFC	Un-P1
B	DVD drive <sup>1</sup>		Un-P3-D7
C	Base storage interposer	2D1F	Un-P2
D	Base storage backplane	2BD7	Un-P3
E	Disk drives (JBOD, RAID-0,1,5,6,10)		Un-P2-D1 through Un-P2-D6
F	RAID/Cache storage controller	2BD9	Un-P1-C18, Un-P1-C18-E1
G	RAID enablement card	2BE1	Un-P1-C12
H	Cache battery card	2BCF	Un-P1-C13
I	SAS I/O attach cable		

<sup>1</sup> Part of the SAS subsystem but separate from feature code 5268.

## Feature details

### SAS RAID adapters

The SAS RAID adapters have the following features:

- A host PCI-x at 66 MHz.
- Physical link (phy) speed of 3 Gbps SAS supporting transfer rates of 300 MB per second
- Optimized for SAS disk configurations that use dual paths through dual expanders for redundancy and reliability
- Adapter managed path redundancy and path switching for multiported SAS devices
- Embedded PowerPC<sup>®</sup> RISC processor, hardware XOR DMA Engine, and hardware Finite Field Multiplier (FFM) DMA Engine (for Redundant Array of Independent Disks (RAID) 6)



- Support for RAID 0 and 10 disk arrays
- RAID disk arrays are supported as a boot device
- Advanced RAID features:
  - Hot spares for RAID 10 disk arrays
  - Background parity checking
  - Background data scrubbing
  - Disks formatted to 528 bytes per sector, providing cyclical redundancy checking (CRC) and logically bad block checking
  - Optimized skip read/write disk support for transaction workloads

**Related information:**

 [Serial attached SCSI cable planning](#)

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## 31E/2B SAS storage configurations

There are three supported SAS subsystem configurations on the 31E/2B system.

The configuration you use depends on the combination of SAS features that you have installed on your system. The following table provides an overview of the features and related configurations.

**Note:** All SAS subsystem configurations for 31E/2B system share the same integrated base system board (CCIN 2BFB/2BFC), physical location code Un-P1.

*Table 4. SAS subsystem configurations for the 31E/2B system*

SAS subsystem configuration	RAID Cache enablement card	External SAS components	SAS port cables	SAS cables	Limitations
SAS base subsystem (FC 5267)	No	None	None	Not applicable	Either solid-state drives (SSD) or hard disk drives (HDD) can be used, but the two can never be mixed in the same RAID array.
SAS base subsystem with tape storage bay (FC 5263)	No	None	None	Not applicable	<ul style="list-style-type: none"> <li>• is not supported.</li> <li>• Connecting to an external disk enclosure is not supported.</li> <li>• Each set of three drives can be HDDs or SSDs.</li> </ul>

Table 4. SAS subsystem configurations for the 31E/2B system (continued)

SAS subsystem configuration	RAID Cache enablement card	External SAS components	SAS port cables	SAS cables	Limitations
SAS dual-RAID subsystem (FC 5268)	Yes <b>Note:</b> The internal dual RAID IOA adapters report as CCIN 2BE1 and CCIN 2BD9.	External SAS port	SAS cable assembly for connecting to an external SAS drive enclosure	<ul style="list-style-type: none"> <li>• YI cable (FC 3686) - System to SAS disk enclosure, Single adapter/Dual path 1.5 meter</li> <li>• YI cable (FC 3687) - System to SAS disk enclosure, Single adapter/Dual path 3 meter</li> </ul>	Both solid-state drives (SSD) and hard disk drives (HDD) can be used in the internal disk enclosure, but can never be mixed in the same RAID array. SSDs and HDDs cannot be mixed in the external disk enclosure.

**Related concepts:**

“31E/2B SAS subsystem service considerations” on page 10

There are several considerations to review before servicing features within the SAS subsystem for the 31E/2B system.

“Service considerations for the cache battery pack” on page 11

To prevent data loss, follow proper procedures before replacing the cache battery pack on the Cache RAID cards.

**Related information:**



Serial attached SCSI cable planning

**31E/2B SAS subsystem base configuration**

This configuration uses the base system backplane.

The following rules apply to this configuration:

- The base backplane uses six 2.5-inch drives and cannot function in dual-storage I/O-adapter (IOA) mode or in high-availability (HA) RAID mode.
- There is a single path to drives.
- Embedded backplane adapter provides the SATA interface to the DVD drive.
- Internal adapter slots must be empty (this does not include the four PCIe slots, P1-C3 through P1-C6).
- Because there is no NVRAM, drives are JBOD only.
- Solid-state drives (SSD) and hard disk drives (HDD) can never be mixed in the same disk enclosure.
  - Bays D1–D6 have SSD
  - Bays D1–D6 have HDD

**Example: Base system backplane**

This example shows a base system backplane configuration on the 31E/2B system.

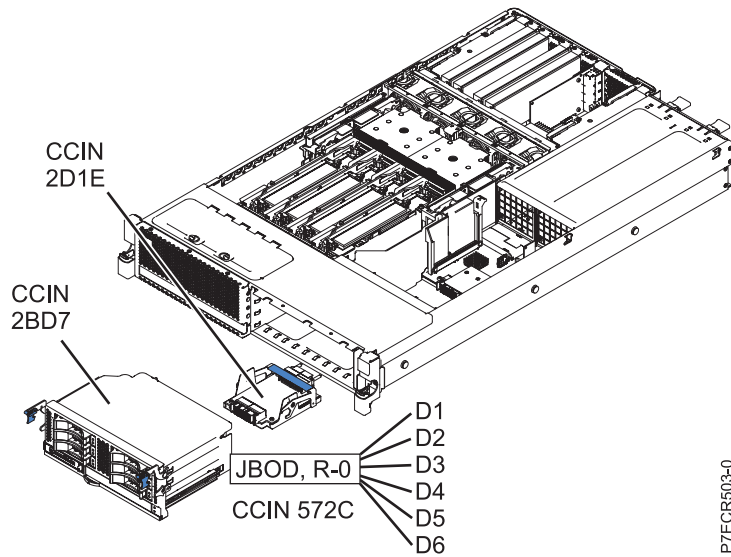


Figure 4. Disk bays controlled by base system backplane

The following table lists the details of the base system backplane configuration on the 31E/2B system.

Table 5. Base configuration details

Embedded SAS	Configuration details
JBOD storage controller (base backplane)	<ul style="list-style-type: none"> <li>• Located at Un-P1</li> <li>• Six JBOD drives (Un-P2-D1 through Un-P2-D6) on base disk drive backplane.</li> <li>• A single path goes to each drive.</li> <li>• The JBOD adapter is directly mounted on the backplane and provides the SATA interface to the DVD device.</li> </ul>

## 31E/2B SAS subsystem configuration with tape storage

This configuration uses the base system board with a disk drive backplane that features tape storage in addition to three disk drive bays.

The following rules apply to this configuration:

- The base backplane uses three 2.5-inch drives and cannot function in dual-storage I/O-adapter (IOA) mode or in high-availability (HA) RAID mode.
- No split backplane is supported.
- This configuration supports RAID 0 or 10 protection for AIX® or Linux.
- This feature is not available with the IBM i operating system.
- The embedded backplane adapter provides the SATA interface to the DVD drive and the SAS 5.25-inch tape unit.
- All internal adapter slots must be empty.
- RAID 10 with two drives is limited. A RAID 10 array with two drives is equivalent to RAID 1 (mirrored drives). A RAID 0 disk array with one drive is similar to JBOD support. A RAID 10 array with 1 drive is not allowed.
- This configuration supports disks without RAID (referred to as JBOD) or RAID drives. However, RAID drives have no write cache.
- Solid-state drives (SSD) and hard disk drives (HDD) can never be mixed in the same disk enclosure.

## Example: SAS subsystem configuration with tape storage

This example shows a storage backplane with tape storage on the 31E/2B system.

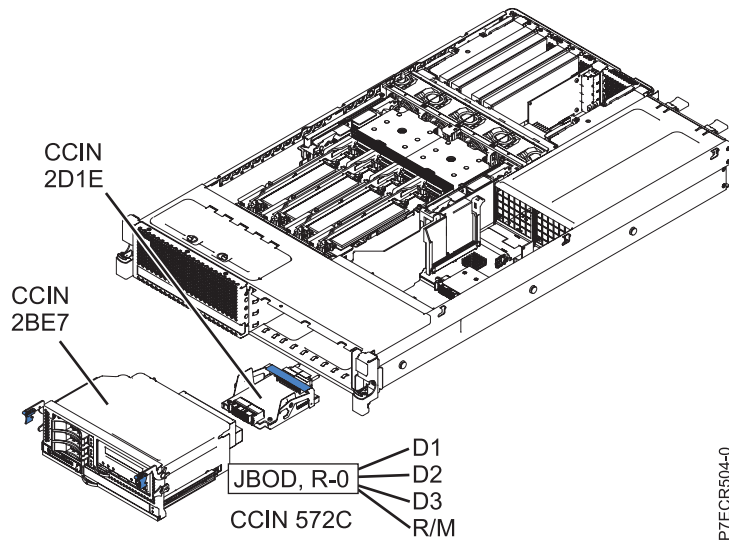


Figure 5. SAS subsystem configuration with tape storage

The following table lists the details of the SAS subsystem configuration with tape storage configuration on the 31E/2B system.

Table 6. Base SAS subsystem with tape storage configuration details

Embedded SAS	Configuration details
JBOD storage controller (base backplane)	<ul style="list-style-type: none"> <li>• Located at Un-P1-D1 (SAS), Un-P1-D2 (USB)</li> <li>• Three JBOD drives (Un-P2-D1 through Un-P2-D3) on base disk drive backplane.</li> <li>• A single path goes to each drive.</li> <li>• The JBOD adapter is directly mounted on the backplane and provides the SATA interface to the DVD drive and the SAS 5.25-inch tape unit.</li> </ul>

## 31E/2B SAS dual-RAID subsystem

This configuration uses dual-storage I/O-adapter (IOA) mode or in high-availability (HA) RAID mode with internal disk drives.

This configuration increases availability using dual-storage IOA or high-availability (HA) to connect multiple adapters to a common set of internal disk drives. It also increases the performance of RAID arrays. The following rules apply to this configuration:

- Two physical adapters and battery cards, in addition to the mounted system board adapter, make up the logical RAID adapter.
- The presence of any of the components requires that all the components must be present.
- The disk drives are required to be in RAID arrays.
- Disk units can be placed in any slot at any time.
- There are no separate SAS cables required to connect the two embedded SAS RAID adapters to each other. The connection is contained within the backplane.
- RAID 0, 10, 5, and 6 support up to six drives.

- Solid-state drives (SSD) and hard disk drives (HDD) can be used, but can never be mixed in the same RAID array. An SSD-only RAID set and an HDD-only RAID set are supported.
- SAS I/O supports optional connection to external storage.
- The external SAS port cannot connect to a SAS drawer that is populated with SSDs.
- The external SAS port cannot connect to a SAS drawer at all (even if it is populated with HDDs) if any SSDs are used in the RAID configuration.

### Example: SAS dual-RAID subsystem

This example provides an overview of the dual storage I/O adapter (IOA) configuration using internal disk drives on the 31E/2B system. This configuration uses a different interposer (2D1F), which provides the foundation for two logical adapters.

- The base logical adapter has the following separate components:
  - Base backplane
  - RAID enablement card
  - Cache battery card
- The RAID/Cache storage controller and its battery form the second logical adapter.

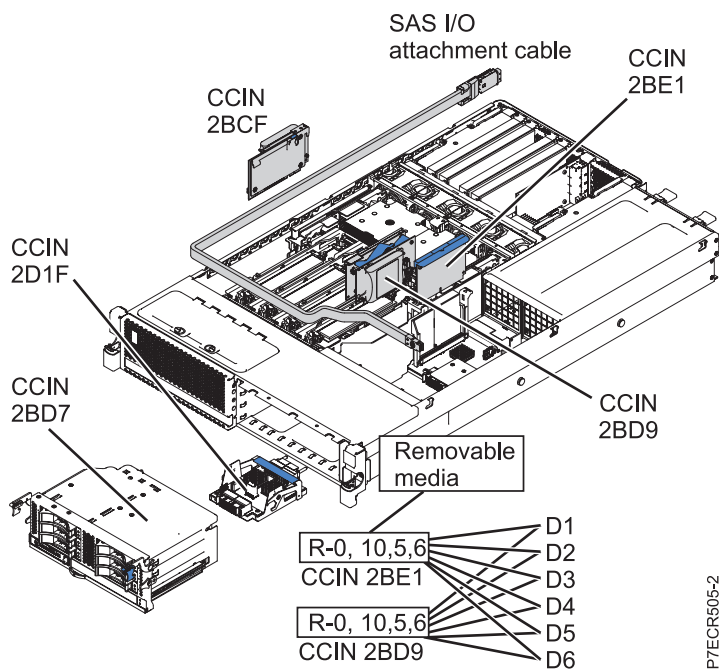


Figure 6. Disk bays controlled by both embedded SAS adapters when using dual storage IOA with internal drives

The following table lists the configuration details.

Table 7. SAS dual-RAID subsystem

Embedded SAS	Configuration details
RAID enablement card (Un-P1-C12) (2BE1)	<ul style="list-style-type: none"> <li>• Six JBOD drives (Un-P2-D1 through Un-P2-D6) are located on base disk drive backplane.</li> <li>• The SAS adapters connect to all six disk drives.</li> <li>• A single path goes to each drive.</li> <li>• The JBOD adapter is directly mounted on the system board.</li> <li>• External SAS port is located on interposer.</li> </ul>
RAID/Cache storage controller (Un-P1-C18, Un-P1-C18-E1) (CCIN 2BD9)	
Battery card (Un-P1-C13) (CCIN 2BCF)	
SAS I/O attachment cable	

**Related concepts:**

“31E/2B SAS subsystem service considerations”

There are several considerations to review before servicing features within the SAS subsystem for the 31E/2B system.

“Service considerations for the cache battery pack” on page 11

To prevent data loss, follow proper procedures before replacing the cache battery pack on the Cache RAID cards.

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## 31E/2B SAS subsystem service considerations

There are several considerations to review before servicing features within the SAS subsystem for the 31E/2B system.

**Attention:** Do not attempt to remove any parts related to the SAS subsystem if the cache data present LED on the card in either P1-C18 or P1-C13 is flashing. To see this LED, you must shut down the system and remove the service cover. The LED shows a no-touch icon (a hand with a slash through it), and indicates that there is possible data in cache on the adapter. To prevent data loss, first make sure that the system has been shut down correctly. If either cache data present LED is flashing, refer to one of the following topics before removing any SAS subsystem parts. You can safely replace the cache battery pack when Yes is displayed next to Battery pack can be safely replaced on the Battery Information panel (for Linux and IBM i systems) or the COMMAND STATUS panel (for AIX systems).

Before servicing any features, review the I/O configurations for each logical partition on your system. It is important to understand the differences between the various configurations and the resulting service considerations. In addition, consider possible impacts to the following areas:

- Logical partitions and their I/O adapter assignments
- RAID array configurations
- Physical disk locations
- Path to your boot device

### Related information:

- [🔗 Displaying rechargeable battery information](#)
- [🔗 Displaying rechargeable battery information](#)
- [🔗 Displaying rechargeable battery information](#)
- [🔗 Logical partitioning](#)
- [🔗 SAS RAID controllers for IBM i](#)
- [🔗 SAS RAID controllers for Linux](#)
- [🔗 SAS RAID controllers for AIX](#)

## Service considerations for the cache battery pack

To prevent data loss, follow proper procedures before replacing the cache battery pack on the Cache RAID cards.

**Note:** Concurrent maintenance of adapter battery is not supported. Even with failed or missing batteries, the card associated with the battery must first be removed.

**Attention:** To maintain system availability and prevent possible data loss, it is important to understand that these features have implications on the SAS configuration and data accessibility of the system.

**Attention:** Do not attempt to remove any parts related to the SAS subsystem if the cache data present LED on the card in either P1-C18 or P1-C13 is flashing. To see this LED, you must shut down the system and remove the service cover. The LED shows a no-touch icon (a hand with a slash through it), and indicates that there is possible data in cache on the adapter. To prevent data loss, first make sure that the system has been shut down correctly. If either cache data present LED is flashing, refer to one of the following topics before removing any SAS subsystem parts. You can safely replace the cache battery pack when Yes is displayed next to Battery pack can be safely replaced on the Battery Information panel (for Linux and IBM i systems) or COMMAND STATUS panel (for AIX systems).

The following figure shows the location of the cache data present LED in the 31E/2B SAS subsystem.

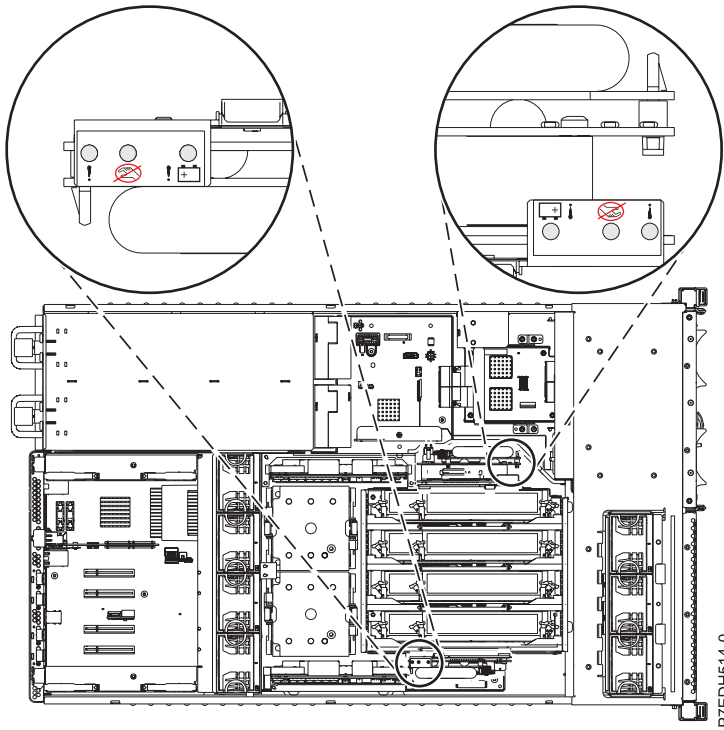










Figure 7. Cache data present LED

The following table describes the states of the cache data present LED and what to consider before attempting a service action.

Table 8. LED indications and actions

Cache battery card (Un-P1-C13)	RAID/Cache storage controller (Un-P1-C18)	Indication	Action
 Off	 Off	Cache is not active.	Service actions can proceed.
 Off	 Flashing	Cache is active on C18. Cache might have been flushed on C13 if C18 is failed.	Attempt to power on and perform a proper shutdown prior to any service action.
 Flashing	 Off	Cache is active on C13. Cache might have been flushed on C18 if C13 is failed.	Attempt to power on and perform a proper shutdown prior to any service action.
 Flashing	 Flashing	Cache is active on the dual controllers.	Attempt to power on and perform a proper shutdown prior to any service action. If this is unsuccessful in clearing the cache active LEDs, contact support. See Contacting IBM service and support.



**Related information:**

- [➤ Removing and replacing SAS RAID adapters and batteries](#)
- [➤ Displaying rechargeable battery information](#)
- [➤ Displaying rechargeable battery information](#)
- [➤ Displaying rechargeable battery information](#)
- [➤ Removing and Replacing a cache battery pack](#)

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**Problem determination and recovery**

Review the following information about using problem determination and recovery procedures for the 31E/2B system.

**Attention:** To maintain system availability and prevent possible data loss, contact your next level of support for any service related to the SAS storage subsystem on the 31E/2B system.

For more details on service, support, service request numbers (SRNs), and feature information for the SAS storage subsystem, refer to the following information:

- Planning for cables
- Removing and replacing SAS RAID adapters and batteries
- Service request numbers

**Related information:**

- [➤ SAS RAID controllers for AIX](#)
- [➤ SAS RAID controllers for IBM i](#)
- [➤ SAS RAID controllers for Linux](#)
- [➤ Serial attached SCSI cable planning](#)



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

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Technical Regulations, Department M372  
IBM-Allee 1, 71139 Ehningen, Germany  
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