System Storage EXP2512 Express Storage Enclosure and
System Storage EXP2524 Express Storage Enclosure

# Installation, User's, and Maintenance Guide

GA32-0965-01

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System Storage EXP2524 Express Storage Enclosure

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**Note:** Before using this information and the product it supports, read the general information in Appendix B, “Notices,” on page 47, the *Systems Safety Notices* and *Environmental Notices and User Guide* documents on the IBM *Documentation* CD, and the *Warranty Information* document that comes with the product.

**Third Edition (November 2011)**

# Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information
（安全信息）。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας
(safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się
z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

**Important:**

Each caution and danger statement in this document is labeled with a number. This number is used to cross reference the English-language caution or danger statement with translated versions of the caution or danger statement in the *IBM®* *Systems Safety Notices* document.

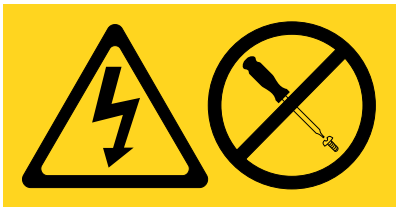
For example, if a caution statement is labeled “D005a,” translations for that caution statement are in the *IBM Systems Safety Notices* document under “D005a.”

Be sure to read all caution and danger statements in this document before you perform the procedures. Read any additional safety information that comes with the server or optional device before you install the device.

**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)**



**DANGER**

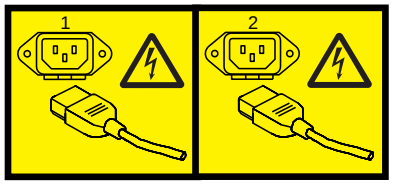
**Rack-mounted devices are not to be used as shelves or work spaces.**

**(L002)**

**DANGER**

**Multiple power cords. The product might be equipped with multiple power cords. To remove all hazardous voltages, disconect all power cords.**

**(L003)**




or

**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:**

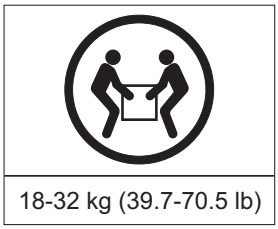
  1. **Turn off everything (unless instructed otherwise).**
  2. **Attach all cables to the devices.**
  3. **Attach the signal cables to the connectors.**
  4. **Attach the power cords to the outlets.**
  5. **Turn on the devices.**

  **(D005a)**

**CAUTION:**

*or*


*or*




**The weight of this part or unit is between 18 and 32 kg (39.7 and 70.5 lb). It takes two persons to safely lift this part or unit. (C009)**

# Contents

# Chapter 1. Introduction

This *Installation, User's, and Maintenance Guide* contains instructions for setting up your IBM System Storage® EXP2512 Express Storage™ Enclosure and IBM System Storage EXP2524 Express Storage Enclosure and provides the instructions for replacing components. The IBM System Storage EXP2512 and IBM System Storage EXP2524 are referred to in this document as the EXP2500, unless specified otherwise.

This document contains information about:

- Setting up and cabling the EXP2500
- Starting and configuring the EXP2500
- Replacing components
- Solving problems

The EXP2500 provides high-capacity, Serial Attached SCSI (SAS), nearline SAS, or Solid State disk storage. The EXP2512 supports up to 12 SAS or nearline SAS hard disk drives and the EXP2524 supports up to 24 SAS, nearline SAS, or Solid State hard disk drives. The EXP2500 delivers fast, high-volume data transfer, retrieval, and storage functions among multiple drives. The EXP2500 is designed for continuous, reliable service; the modular, redundant hard disk drives and power supplies (with fans) use hot-swap technology for easy replacement without turning off the EXP2500.

The EXP2500 comes with two 800-watt ac power supplies, one environmental services module (ESM), a filler panel to cover the empty ESM bay, and 12 or 24 drive filler panels, depending on the storage enclosure model. The drive filler panels can be replaced with optional hard disk drives.

If firmware and documentation updates are available, you can download them from the IBM support website. The EXP2500 might have features that are not described in the documentation that comes with the unit, and the documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the EXP2500 documentation.

**Note:** Changes are made periodically to the IBM website. Procedures for locating firmware and documentation might vary slightly from what is described in this document.

To check for updates, go to http://www.ibm.com/systems/support/. For firmware updates, click **Downloads**. For documentation updates, click **Documentation**.

The EXP2500 comes with a limited warranty. For more information about the terms of your warranty, see the *Warranty and Support Information* document that comes with the EXP2500.

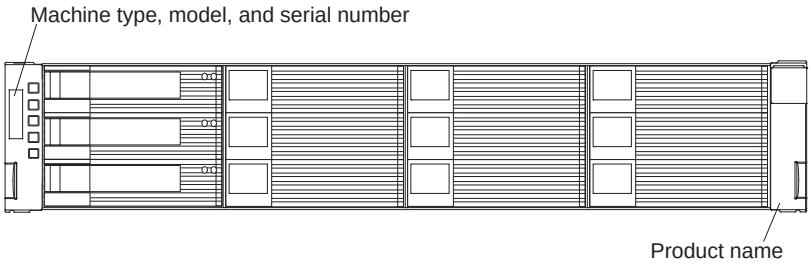
Record information about the EXP2500 in Table 1. You will need this information if you have to call for service.

*Table 1. Product identification record*

| | |
|---|---|
| **Product name** | IBM System Storage EXP2512 Express Storage Enclosure or BM System Storage EXP2524 Express Storage Enclosure |
| **Machine type** | 1727-HC1 or 1727-HC2 |
| **Serial number** | |
| **EXP2500 ID number** | |

The machine type, model, and serial number are on the label chassis flange and on the agency label located on top of the chassis. The machine type, model, and serial number may also be on the label located on the vertical recess on the left bezel. The following illustration shows the product name and serial number label on the front of the EXP2512. The locations are the same for the EXP2524.

**Note:** The illustrations in this document might differ slightly from your hardware.




Use Table 2 to keep a record of the hard disk drives that are installed in or attached to the EXP2500. This information can be helpful when you install additional hard disk drives or if you have to report a hardware problem. Make a copy of this table before you record information in it, in case you need extra space to write new values later, or when you update the EXP2500 configuration.

*Table 2. Drive location information record*

| Drive location | Drive part and model number | Drive serial number |
|---|---|---|
| Bay 1 | | |
| Bay 2 | | |
| Bay 3 | | |
| Bay 4 | | |
| Bay 5 | | |
| Bay 6 | | |
| Bay 7 | | |
| Bay 8 | | |
| Bay 9 | | |
| Bay 10 | | |
| Bay 11 | | |
| Bay 12 | | |
| Bay 13 | | |
| Bay 14 | | |
| Bay 15 | | |

*Table 2. Drive location information record (continued)*

| Drive location | Drive part and model number | Drive serial number |
|---|---|---|
| Bay 16 | | |
| Bay 17 | | |
| Bay 18 | | |
| Bay 19 | | |
| Bay 20 | | |
| Bay 21 | | |
| Bay 22 | | |
| Bay 23 | | |
| Bay 24 | | |

## The IBM Documentation CD

The IBM *Documentation* CD contains documentation for the EXP2500 in Portable Document Format (PDF) and includes the IBM Documentation Browser to help you find information quickly.

## Hardware and software requirements

The IBM *Documentation* CD requires the following minimum hardware and software:

- Microsoft Windows XP, Windows 2000, or Red Hat Linux
- 100 MHz microprocessor
- 32 MB of RAM
- Adobe Acrobat Reader 3.0 (or later) or xpdf, which comes with Linux operating systems

## Using the Documentation Browser

Use the Documentation Browser to browse the contents of the CD, read brief descriptions of the documents, and view documents, using Adobe Acrobat Reader or xpdf. The Documentation Browser automatically detects the regional settings in your server and displays the documents in the language for that region (if available). If a document is not available in the language for that region, the English-language version is displayed.

Use one of the following procedures to start the Documentation Browser:

- If Autostart is enabled, insert the CD into the CD or DVD drive. The Documentation Browser starts automatically.
- If Autostart is disabled or is not enabled for all users, use one of the following procedures:
  - If you are using a Windows operating system, insert the CD into the CD or DVD drive and click **Start --> Run**. In the **Open** field, type

    ```
    e:\win32.bat
    ```

    where *e* is the drive letter of the CD or DVD drive, and click **OK**.
  - If you are using Red Hat Linux, insert the CD into the CD or DVD drive; then, run the following command from the /mnt/cdrom directory:

    ```
    sh runlinux.sh
    ```

Select the EXP2500 from the **Product** menu. The **Available Topics** list displays all the documents for the EXP2500. Some documents might be in folders. A plus sign (+) indicates each folder or document that has additional documents under it. Click the plus sign to display the additional documents.

When you select a document, a description of the document is displayed under **Topic Description**. To select more than one document, press and hold the Ctrl key while you select the documents. Click **View Book** to view the selected document or documents in Acrobat Reader or xpdf. If you selected more than one document, all the selected documents are opened in Acrobat Reader or xpdf.

To search all the documents, type a word or word string in the **Search** field and click **Search**. The documents in which the word or word string appears are listed in order of the most occurrences. Click a document to view it, and press Crtl+F to use the Acrobat search function, or press Alt+F to use the xpdf search function within the document.

Click **Help** for detailed information about using the Documentation Browser.

## Notices and statements in this document

The caution and danger statements in this document are also in the multilingual *IBM Systems Safety Notices* document, which is on the IBM *Documentation* CD. Each statement is numbered for reference to the corresponding statement in the *IBM Systems Safety Notices* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

# Features and operating specifications

Table 3 contains a summary of the features and operating specifications of the EXP2500. Depending on your EXP2500 model, some features might not be available, or some specifications might not apply.

*Table 3. Features and operating specifications*

**General:**

- Modular components
  - High-capacity disk drives
  - Environmental services module (ESM)
  - Power supplies with built-in fan units
- Technology
  - Supports disk array technology
  - SAS host interface, redundant data storage, power and cooling system, and ESMs
  - Hot-swap technology for hard disk drives, power supplies, and ESMs
- User interface
  - Built-in power, activity, and fault LEDs, identification labeling on components, rear LEDs, and connectors
  - Easy-to-replace hard disk drives, power supplies with built-in fan units, and ESMs

**Hard disk drive storage:**
Maximum hard disk drives
EXP2512: 12
Drive type: SAS and nearline SAS
EXP2524: 24
Drive type: SAS, nearline SAS, and Solid State

**ESMs:**
Technology and interfaces:
SAS interface: Two 26-pin, mini-SAS connectors per ESM

**Acoustical noise emissions:**
For maximum system configurations (12 hard disk drives installed)

- Sound power (idling): 6.1 bels
- Sound power (operating): 6.1 bels
- Sound pressure (idling): 48 dBA
- Sound pressure (operating): 48 dBA

**AC power supply with built-in fan:**

- The EXP2500 comes with two hot-swap 800 watt (100 - 240 V ac) power supplies.
- The two power supplies provide redundant power to the EXP2500.

**Size:**

- Height: 8.7 cm (3.4 in.)
- Depth: 55.6 cm (21.9 in.)
- Width: 44.6 cm (17.6 in.)
- Weight (approximate):
  8.7 kg (19.2 lb) for an empty unit
  16.6 kg (36.5 lb) for a standard unit
  26.7 kg (58.8 lb) for a fully configured unit

**Environment:**

- Air temperature:
  - EXP2500 on: 10° to 35°C (50° to 95°F); altitude: 30.5 (100 ft) below to 3000 m (9840 ft) above sea level; temperature change: 10°C (18°F) per hour
  - EXP2500 off: 10° to 50°C (14° to 120°F); maximum altitude: 3000 m (9840 ft); temperature change: 15°C (27°F) per hour
- Humidity:
  - EXP2500 on: 20% to 80%
  - EXP2500 off: 10% to 90%
  - Maximum dew point: 26°C (79°F)
  - Maximum humidity gradient: 10% per hour

**Heat output**

Approximate heat output in British thermal units (Btu) per hour:

- Minimum configuration: 188 Btu (55 watts)
- Maximum configuration 821 Btu (240 watts)

**Electrical input:**

- Sine-wave input (50-60 Hz) required
- Input voltage low range:
  - Minimum: 90 V ac
  - Maximum: 127 V ac
- Input voltage high range:
  - Minimum: 200 V ac
  - Maximum: 264 V ac

**Notes:**

1. Power consumption and heat output vary depending on the number and type of optional features that are installed and the power-management optional features that are in use.
2. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average stated values because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.

## What the EXP2500 offers

The EXP2500 provides several features for easy operation, including the following features:

- **Customer replaceable units (CRUs)**

  The major CRUs in the EXP2500 are SAS, nearline SAS, or Solid State hard disk drives, ESMs, and power supplies. See “Replaceable EXP2500 components” on page 25.
- **Fault indicators**

  All CRUs have fault or status light emitting diodes (LEDs) to indicate hardware failures.
- **Redundant cooling and power capabilities**

  The EXP2500 uses a dual ac input power system. The redundant cooling of the fans enables continued operation if up to three fans fail. The EXP2500 comes with two 800-watt hot-swap power supplies, which provide redundant power for all EXP2500 configurations. If a problem occurs with one of the power supplies, the other power supply can meet the power requirements.

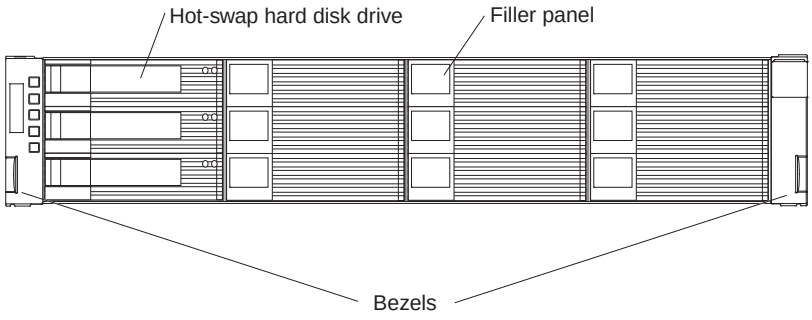
## Major components of the EXP2500

Orange on a component or label indicates that the component can be hot-swapped. You can install or remove a hot-swap component while the EXP2500 is running. For information about installing hot-swap components, see Chapter 4, “Parts listing, EXP2512 and EXP2524 expansion enclosures,” on page 25.

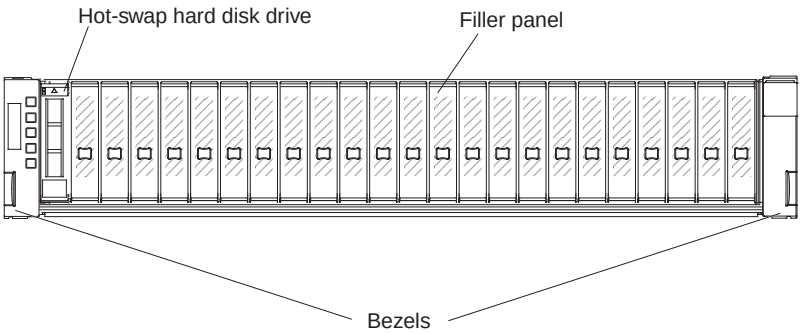
Blue on components and labels indicates touch points, where you can grip a component, move a latch, and so on.

The following illustrations show the major components of the EXP2512 and EXP2524.

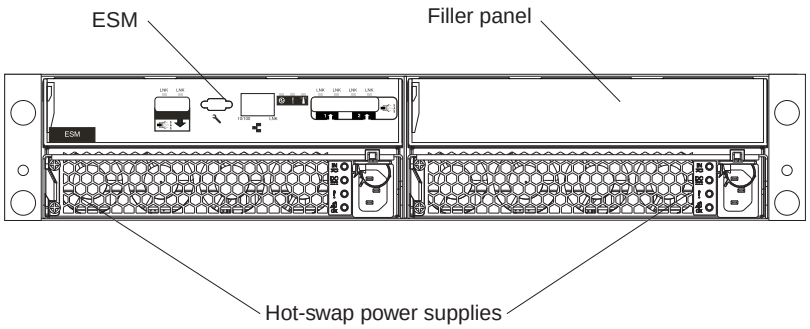
**Front view of the EXP2512**



### Front view of the EXP2524




### Rear view of the EXP2512 and EXP2524



# Chapter 2. Installation

This chapter provides information about installing and cabling the EXP2500. The EXP2500 connects to a RAID controller in a server. For the supported RAID controllers to which the EXP2500 can connect, see the System Storage Interoperation Center (SSIC) at http://www.ibm.com/systems/support/storage/config/ssic.

## Inventory checklist

After you unpack the EXP2500, make sure that you have the following items:

- **Hardware:**
  - IBM System Storage EXP2512 Express Storage Enclosure or IBM System Storage EXP2524 Express Storage Enclosure
  - Two rack jumper power cords
  - Two front bezels (left and right)
  - One rack installation hardware kit:
    - Two rails (right and left assembly)
    - Eight M5 screws
    - Eight spacers
- **Printed documents:**
  - *IBM Rack Installation Instructions for the IBM System Storage EXP2512 and EXP2524 Express Storage Enclosure*
  - *IBM Important Notices*
  - *IBM Warranty Information*
- **Online documents:**
  - *IBM System Storage EXP2512 and System Storage EXP2524 Express Storage Enclosure Installation and User's Guide* (this document)
  - *IBM Systems Safety Notices*
  - *IBM Systems Environmental Notices and User's Guide*

## Installing the EXP2500 in a rack

You can install the EXP2500 in an Electronic Industries Association (EIA) 310 standard rack cabinet. For complete rack cabinet installation instructions, see the *Rack Installation Instructions* document that comes with the EXP2500.

## Installing hot-swap hard disk drives

The EXP2512 supports up to 12 IBM SAS or nearline SAS hard disk drives. The EXP2524 supports up to 24 IBM SAS, nearline SAS, and Solid State hard disk drives.

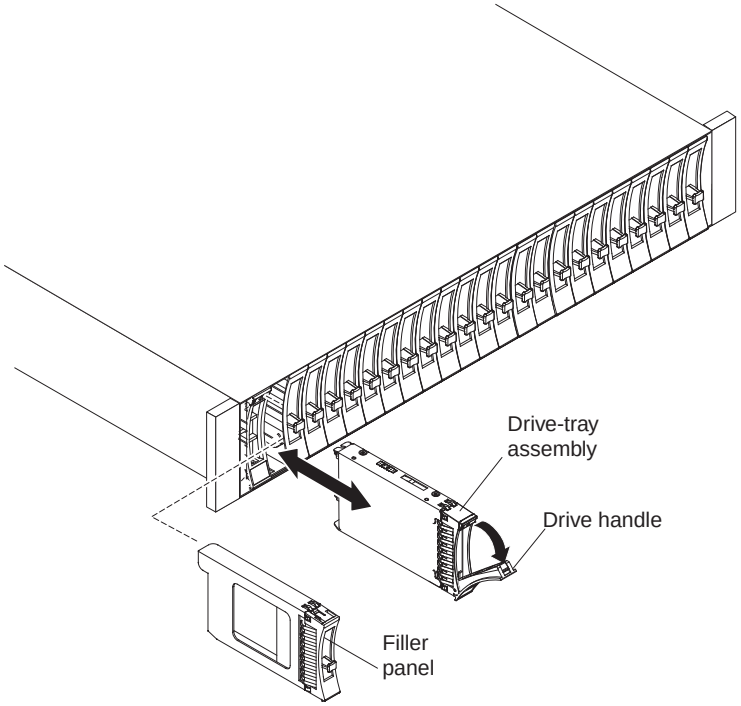
Each drive comes preinstalled in a drive tray, ready for installation in the EXP2500. (Do not detach the drive from the tray.) Be sure to record the location information for each drive in Table 2 on page 2.

The EXP2500 comes with filler panels in the drive bays. Before you install a new hard disk drive, remove the filler panel and save it for future use. Each of the drive bays must contain either a filler panel or a hard disk drive.

To install a hard disk drive in the EXP2500, complete the following steps. You can install drives while the EXP2500 is turned on.

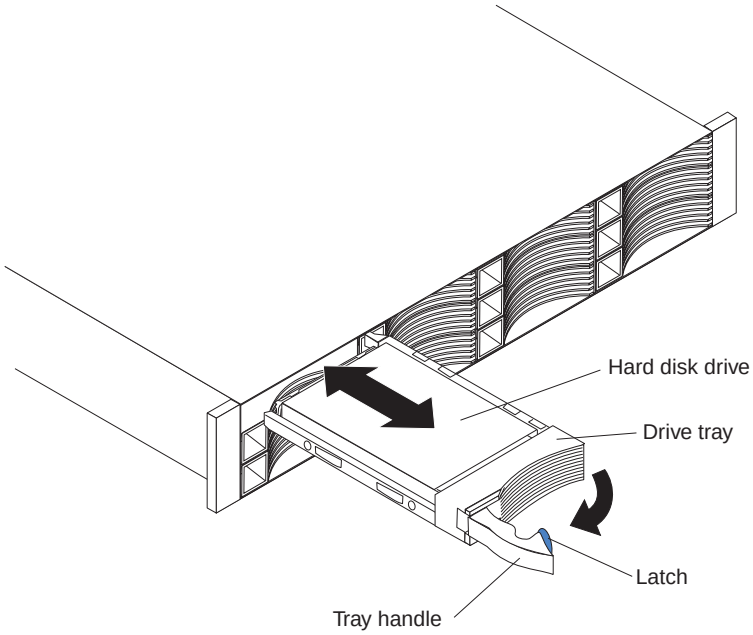
1. Read the instructions that come with the hard disk drive.
2. Read the safety information that begins on page iii and “Installation guidelines” on page 29.
3. Remove the filler panel from the bay into which you want to install the hard disk drive:
   a. Insert a finger into the square hole on the left side of the filler panel to grip and pull the filler panel out of the drive bay.
   b. Save the filler panel for future use.

4. Installing a 2.5-inch hot-swap drive:
   a. Touch the static-protective package that contains the hard disk drive to any unpainted surface on the outside of the enclosure; then, remove the hard disk drive from the package.
   b. Make sure that the drive-tray handle is in the open (unlocked) position.
   c. Align the drive assembly with the guide rails in the bay.




   d. Gently push the drive-tray assembly into the bay until the drive stops.
   e. Rotate the drive-tray handle to the closed (locked) position.

5. Installing a 3.5-inch hot-swap drive:
   a. Touch the static-protective package that contains the hard disk drive to any unpainted surface on the outside of the enclosure; then, remove the hard disk drive from the package.
   b. Make sure that the tray handle is open; then, slide the hard disk drive into the hot-swap bay.




   c. Push the tray handle to the right into the closed (latched) position.
6. Check the drive LEDs:
   a. When a drive is ready for use, the green activity LED and the amber status LED on the drive are off.
   b. If the amber status LED is lit and not flashing, remove the drive from the unit and wait 10 seconds; then, reinstall the drive. If the amber LED is flashing, the drive is rebuilding.

**Controller management information:** In some cases, the RAID controller automatically resets the drive to the Hot Spare or Rebuild state. If the drive state does not change automatically (the amber LED stays lit), see your RAID controller management documentation for information about manually changing the state of the drive from the current state to another state, such as Hot Spare or Ready. The amber LED should turn off within 10 seconds after the drive state changes.

7. Configure the hard disk drive, using the RAID controller management software.

**Note:** Refer to your RAID Adapter documentation to determine if your RAID Adapter supports the hard drives used. The 3 Gbps RAID Adapters may not support 3 TB hard drives. If any hard drive is not supported, it is reported as Unrecognized.

## Cabling the EXP2500

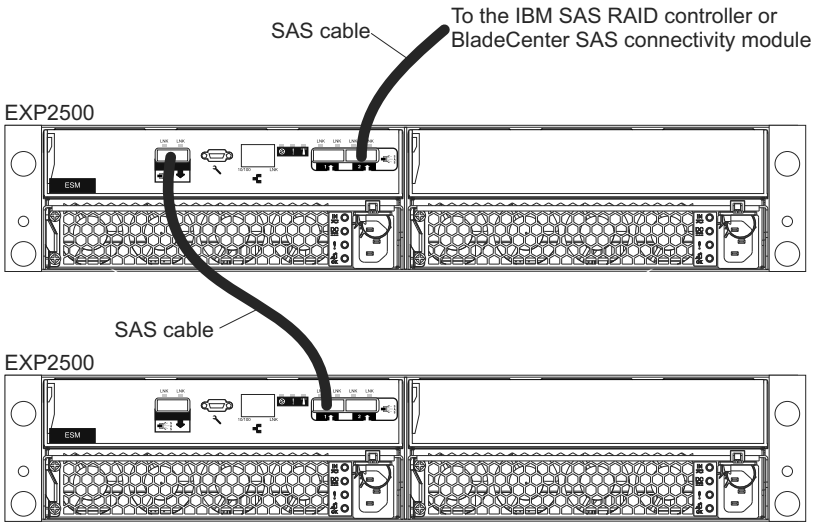
The EXP2500 comes with one ESM, which enables you to connect the EXP2500 to a RAID controller or a BladeCenter SAS connectivity module or another EXP2500 expansion enclosure. Depending on the capabilities of the RAID controller, you can add multiple EXP2500 units to provide a chain of EXP2500s to the RAID controller. See the documentation that comes with the RAID controller or the device that contains the RAID controller for information about the capabilities of the RAID controller.

When attached to the BladeCenter SAS connectivity module, a EXP2500 can be used in conjunction with the BladeCenter blade server RAID controllers. Only a single EXP2500 enclosure can be attached to a BladeCenter SAS connectivity module SAS port but multiple EXP2500 enclosures can be attached to a BladeCenter SAS connectivity module.

The EXP2500 ESM contains three 26-pin mini-SAS connectors. There are two In (↑) connectors and one Out (↓) connector. If your RAID controller supports more than one EXP2500 per physical port, you can connect two or more EXP2500s by chaining them together. See the documentation that comes with your RAID controller or the device that contains the RAID controller for more information.

To connect a RAID controller or BladeCenter SAS connectivity module to one or more EXP2500s that have one ESM each, complete the following steps:

1. Connect one EXP2500 to the RAID controller or BladeCenter SAS connectivity module:
   a. Connect one end of a SAS cable to the RAID controller or one of the two SAS ports on the BladeCenter SAS connectivity module.
   b. Connect the other end to the In (↑) SAS connector on the ESM in the EXP2500.




2. If your RAID controller supports connecting multiple EXP2500s, connect a second EXP2500 to the first EXP2500:
   a. Connect one end of a SAS cable to the Out (↓) SAS connector on the ESM of the EXP2500 that you just connected.
   b. Connect the other end of the SAS cable to one of the In (↑) SAS connectors on the ESM on the next EXP2500.

c. Repeat steps 2a on page 13 and 2b on page 13 for each EXP2500 that you add.

## Connecting the power cords

The EXP2500 comes with two power cords. You can connect the power cords to a primary power unit inside the rack cabinet, such as a properly grounded ac power distribution unit (PDU) or uninterruptible power supply.

**Note:** Power cords, specific to a country, can be purchased separately.

For information about the initial startup of the EXP2500, see “EXP2500 power features” on page 21.

## Systems-management software support

The EXP2500 provides software alert functions through the systems-management functions that are provided by the management software that comes with your RAID controller.

The following alerts are supported:

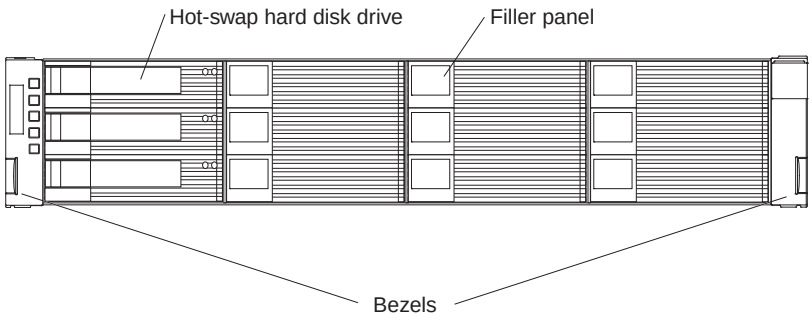
- Hard disk drive failure
- Power-supply failure
- Fan failure
- Normal operating temperature exceeded

# Chapter 3. EXP2500 controls, LEDs, and power

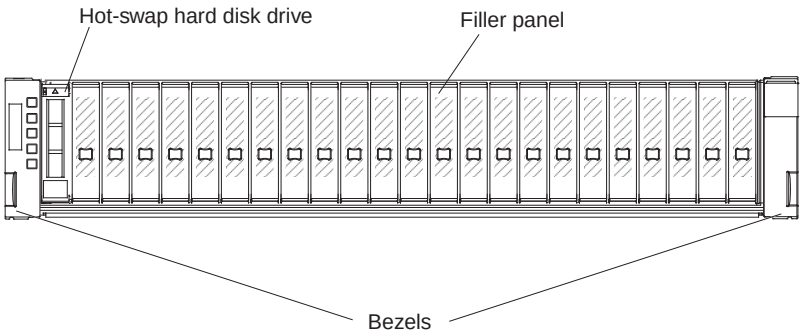
This section describes the controls and light-emitting diodes (LEDs) and how to turn the EXP2500 on and off.

## Front view: components

The components on the front of the EXP2512 are shown in the following illustration.




The components on the front of the EXP2524 are shown in the following illustration.




**Hot-swap hard disk drive**

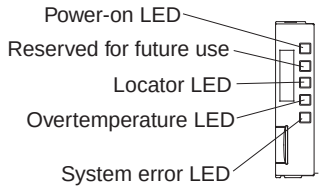
You can install up to 12 hot-swap SAS or nearline SAS hard disk drives in the EXP2512 and up to 24 hot-swap SAS or nearline SAS hard disk drives in the EXP2524.

**Filler panel**

The EXP2500 comes with filler panels in the drive bays. Before you install a hard disk drive, remove the filler panel and save it for future use. Each of the 12 or 24 drive bays must contain either a filler panel or a hard disk drive.

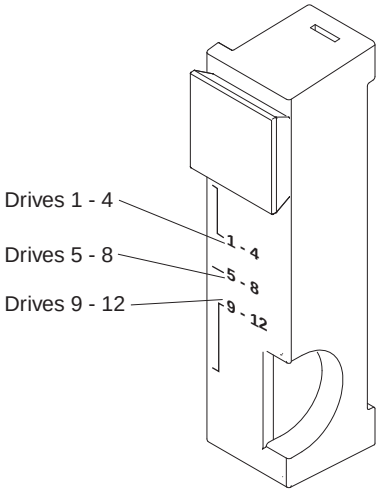
**Bezel (left side)**

The left bezel contains the EXP2500 LEDs, as shown in the following illustration. For a description of the LEDs, see “Front view: LEDs” on page 18.



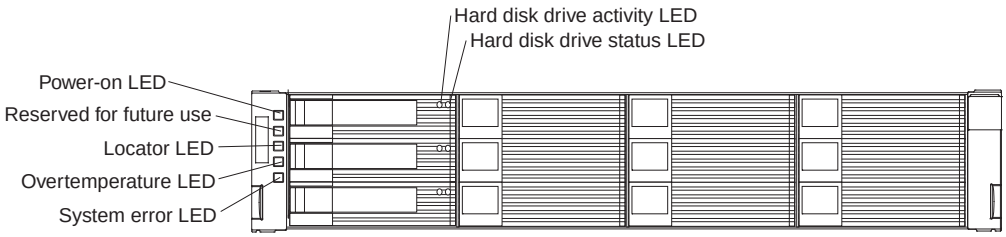
**Bezel (right side)**

On the EXP2512, the right bezel contains the hard disk drive identification information, as shown in the following illustration.

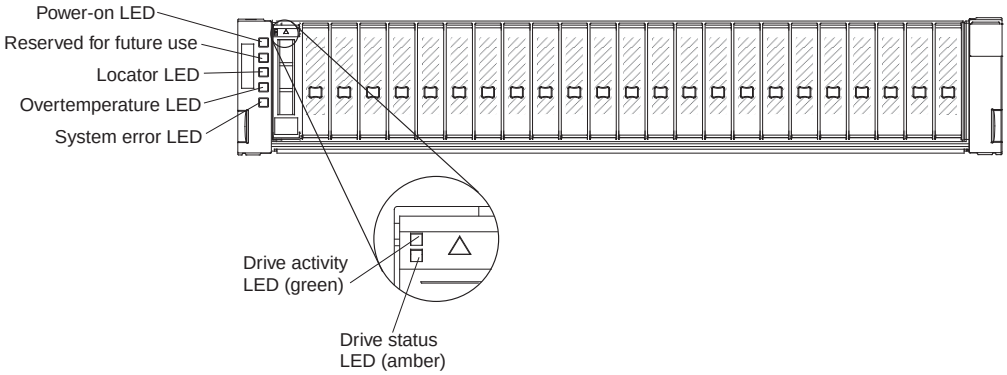



## Front view: LEDs

The LEDs on the front of the EXP2512 are shown in the following illustration.




The LEDs on the front of the EXP2524 are shown in the following illustration.




**Power-on LED (green)**

When this green LED is lit, it indicates that the power supply is turned on and is supplying both 5-volt and 12-volt dc power to the EXP2500.

**Locator LED (blue)**

This blue LED can be lit by the systems-management software on the RAID controller that is connected to the EXP2500, to aid in visually locating the EXP2500.

**Overtemperature LED (amber)**

When this amber LED is lit, it indicates that the EXP2500 is in an overtemperature condition.

**System error LED (amber)**

When this amber LED is lit, it indicates that the unit has a fault, such as in a power supply, ESM, or hard disk drive.

**Hard disk drive activity LED (green)**

Each hard disk drive has an activity LED. When this green LED is flashing, it indicates drive activity.

**Hard disk drive status LED (amber)**

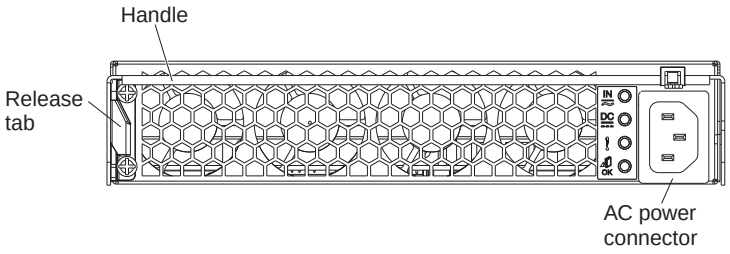
Each hard disk drive has a status LED. When this amber LED is lit continuously, it indicates a drive failure. When it is flashing, it indicates that a drive Identify or Rebuild is in progress.

## Rear view: power supply

The two hot-swap power supplies are on the rear of the EXP2500.

**Attention:** The EXP2500 comes with two installed power supplies. When one power supply fails, the power-supply unit must be replaced to reestablish redundancy. When you replace a failed unit with a new power supply, make sure that you perform this operation in less than 10 minutes to prevent overheating.

The power-supply controls and connectors are shown in the following illustration.




**Release tab**

Press the release tab to the right and rotate the handle downward to remove the power supply.

**Handle**

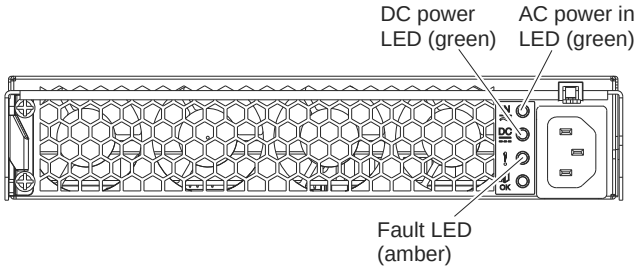
Use the handle to install or remove the power supply.

**AC power connector**

Connect the power cord for the power supply to this connector.

**Note:** There is no power switch on the power supply. A power supply is active when a power cord is connected to it and to a power source.

The LEDs on the power supply are shown in the following illustration.




**AC power LED (green)**
When this green LED is lit, it indicates that the EXP2500 is receiving ac power.

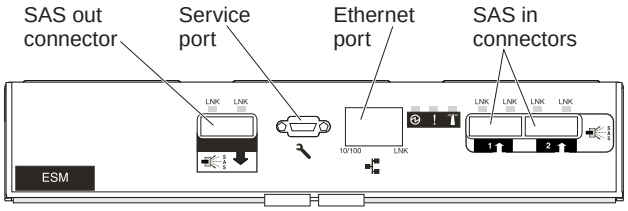
**DC power LED (green)**
When this green LED is lit, it indicates that the EXP2500 is turned on and is supplying both 5-volt and 12-volt dc power to the EXP2500.

**Fault LED (amber)**
When this amber LED is lit, it indicates that a power supply or fan has failed or that a redundant power supply is not turned on.

**OK to remove LED (blue)**
Not in use.

## Rear view: ESMs

The connectors on the ESM are shown in the following illustration.




**SAS out connector**
Connect a SAS cable to this connector and to the SAS In (↑) connector of another EXP2500.

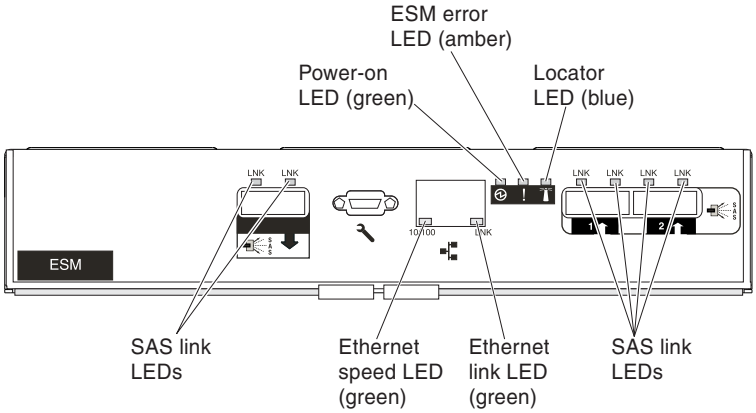
**Service port**
This port is reserved for service technicians.

**Ethernet port**
The Ethernet port is used for remote management and diagnostics.

**Note:** Do not connect the Ethernet port to the public network.

**SAS in connector**
Connect a SAS cable to this connector and to an IBM SAS RAID controller or the SAS Out (↓) connector of another EXP2500 enclosure.

The LEDs on the ESM are shown in the following illustration.




**Power-on LED (green)**
When this green LED is lit, it indicates that the ESM is receiving power.

**ESM error LED (amber)**
When this amber LED is lit, it indicates that the ESM unit has a fault.

**Locator LED (blue)**
This blue LED can be lit by the systems-management software on the RAID controller that is connected to the EXP2500, to aid in visually locating the ESM.

**SAS link LED (green)**
When this green LED is lit, it indicates that two of the x4 SAS links through the SAS cable are successful.

**Ethernet link LED (green)**
When this green LED is lit, it indicates that the Ethernet port link is good.

**Ethernet speed LED (green)**
When this green LED is lit, it indicates that the Ethernet port is operating at 100 Mbps and when this LED is off, the Ethernet port is operating at 10 Mbps.

## EXP2500 power features

This section contains instructions for powering on and off the EXP2500 in normal and emergency situations.

If you are powering on the EXP2500 after an emergency shutdown or power outage, see “Turning on the EXP2500 after an emergency” on page 24.

## Powering on the EXP2500

To power-on the EXP2500 for the initial startup, complete the following steps:

1. Check the system documentation for all the hardware devices that you want to turn on and to determine the correct power-on sequence.
2. Make sure that:
   a. All SAS and Ethernet cables are connected correctly.
   b. All hard disk drives are locked securely in place.
   c. Both power cords are connected to the power supplies on the rear of the EXP2500 and to properly grounded electrical outlets.

**Note:** There is no power-on switch on the EXP2500 or on the power supplies. A power supply is active when a power cord is connected to it and to a power source.

The EXP2500 might take a few seconds to power-on. During this time, you might see the EXP2500 amber fault LED, green power LED, power supply LEDs, and blue system locator LED turn on and off intermittently. When the power-on sequence is completed, only the green power LEDs on the front and rear should remain lit. If one or more amber fault LEDs remain lit, see Chapter 5, “Solving problems,” on page 41.

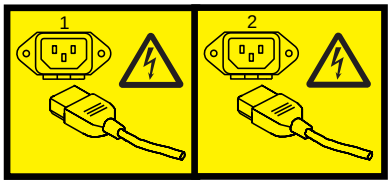
## Powering off the EXP2500

**Attention:** Except in an emergency situation, never power-off if any fault LEDs are lit on the EXP2500. Correct the fault before you attempt to power-off the enclosure, using the correct troubleshooting or servicing procedure. For more information, see Chapter 5, “Solving problems,” on page 41.

**DANGER**

**Multiple power cords. The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.**

**(L003)**




or

The EXP2500 is designed to run continuously, 24 hours a day. Turn off the power only under one or more of the following conditions:

- Instructions in a hardware or software procedure require you to turn off the power.
- A service technician tells you to turn off the power.
- A power outage or emergency situation occurs. See “Turning off the EXP2500 in an emergency.”

To turn off the EXP2500, complete the following steps:

1. Make sure that all amber status or fault LEDs on the EXP2500 are off. If any status or fault LEDs are lit (on hard disk drives, power supplies, or ESMs), identify or correct the problems before you turn off the power. For more information, see Chapter 5, “Solving problems,” on page 41.
2. On the server to which the EXP2500 is connected, either directly or through another supported device that contains a RAID controller to which the EXP2500 is connected, close all operating-system windows and programs; then, shut down the server.
3. Shut down any device that contains a RAID controller to which the EXP2500 is connected.
4. Remove power from both EXP2500 power supplies.

## Turning off the EXP2500 in an emergency

**Attention:** Emergency situations might include fire, flood, extreme weather conditions, or other hazardous circumstances. If a power outage or emergency situation occurs, always turn off all power switches on all computing equipment. This will help safeguard your equipment from potential damage due to electrical surges when power is restored. If the EXP2500 loses power unexpectedly, it might be due to a hardware failure in the power system or midplane. See Chapter 5, “Solving problems,” on page 41.

To turn off the EXP2500 during an emergency situation, complete the following steps:

1. If you have time, stop all activity and check the LEDs (front and rear). Make note of any status or fault LEDs that are lit so that you can correct the problem when you turn on the power again.

   **Note:** See the documentation that comes with your RAID controller for information about correcting the problem.
2. On the server to which the EXP2500 is connected, either directly or through another supported device that contains a RAID controller to which the EXP2500 is connected, close all operating-system windows and programs; then, shut down the server.
3. Shut down any device that contains a RAID controller to which the EXP2500 is connected.
4. Remove power from both EXP2500 power supplies.

## Turning on the EXP2500 after an emergency

To restart the EXP2500 after an emergency shutdown, or if a power failure or a power outage occurred, complete the following steps:

1. After the emergency situation is over or power is restored, check the EXP2500 for damage. If there is no visible damage, continue with step 2; otherwise, have your unit serviced.
2. Check the system documentation for the hardware devices that you intend to turn on, and determine the correct power-on sequence.

   **Note:** Be sure to power-on the EXP2500 before or at the same time you power-on the device that contains the RAID controller to which the EXP2500 is connected.
3. Turn on each connected device, according to the power-on sequence that is described in the documentation that comes with the device.
4. Connect the EXP2500 power cables to power both power supplies on the rear of the EXP2500.
5. Make sure that only the power (green) LEDs on the front and rear are lit. If one or more of the fault (amber) LEDs are lit, see Chapter 5, “Solving problems,” on page 41 for instructions.
6. Use the RAID controller management software as applicable to check the status of the EXP2500.

# Chapter 4. Parts listing, EXP2512 and EXP2524 expansion enclosures

The replaceable components that are available for the EXP2512 and EXP2524 expansion enclosures are described in this chapter. To check for an updated parts listing, go to http://www.ibm.com/systems/support/.

## Replaceable EXP2500 components

Replaceable components are of three types:

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.
- **Tier 2 customer replaceable unit:** You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

For information about the terms of the warranty and getting service and assistance, see the *IBM Warranty and Support Information* document that comes with the EXP2500.

## EXP2512 expansion enclosure parts listing

The following illustration and Table 4 provide a parts listing for the EXP2512 expansion enclosure.

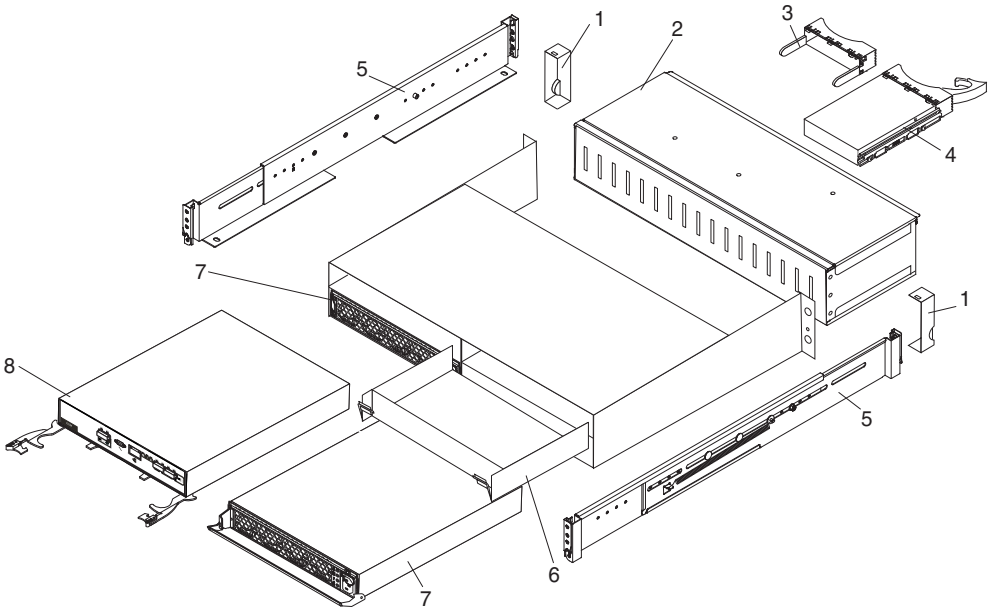



*Table 4. EXP2512 parts listing*

| Index | Description | CRU part number (Tier 1) | CRU part number (Tier 2) | FRU part number |
|---|---|---|---|---|
| 1 | Bezel kit | 69Y0239 | | |
| 2 | Midplane assembly | | | 81Y9609 |
| 3 | Filler panel, 3.5-inch hard disk drive | 42R7992 | | |
| 4 | 3.5-inch hard disk drive | | | |
| | 300 GB 15 K SAS hard disk drive | 49Y1935 | | |
| | 450 GB 15 K SAS hard disk drive | 49Y1936 | | |
| | 600 GB 15 K SAS hard disk drive | 49Y1937 | | |
| | 1 TB 7.2 K nearline SAS hard disk drive | 49Y1939 | | |
| | 2 TB 7.2 K nearline SAS hard disk drive | 49Y1938 | | |
| | 3 TB 7.2 K nearline SAS hard disk drive | 81Y9879 | | |
| 5 | 2 U rail kit | 69Y0233 | | |
| 6 | Filler panel, ESM | 69Y0237 | | |
| 7 | 800-watt power supply, ac | 45W8229 | | |
| 8 | ESM | 69Y0236 | | |
| | IBM 1-meter SAS cable | 39R6530 | | |
| | IBM 3-meter SAS cable | 39R6532 | | |
| | Service pass-thru cable | 43W9310 | | |
| | Power cord, rack jumper, 2.8-meter | 39M5377 | | |

## EXP2524 expansion enclosure parts listing

The following illustration and Table 5 provide a parts listing for the EXP2524 expansion enclosure.

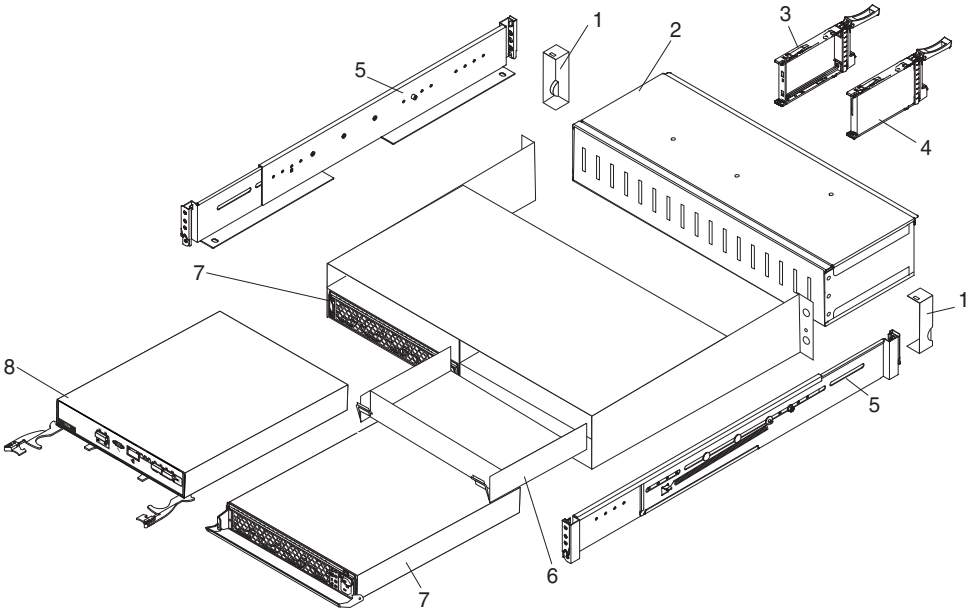



*Table 5. EXP2524 parts listing*

| Index | Description | CRU part number (Tier 1) | CRU part number (Tier 2) | FRU part number |
|---|---|---|---|---|
| 1 | Bezel kit | 49Y1990 | | |
| 2 | Midplane assembly | | | 81Y9834 |
| 3 | Filler panel, 2.5-inch hard disk drive | 45W8680 | | |
| 4 | 2.5-inch hard disk drive | | | |
| | 146 GB 15 K SAS hard disk drive | 49Y1932 | | |
| | 300 GB 15 K SAS hard disk drive | 81Y9914 | | |
| | 300 GB 10 K SAS hard disk drive | 49Y1931 | | |
| | 600 GB 10 K SAS hard disk drive | 81Y9600 | | |
| | 900 GB 10 K SAS hard disk drive | 81Y9894 | | |
| | 500 GB 7.2 K nearline SAS hard disk drive | 49Y1934 | | |
| | 1 TB 7.2 K nearline SAS hard disk drive | 81Y9876 | | |
| | 200 GB Solid State disk drive | 81Y9868 | | |
| | 400 GB Solid State disk drive | 81Y9870 | | |
| 5 | 2 U rail kit | 69Y0233 | | |
| 6 | Filler panel, ESM | 69Y0237 | | |
| 7 | 800-watt power supply, ac | 45W8229 | | |
| 8 | ESM | 69Y0236 | | |
| | IBM 1-meter SAS cable | 39R6530 | | |
| | IBM 3-meter SAS cable | 39R6532 | | |
| | Service pass-thru cable | 43W9310 | | |

*Table 5. EXP2524 parts listing (continued)*

| Index | Description | CRU part number (Tier 1) | CRU part number (Tier 2) | FRU part number |
|---|---|---|---|---|
| | Power cord, rack jumper, 2.8-meter | 39M5377 | | |

## Installation guidelines

Before you install the EXP2500, read the following information:

- Read the safety information that begins on page iii and the guidelines in "Handling static-sensitive devices." This information will help you work safely.
- Make sure that you have an adequate number of properly grounded electrical outlets for the EXP2500 and other devices that you will connect to the EXP2500.
- Back up all important data before you make changes to disk drives.
- You do not have to turn off the EXP2500 to install or replace hot-swap power supplies or hot-swap hard disk drives.
- Orange on a component or label indicates that the component can be hot-swapped. You can install or remove a hot-swap component while the EXP2500 is running.
- Blue on components and labels indicates touch points, where you can grip a component, move a latch, and so on.

## System reliability guidelines

To help ensure proper cooling and system reliability, make sure that the following requirements are met:

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- Each of the power-supply bays has a power supply installed in it.
- Each of the ESM bays has an ESM or a filler panel installed in it.
- There is adequate space around the EXP2500 to allow the cooling system to work correctly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the EXP2500. Do not place objects behind the power supplies.
- You have replaced a failed power supply within 48 hours.
- You have replaced a removed hot-swap hard disk drive with a new drive or filler panel.

## Handling static-sensitive devices

**Attention:** Static electricity can damage the EXP2500 and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of damage from electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal part of the EXP2500 for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the EXP2500 without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the EXP2500 or on a metal surface.

- Take additional care when you handle devices during cold weather. Heating reduces indoor humidity and increases static electricity.

## Working with hot-swap hard disk drives

Before you remove a hard disk drive, review the following information:

**Hot-swap hardware**

You can replace a failed hard disk drive without turning off the EXP2500. Therefore, you can continue to operate the EXP2500 while a hard disk drive is removed or installed. These drives are known as *hot-swap* drives.

**Hard disk drives**

The EXP2500 supports IBM SAS or nearline SAS hard disk drives. Each drive comes preinstalled in a drive tray, ready for installation in the EXP2500. (Do not detach the drive from the tray.) You can install the drives directly into the 12 drive bays on the front of the EXP2500. Before you remove any drives, record the location information for each drive in Table 2 on page 2.

**Attention:** If you remove a drive, you must reinstall it in the same bay. If you reinstall a hard disk drive in the wrong bay, you might lose data.

**Hard disk drive LEDs**

Each hard disk drive has two LEDs that indicate the status of the drive. The drive LED states and descriptions are shown in the following table.

| LED | LED state | Description |
|---|---|---|
| Activity (green) | Flashing | Flashes during read/write or inquiry operations to the hard disk drive |
| Status (amber) | Flashing | Flashes to indicate that the hard disk drive is being rebuilt or that the hard disk drive has been identified by the RAID controller management software |
| Status (amber) | Lit | Is lit continuously to indicate a drive failure |

## Replacing a hot-swap hard disk drive

Hard disk drive problems include any malfunctions that delay, interrupt, or prevent successful I/O activity between the hosts and the hard disk drives in the EXP2500. This includes transmission problems between the host controllers, the ESMs, and the drives. This section explains how to replace a failed drive.

Check the hardware and software documentation that comes with your server to determine whether there are restrictions regarding hard disk drive configurations. Some system configurations might not allow mixing different hard disk drive capacities or types within an array.

To replace a hot-swap hard disk drive, complete the following steps:

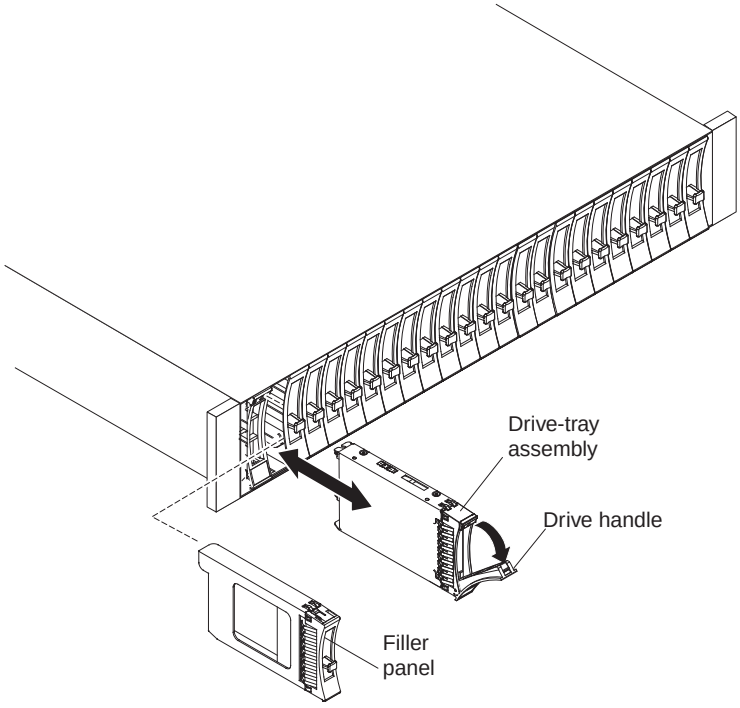
1. Read the instructions that come with the hard disk drive.
2. Read the safety information that begins on page iii and “Installation guidelines” on page 29.

3. Locate the hard disk drive that you want to remove.

   **Attention:** Never hot-swap a hard disk drive when its green activity LED is flashing. Hot-swap a drive only when its amber status LED is lit (not flashing) or when the drive is inactive (activity LED is off).

4. Removing a 2.5-inch hot-swap drive:

   a. Slide the release latch (orange) up gently to unlock the drive handle.

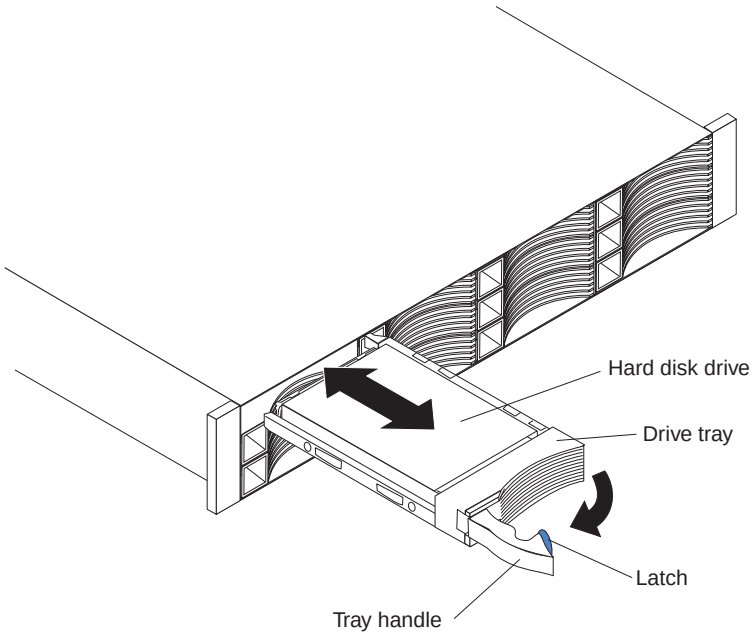



   b. Grasp the handle and pull the drive partially out of the bay and wait at least 20 seconds before you remove the drive from the EXP2500. This enables the drive to spin down and avoids possible damage to the drive.

   c. Make sure that there is proper identification (such as a label) on the hard disk drive; then, gently slide it completely out of the EXP2500. If the drive has failed, indicate that on the label.

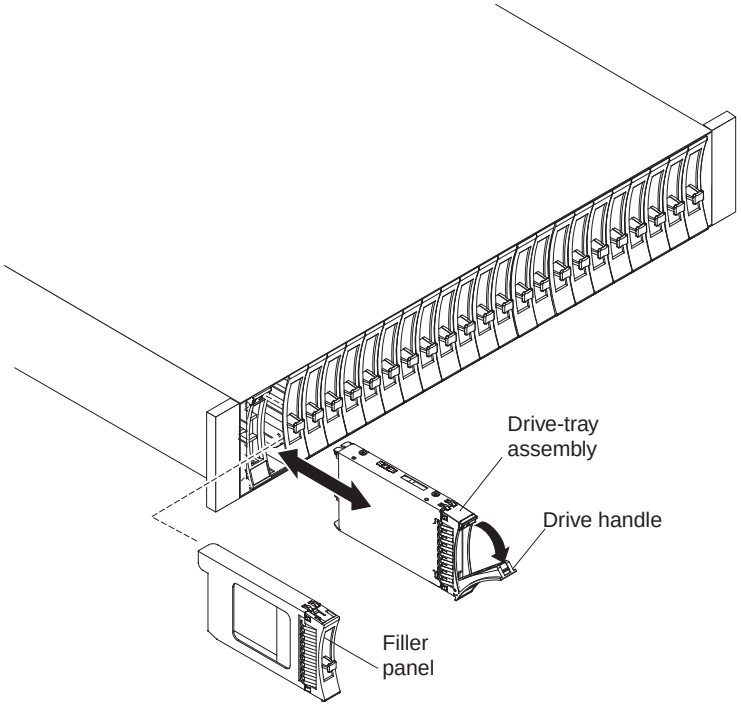
   d. Skip to step 6.

5. Removing a 3.5-inch hard disk drive.
   a. Press the latch on the right end of the tray handle to release it.



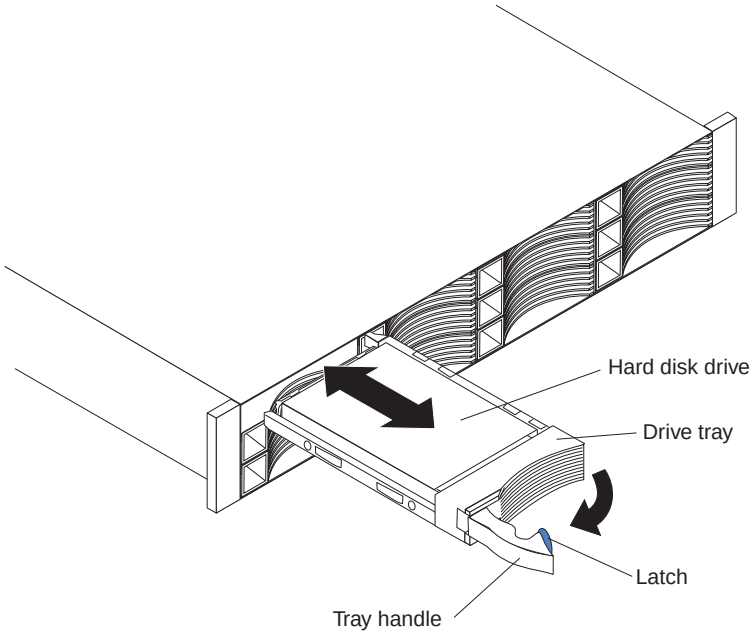

   b. Pull out the tray handle to the open position.
   c. Grasp the handle and pull the drive partially out of the bay and wait at least 20 seconds before you remove the drive from the EXP2500. This enables the drive to spin down and avoids possible damage to the drive.
   d. Make sure that there is proper identification (such as a label) on the hard disk drive; then, gently slide it completely out of the EXP2500. If the drive has failed, indicate that on the label.

6. Installing a 2.5-inch hot-swap drive:
   a. Touch the static-protective package that contains the hard disk drive to any unpainted surface on the outside of the enclosure; then, remove the hard disk drive from the package.
   b. Make sure that the drive-tray handle is in the open (unlocked) position.
   c. Align the drive assembly with the guide rails in the bay.




   d. Gently push the drive-tray assembly into the bay until the drive stops.
   e. Rotate the drive-tray handle to the closed (locked) position.

7. Installing a 3.5-inch hot-swap drive:
   a. Touch the static-protective package that contains the hard disk drive to any unpainted surface on the outside of the enclosure; then, remove the hard disk drive from the package.
   b. Make sure that the tray handle is open; then, slide the hard disk drive into the hot-swap bay.




   c. Push the tray handle to the right into the closed (latched) position.
8. Check the hard disk drive LEDs:
   - When the drive is ready for use, the green activity LED and the amber status LED are off.
   - If the amber status LED is lit and not flashing, remove the drive from the unit and wait 10 seconds; then, reinstall the drive. If the status LED is flashing, the drive is rebuilding.

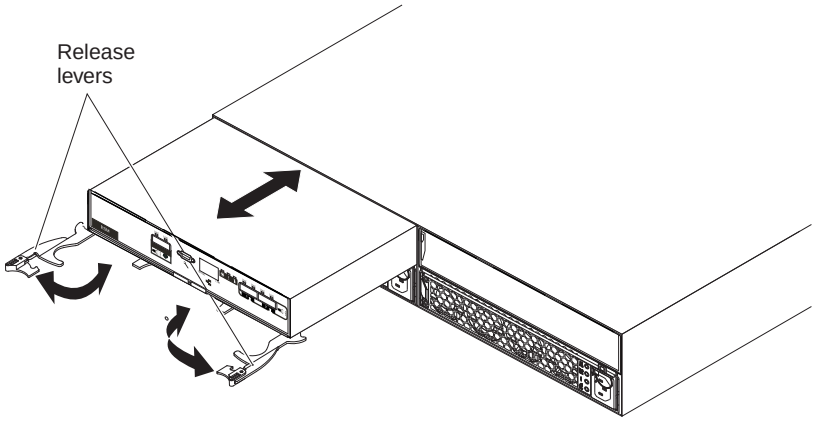
**Controller management information:** In some cases, the RAID controller automatically resets the drive to the Hot Spare or Rebuild state. If the drive state does not change automatically (the amber LED stays lit), see your RAID controller management documentation for information about manually changing the state of the drive from the current state to another state, such as Hot Spare or Ready. The amber LED should turn off within 10 seconds after the drive state changes.

## Replacing an ESM

If you are replacing the only ESM in the EXP2500, you must turn off power to the EXP2500 before you replace the ESM. Refer to the documentation that comes with your RAID controller for additional information and instructions.

To replace an ESM, complete the following steps:

1. Read the safety information that begins on page iii and “Installation guidelines” on page 29.
2. If the EXP2500 contains only one ESM, turn off the power to the EXP2500. For more information, see “Powering off the EXP2500” on page 22.
3. Disconnect the SAS cable from the ESM.
4. Open the two release levers. The ESM moves out of the bay approximately 0.6 cm (0.25 inch).




5. Slide the ESM out of the bay and set it aside.
6. Make sure that the release levers on the new ESM are in the open position.
7. Slide the new ESM into the bay until it stops.
8. Push the release levers to the closed position.
9. Connect the SAS cable to the ESM.
10. Turn on the power to the EXP2500. For more information, see “Powering on the EXP2500” on page 21.
11. Go to http://www.ibm.com/servers/storage/support/ to check for ESM code updates. For more information, see the download instructions on page 1.

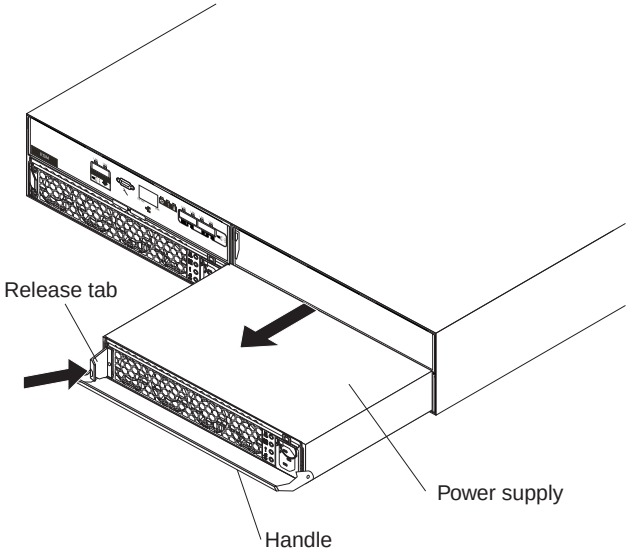
## Replacing a hot-swap power supply

Before you replace a power supply, read the following important information:

- The power supply does not require preventive maintenance.
- Both power supplies must be installed to maintain cooling.
- Use only power supplies that the EXP2500 supports.

To replace a hot-swap power supply, complete the following steps:

1. Read the safety information that begins on page iii and “Installation guidelines” on page 29.
2. Disconnect the power cord from the electrical outlet and from the power supply.
3. On the left side of the power supply, press the orange release tab to the right just enough to release the handle (no more than 6 mm [0.25 in.]) as you rotate the handle downward.



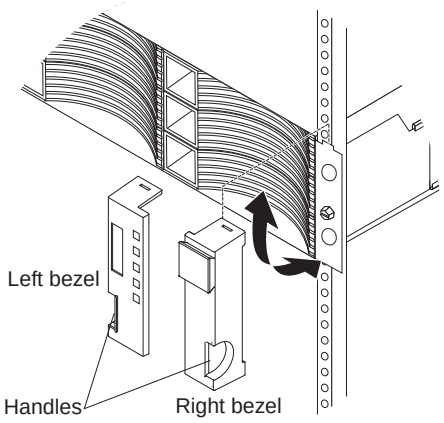

4. Using the handle, gently slide the power supply out of the EXP2500.
5. Hold the new power supply so that the handle is fully extended.
6. Gently slide the power supply into the EXP2500 until it stops. Rotate the handle upward into the closed position until it clicks.
7. Connect the power cord to the power supply and to a properly grounded electrical outlet.

   **Note:** After the power cord is connected to the electrical outlet, make sure that the ac and dc power (green) LEDs are lit and the fault (amber) LED is off.

## Replacing the bezels

The left bezel contains the LEDs; the right bezel shows the hard disk drive IDs. See the illustrations in “Front view: components” on page 17

## Removing the bezels




To remove either the left or right bezel, complete the following steps:

1. If the EXP2500 is on a table or other flat surface, elevate the EXP2500 front slightly or extend the front over the table edge.
2. Grasp the handle on the front of the bezel and pull until the bezel is clear of the bottom tab on the chassis flange.
3. Lift the bezel off the chassis flange.

## Installing the bezels

To install either the left or right bezel, complete the following steps:

1. Fit the cutout that is on the top of the bezel over the tab on the chassis flange.
2. Rotate the bezel down until it snaps into place. Make sure that the inside surface of the bezel is flush with the chassis.

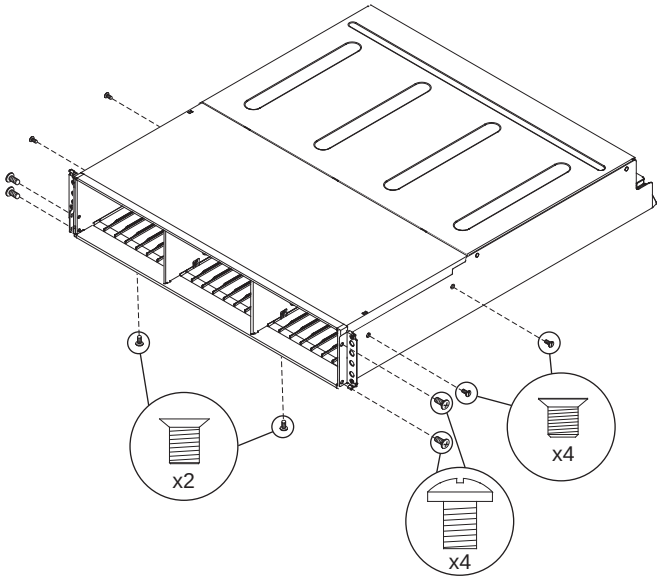
## Replacing the midplane

The midplane assembly must be replaced only by a trained service provider.

To replace the midplane assembly, complete the following steps.

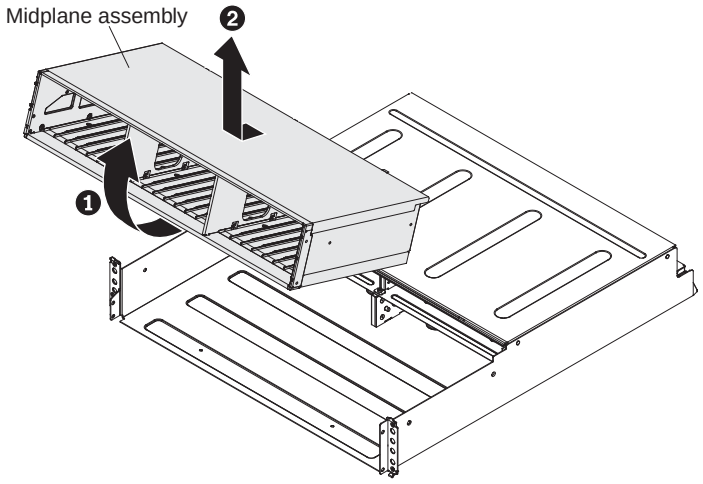
**Attention:** To prevent data loss, you must shut down the storage enclosure before you begin the procedure to replace the midplane assembly.

1. Read the safety information that begins on page iii and “Installation guidelines” on page 29.
2. Turn off the power to the EXP2500 and disconnect all cables. For more information, see “Powering off the EXP2500” on page 22.
3. Carefully remove each hard disk drive and label it with the drive slot from which it was removed (see “Replacing a hot-swap hard disk drive” on page 30). The drives must be inserted back in the same slot from which they were removed.
4. Remove the two power supplies (see “Replacing a hot-swap power supply” on page 36).
5. Remove the ESM and filler panel (see “Replacing an ESM” on page 35).
6. Remove the enclosure from the rack cabinet, turn it on its side with the bottom facing toward you, and place the enclosure on a flat surface.
7. Remove the two screws from the bottom of the enclosure. Label these screws as to the location from which they are removed and place them aside.

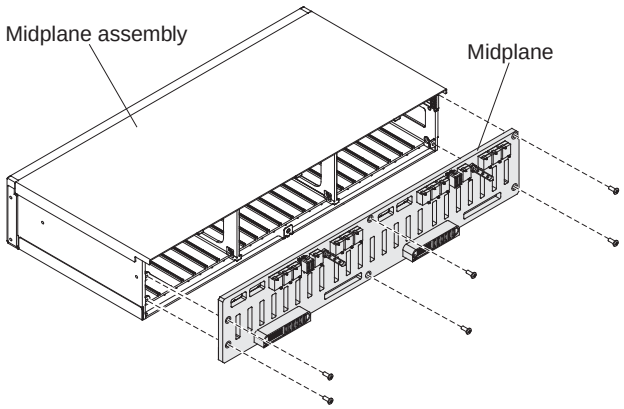



8. Turn the enclosure top side up and place it on a flat surface. Remove the four screws on the right and left sides that secure the midplane assembly to the front of the enclosure. Label the four screws as to the location from which they are removed and place them aside. (See the illustration in step 7.)
9. Remove the four screws on the right and left sides of the enclosure that secure the midplane assembly to the chassis. Label the four screws as to the location from which they are removed and place them aside. (See the illustration in step 7.)

10. Remove the midplane assembly from the chassis. Rotate the midplane assembly up about 45° and then lift it out. Set the midplane assembly on a flat surface.

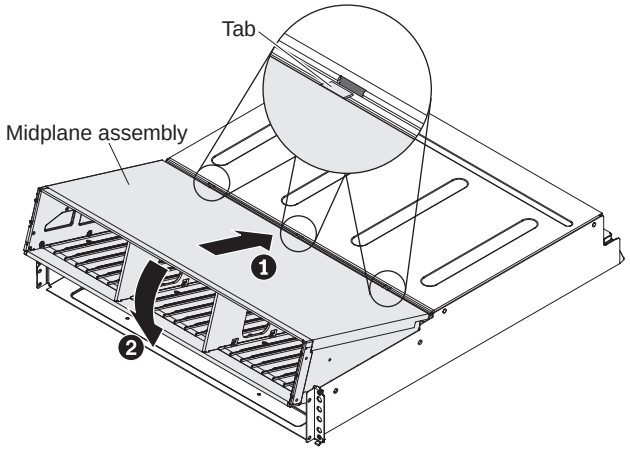



11. Remove the six screws that attach the midplane to the midplane assembly and lift off the failed midplane.




12. Unpack the replacement midplane and align the six screw holes on the midplane with the six screw holes on the midplane assembly. Secure the midplane to the midplane assembly with the six screws that you removed in step 11.

13. Replace the midplane assembly in the enclosure chassis:
    a. Grasp the midplane assembly with two hands and hold it at a 45° angle.




    b. Insert the three tabs on the midplane assembly into the tab holes in the enclosure and rotate the front of the assembly down.
14. Secure the midplane assembly to the chassis on both the right and left sides of the enclosure by using the four screws that you removed in step 9 on page 38.
15. Insert the four screws that secure the midplane assembly to the enclosure on both the right and left front flanges by using the four screws that you removed in step 8 on page 38.
16. Turn the enclosure on its side with the bottom facing toward you and insert the two screws on the bottom of the enclosure by using the two screws that you removed in step 7 on page 38.
17. Reinstall the ESM and blank filler panel (see “Replacing an ESM” on page 35).
18. Reinstall the two power supplies (see “Replacing a hot-swap power supply” on page 36).
19. Reinstall the hard disk drives making sure that each drive is inserted back in the same slot from which it was removed (see “Replacing a hot-swap hard disk drive” on page 30).
20. Power-on the enclosure (see “Powering on the EXP2500” on page 21).
21. Check the LEDs to make sure that the enclosure is fully operational.

# Chapter 5. Solving problems

The following table contains troubleshooting information to help you solve some basic problems that you might have with the EXP2500.

*Table 6. Troubleshooting information*

| Component | Problem indicator | Possible cause | Possible solutions |
|---|---|---|---|
| Hard disk drive | Amber fault LED lit | Drive failure | Replace the failed hard disk drive. See “Replacing a hot-swap hard disk drive” on page 30. |
| ESM | | Board failure | Replace the failed ESM. See “Replacing an ESM” on page 35. |
| Front panel | | General machine fault | A status or fault LED somewhere on the EXP2500 is lit. Check for amber LEDs on components. See Chapter 3, “EXP2500 controls, LEDs, and power,” on page 17. |
| All components | All green LEDs off | The EXP2500 is turned off | Make sure that all EXP2500 power cables are connected and that the power is on. If applicable, make sure that the main circuit breakers for the rack are turned on. |
| | | ac or dc power failure | Check the main circuit breaker and ac or dc outlet. |
| | | Power-supply failure | Replace the power supply. See “Replacing a hot-swap power supply” on page 36. |
| | | Midplane failure | Have the EXP2500 serviced. |
| Hard disk drives | Amber fault LED flashing | Drive rebuild or identity in process | No action is required. |
| Power supply | Amber fault LED lit; green dc power LED off | Power supply failure; power supply turned off; minimum hard disk drives not installed | 1. Install four or more hard disk drives, turn off the power, and turn it on again.<br>2. If the power-supply switch is on, turn off the power supply and then turn it on again. If the condition remains, replace the power supply. See “Replacing a hot-swap power supply” on page 36. |
| Power supply | Amber fault LED lit; green ac power LED off | No ac power to power supply | Check the ac power cord or breaker.<br>• If ac power is good at the source, replace the power cord.<br>• If the power supply has failed, replace the power supply. See “Replacing a hot-swap power supply” on page 36. |
| Front panel | Amber overtemperature LED lit | Filler panel missing | Make sure that the ESM filler panel is installed in the correct ESM bay. |
| | | Environment | Turn off the system until the environment temperature returns to within the defined operating temperature range. |
| | | Fan failure | Replace the power supply with the failed fans. |
| ESM | SAS link LED off | SAS communication failure | 1. Reconnect the SAS cable.<br>2. Replace the SAS cable.<br>3. If the LED is still off, replace the ESM or the device into which the other end of the SAS cable is connected. |

*Table 6. Troubleshooting information (continued)*

| Component | Problem indicator | Possible cause | Possible solutions |
|---|---|---|---|
| One or more hard disk drives | One or more green LEDs off | No activity to the drives | No action is required. |
| All hard disk drives | | No activity to the drives | No action is required. |
| | | Damaged or loose SAS cables | Check the SAS cables and connections. |
| | | ESM failure | Use the RAID controller management software to check the drive status. Replace the ESM. See “Replacing an ESM” on page 35. |
| | | Midplane failure | Have the EXP2500 serviced. |
| Front panel | | Power supply | Make sure that the cables are connected and the power supplies are turned on. |
| | | Hardware failure | If any other LEDs are lit, have the EXP2500 serviced. |
| Some or all components | Intermittent or sporadic power loss to the EXP2500 | Defective ac or dc power source or partially connected power cord | 1. Check the ac or dc power source.<br>2. Secure all installed power cables and power supplies.<br>3. If applicable, check the power components (power supplies, uninterruptible power supply, and so on).<br>4. Replace defective power cables. |
| | | Power-supply failure | Check for a fault LED on the power supply and replace the failed power supply. See “Replacing a hot-swap power supply” on page 36. |
| | | Midplane failure | Have the EXP2500 serviced. |
| Drives | Unable to access any drives | SAS cable | 1. Make sure that the SAS cables are undamaged and correctly connected.<br>2. Replace the cables. |
| | | ESM failure | Have the EXP2500 serviced. |
| Subsystem | Random errors | Midplane failure | Have the EXP2500 serviced. |

# Chapter 6. Remote management and system diagnostics

You can use the command-line interface of the EXP2500 environmental service module (ESM) to perform system diagnostics and other subsystem management tasks. Before you can issue any commands, you must connect to the EXP2500 ESM Ethernet port, establish a session with the EXP2500 ESM, and then launch its command-line interface.

## Launching the EXP2500 ESM command-line interface

Complete the following steps to launch the EXP2500 ESM command-line interface:

1. Use Telnet, or a terminal application that supports Telnet, to connect to the EXP2500 ESM Ethernet port that has a default address of 192.168.128.101 and a subnet mask of 255.255.0.0.
2. Enter USERID as the login name and press ENTER. Leave the password field blank. The command-line interface launches.

See EXP2500 ESM command-line reference for the list of commands.

## EXP2500 ESM command-line reference

*Table 7. List of Commands the EXP2500 Environmental Service Module (ESM) Supports*

| Command Usage | Description |
|---|---|
| `dhcp on\|off timeout_in_ seconds` | Enables/Disables DHCP. Specify timeout. 0 (zero) or unspecified means no timeout |
| `cfgip IP_address Subnet_mask gateway` | Sets IP configuration. Example: cfgip 192.168.0.3 255.255.255.0 192.168.0.2 |
| `collsvcsnap` | Displays all config and status information, such as error logs and state capture buffers |
| `dmesg` | Displays the history buffer of system print strings |
| `drivetemps` | Gets current disk-drive temperatures |
| `drvpres startphy endphy` | Displays present status of the drive |
| `dumperrorlog` | Displays error log contents as hex records |
| `enclamptest on\|off` | Turns on or off all LEDs for testing purposes |
| `esmcompatcheck` | Resets the ESM |
| `esmstatus` | Shows the lockdown status of the ESM |
| `istat` | Provides chassis-specific expander information |
| `netif` | Displays MAC and TCP/IP addresses for all network interfaces |
| `password new_password` | Changes the user password |
| `phyerrregs phyStart [phyEnd]` | Displays PHY Error Registers on PHY phynum (in hex) |
| `phystat` | Prints PHY Status Table |
| `ping host_name_length` | Issues a single ICMP 'Echo Request' packet to a specified host. Length is the 'send buffer' size. Default is 56 bytes |
| `showenc` | Displays Detailed Enclosure Inventory Data |
| `showfwlevels` | Displays firmware levels for all devices connected to the system |
| `showinventory` | Displays information about all the components |
| `uptime` | Informs how long the system has been running |

# Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

## Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Problem Determination and Service Guide* on the IBM *Documentation* CD that comes with your system.
- Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with IBM systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

## Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/systems/support/ and follow the instructions. Also, some documents are available through the IBM Publications Center at http://www.ibm.com/shop/publications/order/.

## Getting help and information from the World Wide Web

On the World Wide Web, the IBM website has up-to-date information about IBM systems, optional devices, services, and support. The address for IBM System x® and xSeries® information is http://www.ibm.com/systems/x/. The address for IBM BladeCenter® information is http://www.ibm.com/systems/bladecenter/. The address for IBM IntelliStation® information is http://www.ibm.com/intellistation/.

You can find service information for IBM systems and optional devices at http://www.ibm.com/systems/support/.

## Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with System x and xSeries servers, BladeCenter products, IntelliStation workstations, and appliances. For information about which products are supported by Support Line in your country or region, see http://www.ibm.com/services/sl/products/.

For more information about Support Line and other IBM services, see http://www.ibm.com/services/, or see http://www.ibm.com/planetwide/ for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

## Hardware service and support

You can receive hardware service through your IBM reseller or IBM Services. To locate a reseller authorized by IBM to provide warranty service, go to http://www.ibm.com/partnerworld/ and click **Find Business Partners** on the right side of the page. For IBM support telephone numbers, see http://www.ibm.com/planetwide/. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

## IBM Taiwan product service

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# Appendix B. Notices

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## Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1,048,576 bytes, and GB stands for 1,073,741,824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1,000,000 bytes, and GB stands for 1,000,000,000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives that are available from IBM.

Maximum memory might require replacement of the standard memory with an optional memory module.

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## Particulate contamination

**Attention:** Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the device that is described in this document. Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the device to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If IBM determines that the levels of particulates or gases in your environment have caused damage to the device, IBM may condition provision of repair or replacement of devices or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

*Table 8. Limits for particulates and gases*

| Contaminant | Limits |
|---|---|
| Particulate | • The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2[1].<br>• Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282.<br>• The deliquescent relative humidity of the particulate contamination must be more than 60%[2].<br>• The room must be free of conductive contamination such as zinc whiskers. |
| Gaseous | • Copper: Class G1 as per ANSI/ISA 71.04-1985[3]<br>• Silver: Corrosion rate of less than 300 Å in 30 days |

[1] ASHRAE 52.2-2008 - *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

[2] The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.

[3] ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.

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## European Union EMC Directive conformance statement

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## Germany Class A statement

**Deutschsprachiger EU Hinweis:**

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

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

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

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

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

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

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

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

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:
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Armonk, New York 10504
914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
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**Generelle Informationen:**

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

## Japan Voluntary Control Council for Interference (VCCI) Class A Statement

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

## Japan Electronics and Information Technology Industries Association (JEITA) statement

高調波ガイドライン適合品

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

## Korea Communications Commission (KCC) Class A Statement

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## Russia Electromagnetic Interference (EMI) Class A statement

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В жилых помещениях оно может создавать радиопомехи, для снижения которых необходимы дополнительные меры

## People's Republic of China Class A electronic emission statement

中华人民共和国“A类”警告声明

声 明

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