

# 5886 Expansion Unit

Service Guide





# ESCALA

## 5886 Expansion Unit Service Guide

### Hardware

July 2008

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#### CAUTION:

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- **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:

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**CAUTION:**

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- Locations where the NEC (National Electrical Code) applies

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This product may contain sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, go to <http://www.ibm.com/ibm/environment/products/index.shtml> or contact your local waste disposal facility.

In the United States, IBM has established a return process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and other battery packs from IBM Equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Please have the IBM part number listed on the battery available prior to your call.

For Taiwan: Please recycle batteries.



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Les batteries ou emballages pour batteries sont étiquetés conformément aux directives européennes 2006/66/EC, norme relative aux batteries et accumulateurs en usage et aux batteries et accumulateurs usés. Les directives déterminent la marche à suivre en vigueur dans l'Union Européenne pour le retour et le recyclage des batteries et accumulateurs usés. Cette étiquette est appliquée sur diverses batteries pour indiquer que la batterie ne doit pas être mise au rebut mais plutôt récupérée en fin de cycle de vie selon cette norme.

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The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5 Chapter 33. Best Management Practices for Perchlorate Materials. This product, part, or both may include a lithium manganese dioxide battery which contains a perchlorate substance.

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## About this publication

The 5886 Serial Attached SCSI (SAS) expansion unit provides power, cooling, and SAS interface connections for up to 12 SAS disk drives. Several SAS connection options are offered. One option includes a single initiator that provides paths to all the SAS disk drives.

For information about the accessibility features of this product, for users who have a physical disability, see “Accessibility features,” on page 43.

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## Chapter 1. Reference information

System features include light emitting diode (LED) indicators, SAS disk drives, power supplies, fans, and adapters.

The following features are available on the SAS enclosure:

- Several SAS connection options are available, including a single initiator that provides dual paths to all of the SAS disk drives as a standard offering, and a high-availability dual initiator feature that allows the connection of two adapters to all the SAS disk drives.
- Uses the magapack common disk carrier
- The SAS enclosure is available in a horizontal EIA rack drawer for mounting in industry-standard equipment racks.
- AC operation, 100-240 V at 50/60 Hz power supply
- The SAS enclosure has slots for up to 12 disk drives and contains two redundant power supplies, facilitating operation from two independent prime power sources. Two fans are embedded in each power supply, providing redundancy. The hard drives, expanders, and power supplies, all of which are field replaceable, all plug into a midplane. The SAS enclosure does not have internal cables. All power and signal cables connect to the rear of the drawer.
- In high-availability configurations, power and cooling failures, as well as disk drive and SAS interface card failures, can be repaired concurrently.
- A full family of System i™ and System p™ drive assemblies are available.
- 3 Gbit peak data rate per drive, 3 Gbit peak data rate per SAS
- Complete power fault containment to each FRU (Field Replaceable Unit)
- Independent SCSI Enclosure Services (SES) diagnostic processor for each expander
- Service identification indicators for each expander, power supply, disk drive, and the SAS enclosure
- High reliability midplane within chassis, automatically locks in place, and interconnects all FRUs

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### Service indicators

Describes the LED indicators and the types and locations of disk drives, power supplies, fans, and adapters.

### SAS enclosure front view indicators

## Drive carrier LEDs with disk drive installed

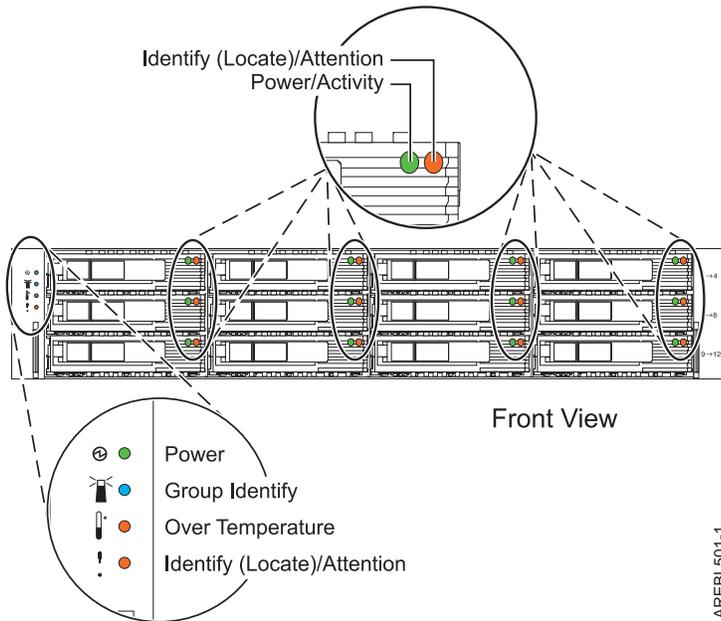


Figure 1. SAS enclosure front view.

Table 1. Identifies the drive carrier LED state when a disk drive is installed

LED name	LED color	LED state	Description
Power / Activity	Green	Flashing	Drive is processing data
Identify(Locate)/ Attention	Amber	Solid on	Drive is faulty or ready to be removed
		Flashing	Identifies the slot
<b>Note:</b>			
1. A request to flash the LED overrides any request for solid on. If the flashing request is removed and the solid on has not been removed, the LED reverts to solid on.			
2. The flashing rate shall be nominally 4 Hz (minimum 1 Hz) with a nominal 50% duty cycle.			
3. The SCSI Enclosure Services (SES) device also turns solid on the amber Identify(Locate)/Attention LED of the SAS enclosure.			
4. The SES device also flashes the amber Identify(Locate)/Attention LED of the SAS enclosure.			

## Drive carrier LEDs with no disk drive installed

Table 2. Identifies the drive carrier LED state when a disk drive is not installed

LED name	LED color	LED state	Description
Power / Activity	Green	Off	Not used
Identify(Locate)/ Attention	Amber	Solid On	The slot is empty and a drive is to be installed
		Flashing	Identifies the slot.

Table 2. Identifies the drive carrier LED state when a disk drive is not installed (continued)

LED name	LED color	LED state	Description
<b>Note:</b>			
1. A request to flash the LED overrides any request for solid on. If the flashing request is removed and the solid on has not been removed, the LED reverts to solid on.			
2. The flashing rate is nominally 4 Hz (minimum 1 Hz) with a nominal 50% duty cycle.			
3. The SES device also flashes the amber Identify(Locate)/Attention LED of the SAS enclosure.			

## SAS enclosure front LEDs

Table 3. Identifies the SAS enclosure's front LED state

LED name	LED color	LED state	Description
Group Identify	Blue	Solid on	Locates the SAS enclosure
Identify(Locate)/Attention	Amber	Flashing	
Identify(Locate)/Attention	Amber	Solid on	Indicates a faulty element in the enclosure or an element is ready for a concurrent maintenance insert/remove action (if any element in the SAS enclosure has its amber LED solid on, then this LED is solid on).
Over Temperature	Amber	Solid on	Identifies an over temperature situation on the SAS enclosure
Power	Green	Solid on	Identifies the SAS enclosure is powered-on
<b>Note:</b>			
1. A request to flash the LED overrides any request for solid on. If the flashing request is removed and the solid on has not been removed the LED shall be set back to solid on.			
2. The flashing rate shall nominally 4 Hz (minimum 1 Hz) with a nominal 50% duty cycle.			

## SAS enclosure back view indicators

Each SAS 4x cable connector has a green LED and an amber LED. No fault is indicated (that is, the amber LED solid off) on any of the SAS 4x cable connectors. There is no identify indication (such as the amber LED flashing) on any of the SAS 4x cable connectors. The state of the green LED is not defined.

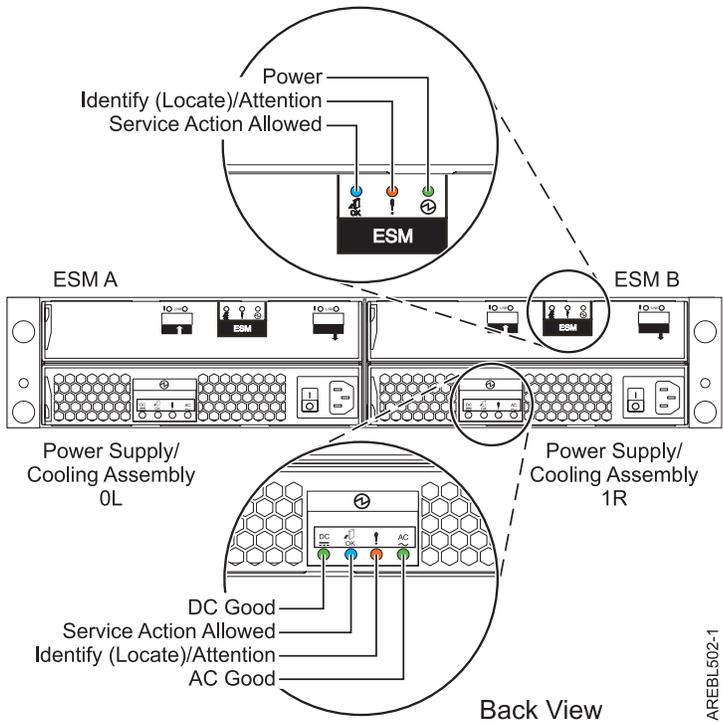


Figure 2. SAS enclosure back view shows the positions of the LED indicators.

### SAS enclosure Enclosure Services Manager (ESM) LEDs

Table 4. Describes the SAS enclosure's ESM LEDs.

LED name	LED color	LED state	Description
Service Action Allowed	Blue	Solid on	Identifies the ESM
Identify(Locate)/Attention	Amber	Flashing	
		Solid on	Indicates a fault has occurred in the ESM
		Solid off	Indicates that the ESM has successfully completed initialization
Power	Green	Solid on	Identifies the ESM is powered-on

**Note:**

1. The blue LED is not used by IBM service.
2. A request to flash the LED overrides any request for solid on. If the flashing request is removed and the solid on has not been removed the LED shall be set back to solid on.
3. The flashing rate shall nominally 4 Hz (minimum 1 Hz) with a nominal 50% duty cycle.
4. There is no SES command control to turn the amber LED solid on. Only the ESM can turn the able LED solid on.
5. The SES device also flashes the amber Identify(Locate)/Attention LED of the SAS enclosure.
6. The SES device also turns solid on the amber Identify(Locate)/Attention LED of the SAS enclosure.

## SAS enclosure power supply and cooling assembly LEDs

Table 5. Describes the SAS enclosure's Power Supply and Cooling Assembly LEDs.

LED name	LED color	LED state	Description
DC Power	Green	Solid on	Identifies the power supply or cooling assembly is supplying dc power
Service Action Allowed	Blue	Solid on	Indicates the power supply and cooling assembly can be removed.
Identify(Locate)/Attention	Amber	Solid on	Indicates a fault has occurred in the power supply or cooling element
AC Power	Green	Solid on	Identifies the power supply and cooling assembly has ac power

**Note:**

1. The blue LED is not used by IBM service.
2. There is no SES command control to turn the LED solid on. Only the ESM can turn the able LED solid on.
3. The SES device also turns solid on the amber Identify(Locate)/Attention LED of the SAS enclosure.

## LEDs during power on

The condition of the LEDs is independent of, and causes no delays in, powering on the SAS disk drives.

Table 6. The condition of the drive carrier LEDs during power on.

LED name	LED color	LED state during Power on
Power/Activity	Green	If a SAS disk drive is present in the carrier, the green LED will flash twice when power is applied, after which it blinks at a 1Hz frequency while the SAS disk drive is starting. If no SAS disk drive is present in the carrier, the green LED is turned off.
Identify(Locate)/Attention	Amber	Off

Table 7. SAS enclosure front LEDs state during power on.

LED name	LED color	LED state during Power on
Group Identify	Blue	Flashes briefly when power applied. Goes off when boot process begins.
Identify(Locate)/Attention	Amber	
Over Temperature	Amber	
Power	Green	Solid on after power applied.

Table 8. SAS enclosure ESM LEDs during power on

LED name	LED color	LED state during Power on
Service Action Allowed	Blue	Solid on as soon as dc ready is signaled by the power supply. Turned off when power on self test (POST) begins. Remains off unless fault is detected.

Table 8. SAS enclosure ESM LEDs during power on (continued)

LED name	LED color	LED state during Power on
Identify(Locate)/Attention	Amber	Solid on as soon as dc ready is signaled by the power supply. Turned off if the power on self test completes successfully; otherwise, left on. Remains off unless fault is detected or if instructed by an SES command.
Power	Green	Solid on as soon as dc ready is signaled by the power supply.

Table 9. SAS enclosure power supply or cooling assembly LEDs during power on.

LED name	LED color	LED state during Power on
DC Power	Green	Off until dc current is stable, which occurs up to 3 seconds after power on, then turns solid on.
Service Action Allowed	Blue	Solid on until dc becomes stable then turns solid off.
Identify(Locate)/Attention	Amber	May turn on until power balance is achieved between the two power supplies, which might take up to five seconds.
AC Power	Green	Solid on when the ac switch is set to "I" and remains solid on.
<b>Note:</b> A successful power sequence results in both green LEDs solid on about 3 to 5 seconds after power is applied to both supplies.		

## SAS enclosure nonfunctional ESM Identify(Locate)/Attention LED control

If power is applied and an ESM is nonfunctional, that ESM's amber LED is turned on solid by the functional ESM. The functional ESM also causes the SAS enclosure front Fault Identify(Locate)/Attention LED to be solid on.

If a functional ESM detects that the other ESM is nonfunctional, then the functional ESM forces the nonfunctional ESM into reset, which causes the ESM's amber LED to turn on solid. The functional ESM also causes the SAS enclosure front Fault Identify(Locate)/Attention LED to be solid on.

Each ESM contains a watchdog timer that it monitors. If the watchdog is not serviced regularly (for example, there is a failure on the ESM), the ESM attempts to recover. If the recovery fails, the ESM attempts to blink its amber LED, turning solid on the SAS enclosure front Fault Identify(Locate)/Attention LED.

If communication is possible between the nonfunctional ESM's SES device and the adapter, then the adapter software might request that the ESM amber LED be set to blink. This action also causes the SAS enclosure front Fault Identify(Locate)/Attention LED to blink. The adapter software is unable to indicate an ESM fault (for example, amber LED solid on). However, the adapter might cause a box fault at any time.

---

## Chapter 2. Using location codes

The information provided in this topic defines specific sections of a location code string. Use this topic when you need help in interpreting a location code.

For additional information about reading your location code, use the following table to link to a specific topic.

Location code topics that might be of interest	Description
"Location code overview"	Contains background information on the use of location codes.
"Physical location codes" on page 8	Provides a definition for physical location code.
"Logical location codes" on page 8	Provides a definition for a logical location code.
"Location code format" on page 8	Provides descriptive information of the <i>Un</i> value in the location code string. For example U5886.001.
"Location code labels" on page 9	Provides a table that identifies and defines the location code labels. The location code labels begin with an alphabetic character and follow the system serial number. For example, U7879.001.10ABCDE-P3-C31-T2-L23. (The system serial number is the "10ABCDE" in the previous example.) The P3, C31, T2, and L23 all contain an alphabetic character that is identified in the Location code labels table.
"Worldwide unique identifier" on page 9	Provides a definition for the worldwide unique identifier. This group of digits follows the resource code labels and always begins with the letter <i>W</i> .

### Location code overview

Servers (system unit and expansion units) use physical location codes to provide mapping of replaceable units. Location codes are produced by the server's firmware, which structures them so that they can be used to identify specific parts in a system. The location code format is the same for all servers.

If you are working with a specific location code, the feature immediately follows the first character (U5886). Refer to the Unit type and locations table.

If the location code ends with **-Txx-Lxx**, the server's firmware could not identify the physical location. When a physical location cannot be identified, a logical location code is provided. Where logical location codes occur in enclosures, the locations article for the enclosure has the known conversions listed. For logical location codes with no conversion, contact your next level of support.

If the location code begins with **UTMPx**, the expansion I/O unit's machine type, model and serial number have not been set yet and this is a temporary unit identifier. To identify the unit, examine the display panels on all of the expansion I/O units connected to the server until you find one with the same characters in the first 5 digits of the top line in the unit's display. Record the unit's real machine type and model from the unit label. Match the unit's machine type and model in the Unit type and locations table, and follow the link to determine the service information.

**Note:** Locations for units that are not in the preceding list are either not supported or there is a problem in the firmware. Contact your next level of support.

## Physical location codes

Physical location codes provide a mapping of logical functions and components, such as backplanes, removable modules, connectors, ports, cables, and devices, to their specific locations within the physical structure of the server.

## Logical location codes

If the physical location cannot be mapped to a physical location code, the server's firmware will generate a logical location code. A logical location code is a sequence of location labels that identify the path that the system uses to communicate with a given resource.

**Note:** A resource has as many logical location codes as it has logical connections to the system. For example, an external tape device connected to two I/O adapters will have two logical location codes.

An example of a logical location code is:

U7879.001.10ABCDE-P3-C31-T2-L23

The first part of the location code (through the T2 label) represents the physical location code for the resource that communicates with the target resource. The remainder of the logical location code (L23) represents exactly which resource is indicated.

## Location code format

The location code is an alphanumeric string of variable length, consisting of a series of location identifiers, separated by a dash. An example of a physical location for a fan is  $U_n-A1$ .

The first position, represented by  $U_n$  (where  $n$  is equal to any string contained between the U and the hyphen) in the preceding example, is displayed in one of the following forms:

**Note:** In location codes, the U is a constant digit, however, the numbered positions following the U are variables and are dependent on your server. Each column defines the numbers following the U in the beginning of the location code.

Table 10. Differentiates between the machine type model and feature code location codes

Feature codes and sequence numbers in its location code
$Uffff.ccc.ssssss-A1$
The leftmost code is always U
$ffff$ represents the feature code of the enclosure (drawer or node)
$ccc$ represents the sequence number of the enclosure
$ssssss$ represents the serial number of the enclosure

The location code is hierarchical; that is, each location identifier in the string represents a physical part. The order (from left to right), in which each identifier is shown, allows you to determine which parts contain other parts in the string.

The - (dash) separator character represents a relationship between two components in the unit. In the example of the fan, whose location code is  $U_n-A1$ , the - (dash) shows that the fan (A1) is contained in the base unit (or  $U_n$ ). Modules, adapters, cables, and devices are all parts that are plugged into another part. Their location codes will always show that they are plugged into another part as components of the server. Another example,  $U_n-P1-C9$  is a memory DIMM, with (C9) plugged into a backplane (P1), which is inside the unit ( $U_n$ ).

For more information about the various location code label prefixes, refer to Location code labels.

**Note:** For devices, certain error conditions might cause an i5/OS® device to display the device location in an AIX® format.

Table 11. Unit type and locations

Unit type (Utttt)	Link to location information
U5886	Locations

## Location code labels

The following table identifies the location code label prefixes.

**Note:** These labels apply to system units only.

Table 12. Location code label prefixes for system units

Prefix	Description	Example
A	Air-moving device	Fan, blower
C	Card connector	IOP, IOA, DIMM, processor card
D	Device	Diskette, control panel
E	Electrical	Battery, power supply, ac charger
L	Logical path SAS target	IDE address, Fibre Channel LUN
N	Horizontal placement for an empty rack location	
P	Planar	System backplane
T	Port	
U	Unit	
V	Virtual planar	
W	Worldwide unique ID	
X	EIA value for an empty rack location	
Y	Firmware FRU	

## Worldwide unique identifier

A worldwide unique identifier location label consists of the prefix "W" followed by a maximum of 16 uppercase hexadecimal digits with no leading zeros. A location code may or may not consist of a worldwide unique identifier. When present, the worldwide unique identifier location label follows the location label of the resource that interfaces with the resource having the worldwide unique identifier, usually a port.

---

## Locations

Use this information to help you map a location code to a position on the unit.

**Note:** The known logical location codes for this unit are listed next to the corresponding physical location in the following information. If you are working with a logical location code for this unit and it is not listed in the following information, contact your next level of support.

The following diagrams show the field replaceable unit (FRU) layout in the system. Use these diagrams with the following tables.

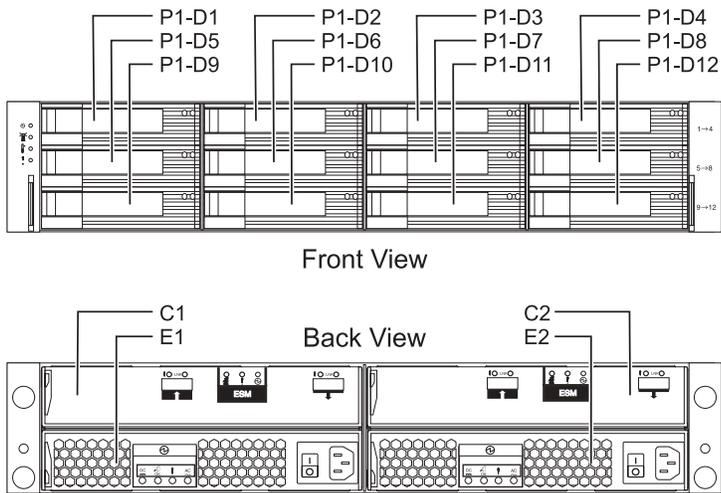


Figure 3. Front and rear views.

The following table provides location codes for parts that make up the server.

Table 13. FRU locations and failing components

Failing item name	Symbolic failing item name	Physical location code	Identify LED	Link to part number	Failing item removal and replacement procedures
System unit		U <sub>n</sub>			
<b>ESM</b>					
ESM A		U <sub>n</sub> -C1	Yes	Part information	"Enclosure Services Manager (ESM)" on page 16
ESM B		U <sub>n</sub> -C2	Yes	Part information	"Enclosure Services Manager (ESM)" on page 16
<b>Power supplies</b>					
Power supply	PWRSPLY	U <sub>n</sub> -E1	Yes	Part information	"Power Supply" on page 22
Power supply	PWRSPLY	U <sub>n</sub> -E2	Yes	Part information	"Power Supply" on page 22
<b>Midplane</b>					
Midplane		U <sub>n</sub> -P1	Yes	Part information	"Midplane" on page 18
<b>Device physical locations</b>					
Disk drive 1		U <sub>n</sub> -P1-D1	Yes	Part information	"Disk Unit" on page 15
Disk drive 2		U <sub>n</sub> -P1-D2	Yes	Part information	"Disk Unit" on page 15
Disk drive 3		U <sub>n</sub> -P1-D3	Yes	Part information	"Disk Unit" on page 15

Table 13. FRU locations and failing components (continued)

Failing item name	Symbolic failing item name	Physical location code	Identify LED	Link to part number	Failing item removal and replacement procedures
Disk drive 4		Un-P1-D4	Yes	Part information	"Disk Unit" on page 15
Disk drive 5		Un-P1-D5	Yes	Part information	"Disk Unit" on page 15
Disk drive 6		Un-P1-D6	Yes	Part information	"Disk Unit" on page 15
Disk drive 7		Un-P1-D7	Yes	Part information	"Disk Unit" on page 15
Disk drive 8		Un-P1-D8	Yes	Part information	"Disk Unit" on page 15
Disk drive 9		Un-P1-D9	Yes	Part information	"Disk Unit" on page 15
Disk drive 10		Un-P1-D10	Yes	Part information	"Disk Unit" on page 15
Disk drive 11		Un-P1-D11	Yes	Part information	"Disk Unit" on page 15
Disk drive 12		Un-P1-D12	Yes	Part information	"Disk Unit" on page 15

## Addresses

Location code to address cross reference

Use the table to cross reference a disk drive physical location code to the address.

Table 14. Device address information

Physical location code	Unit address
Un-P1-D1	044000FF
Un-P1-D2	044100FF
Un-P1-D3	044200FF
Un-P1-D4	044300FF
Un-P1-D5	044400FF
Un-P1-D6	044500FF
Un-P1-D7	044600FF
Un-P1-D8	044700FF
Un-P1-D9	044800FF
Un-P1-D10	044900FF
Un-P1-D11	044A00FF
Un-P1-D12	044B00FF



---

## Chapter 3. Removal and replacement procedures

Use the removal and replacement procedures when you repair, maintain, or exchange your system parts.

Before you begin a replacement, perform these tasks:

1. If you are performing a replacement procedure that might put your data at risk, ensure, if possible, that you have a current backup of your system or logical partition (including operating systems, licensed programs, and data).
2. Review the installation or replacement procedure for the feature or part.
3. Note the significance of color on your system. Black or silver on a part of the hardware indicates a touch point where you can grip the hardware to remove it from or install it in the system, open or close a latch, and so on. Black or silver might also indicate that the part can be removed and replaced with the system or logical partition power on.
4. Ensure that you have access to a medium, flat-blade screwdriver.
5. If parts are incorrect, missing, or visibly damaged, contact your service provider or next level of support.

## DANGER

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

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

- Connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To Disconnect:

1. Turn off everything (unless instructed otherwise).
2. Remove the power cords from the outlets.
3. Remove the signal cables from the connectors.
4. Remove all cables from the devices

To Connect:

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

(D005)

**Attention:** Failure to follow the step-by-step sequence for FRU removal or installation may result in FRU or system damage.

Use the following precautions whenever you handle electronic components or cables.

- The electrostatic discharge (ESD) kit and the ESD wrist strap must be used when handling logic cards, SCMs, MCMs, electronic boards, and disk drives.
- Keep all electronic components in the shipping container or envelope until you are ready to install them.
- If you remove, then reinstall an electronic component, temporarily place the component on an ESD pad or blanket.

---

## Disk Unit

How to service the disk unit.

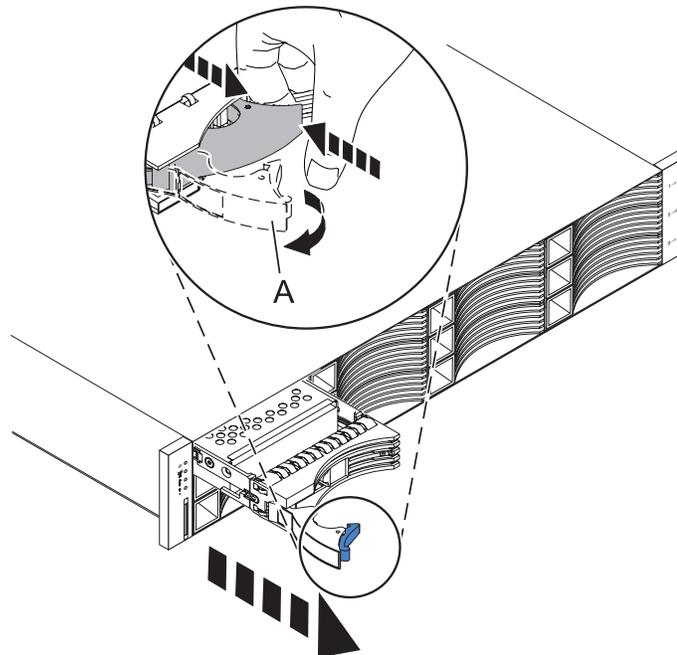
Use this procedure to service the disk unit.

The disk unit is serviced concurrently.

### Attention:

Failure to follow the step-by-step sequence for this FRU removal and/or installation may result in damage to the FRU or system.

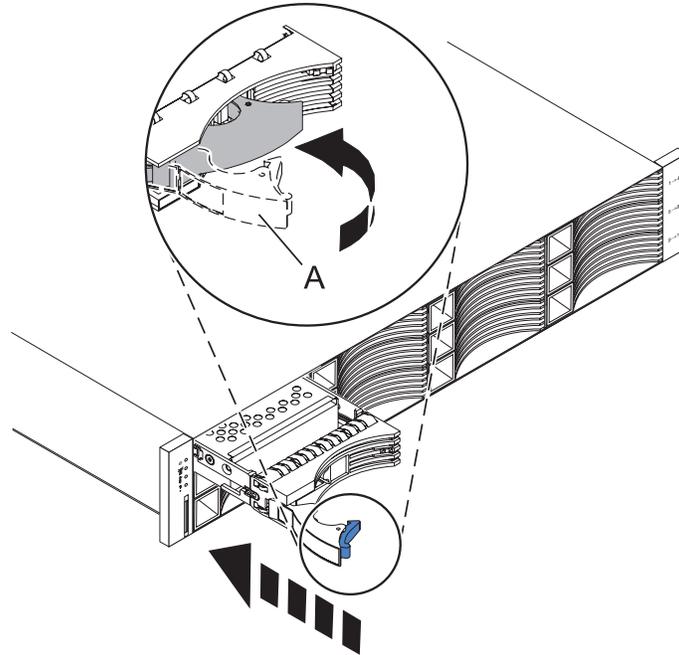
1. Use the following precautions whenever you handle electronic components or cables.
  - Attach a wrist strap to an unpainted metal surface of your hardware to prevent electrostatic discharge from damaging your hardware.
  - If you do not have a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds.
  - Keep all electronic components in the shipping container or envelope until you are ready to install them.
  - If you remove, then reinstall an electronic component, temporarily place the component on an ESD pad or blanket, if available.



### 2. Remove the disk unit.

- a. Press the latch on the right end of the disk unit handle to release the disk unit from its slot.
- b. Pull out the handle (A) to the open position. This action releases the disk unit from its slot.
- c. Grasp the front of the disk unit and pull it out from the system unit, make sure that you support the bottom of the drive while you do this.

**Note:** The concurrent maintenance light for the slot turns off when you remove the disk unit.



### 3. Install the disk unit.

- With the handle (A) in the unlocked position, support the bottom of the disk unit as you align it with the guide rails in the expansion unit.

**Note:** Do not hold the disk unit solely by the handle.

- Slide the disk unit into the expansion unit.
- Push the handle towards the disk unit to lock it into place.

---

## Enclosure Services Manager (ESM)

Service the Enclosure Services Manager (ESM).

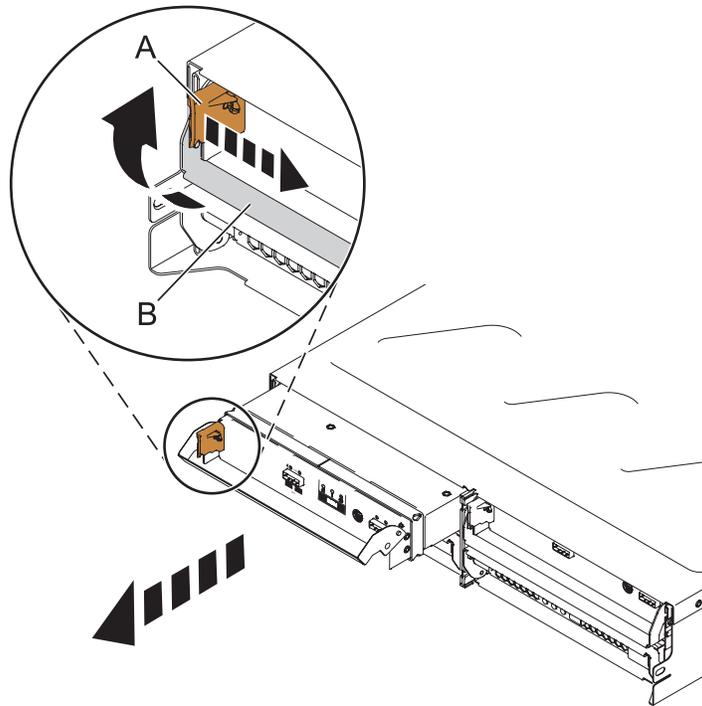
Use this procedure to service the ESM.

**The ESM can be serviced concurrently only when its amber fault light is solid on.**

**Attention:** Failure to follow the step-by-step sequence for this FRU removal and/or installation may result in damage to the FRU or system.

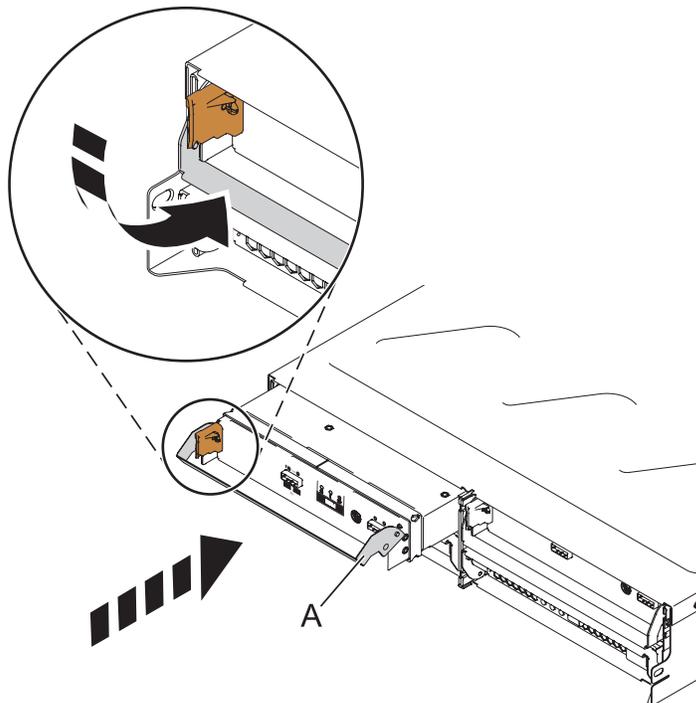
Use the following precautions whenever you handle electronic components or cables.

- Attach a wrist strap to an unpainted metal surface of your hardware to prevent electrostatic discharge from damaging your hardware.
- If you do not have a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds.
- Keep all electronic components in the shipping container or envelope until you are ready to install them.
- If you remove, then re-install an electronic component, temporarily place the component on an ESD pad or blanket, if available.



**1. Remove the ESM**

- a. Disconnect the SAS cable or cables from the ESM and mark their locations.
- b. On the left side of the ESM, press the orange release tab (A) to the right as you rotate the handle (B) upward.
- c. Using the handle, gently slide the ESM out of the enclosure, supporting the sides while you do this.



**2. Install the ESM**

- a. Hold the replacement ESM so that the handle (A) is fully extended.
- b. Gently slide the ESM into the bay until the ESM stops.

- c. Rotate the handle downward into the closed position until it clicks.
- d. Reconnect the SAS cable or cables to the ESM.

---

## Midplane

How to service the midplane.

Use this procedure to service the midplane.

**The midplane will be serviced non-concurrently.**

**Attention:** Failure to follow the step-by-step sequence for this FRU removal and/or installation may result in damage to the FRU or system.

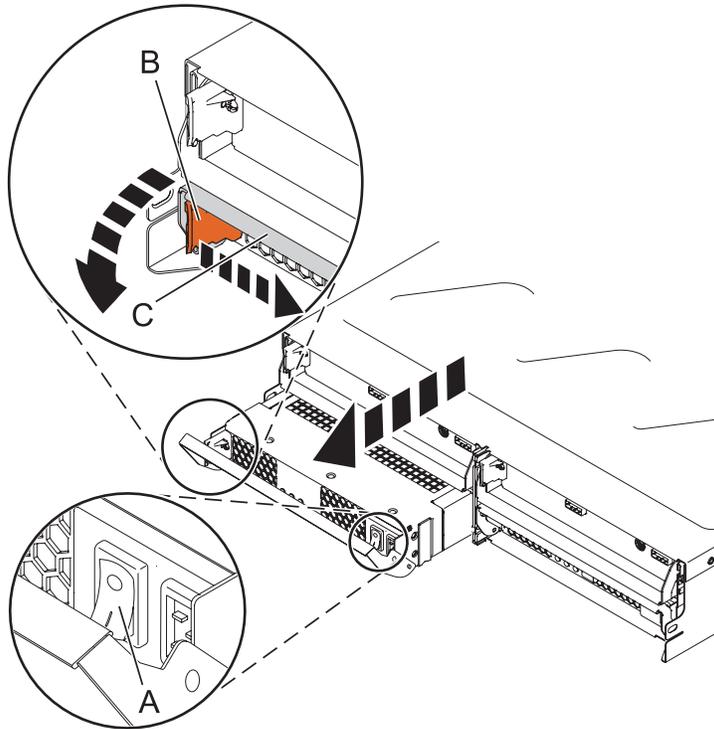
1.
  - a. Unconfigure the expansion unit from the system by either method:
    - Power off the entire system
    - Remove the Serial Attached SCSI (SAS) configuration from the system configuration
  - b. Power off the expansion unit by turning off the power supply switches on each of the power supplies.

2.

Use the following precautions whenever you handle electronic components or cables.

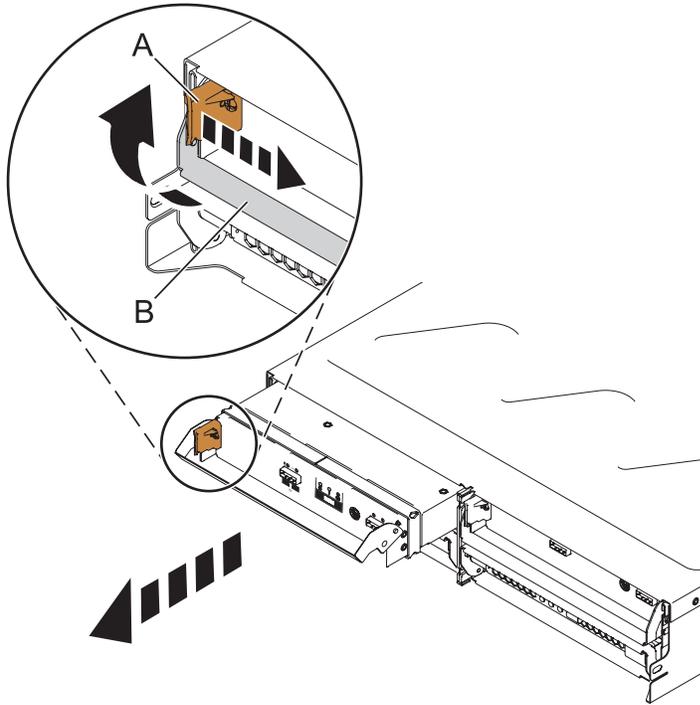
- Attach a wrist strap to an unpainted metal surface of your hardware to prevent electrostatic discharge from damaging your hardware.
- If you do not have a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds.
- Keep all electronic components in the shipping container or envelope until you are ready to install them.
- If you remove, then re-install an electronic component, temporarily place the component on an ESD pad or blanket, if available.

### 3. Remove both power supplies and disk drives

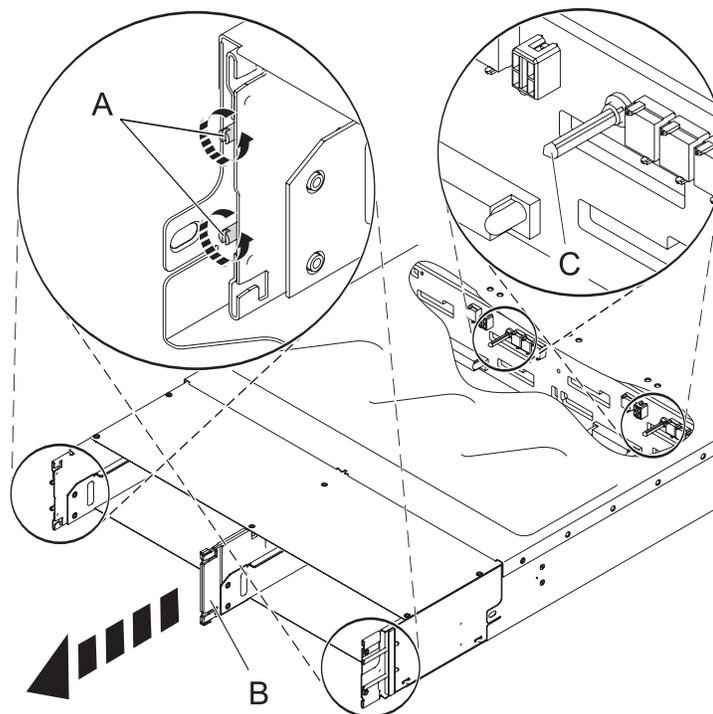


- a. Remove all the disk drives, following the “Disk Unit” on page 15 removal procedures.
- b. Make sure that the power switch (A) on the right side of the power supply that is to be removed is in the off position.
- c. Label and remove the power cable from the power supply to be removed.
- d. On the left side of the power supply, press the orange release tab (B) to the right as you rotate the handle (C) downward.
- e. Using the handle, gently slide the power supply out of the enclosure, make sure that you support the bottom while you do this.
- f. Repeat these steps until both power supplies have been removed from the failing unit.

4. Remove both Enclosure Services Managers (ESMs).



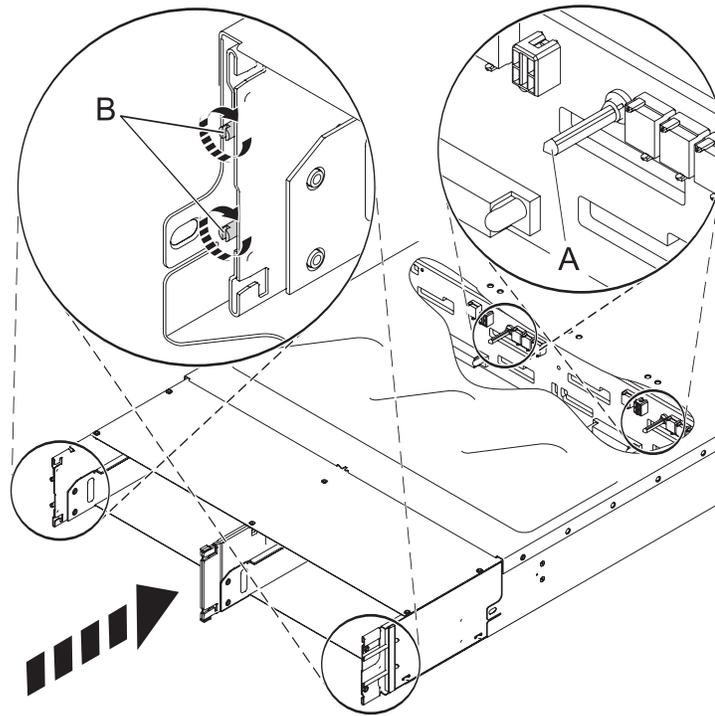
- a. Label and disconnect the SAS cables from the ESM.
- b. On the left side of the ESM, press the orange release tab (A) to the right as you rotate the handle (B) upward.
- c. Using the handle, gently slide the ESM out of the enclosure, make sure that you support the bottom while you do this.
- d. Repeat these steps until both ESMs have been removed from the failing unit.



5. Remove the midplane.

- a. Using a flathead screwdriver, loosen (do not remove) four capture screws (**A**) by turning them counter-clockwise. Two screws are located on each side of the drawer toward the back.
- b. Grab the center vertical bar (**B**) and pull out the rear docking tray.
- c. Take hold of the two metal guide posts (**C**), and gently pull the midplane out.

**Note:** To get the midplane past the blocks near the opening, you will have to hold the midplane at an angle.



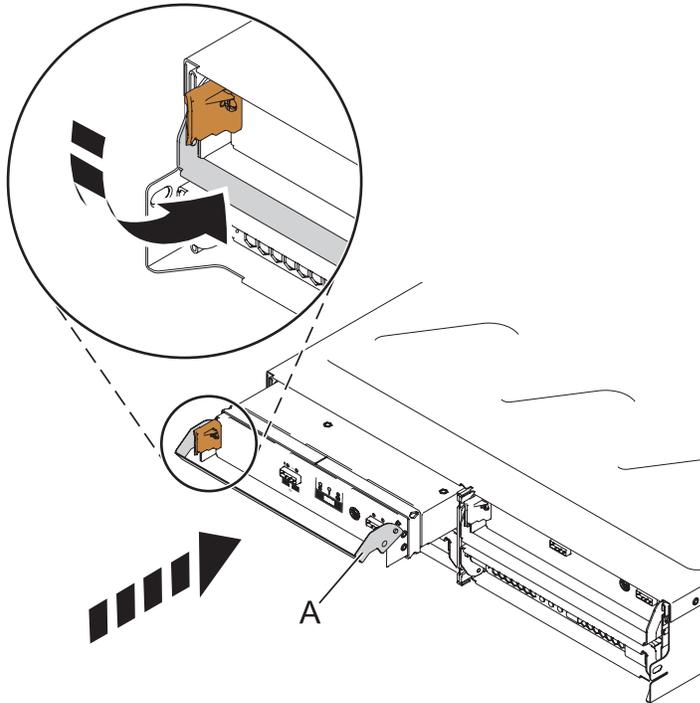
## 6. Install the midplane.

- a. Using the two metal guide posts (**A**), gently slide the midplane into the drawer.

**Note:** To get the midplane past the blocks near the opening, you will have to hold the midplane at an angle.

- b. Slide the rear docking tray into the drawer, ensuring the tray fits against the midplane.
- c. Apply pressure on the midplane's corners and midpoint of the top and bottom to firmly seat the midplane.
- d. Using a flathead screwdriver, tighten the four capture screws (**B**) clockwise.

7. Install both original Enclosure Services Managers (ESMs).



- a. Hold the ESM so that the handle (A) is fully extended.
  - b. Gently slide the ESM into the bay until the ESM stops.
  - c. Rotate the handle downward into the closed position until it clicks.
  - d. Reconnect the SAS cables to the ESM.
  - e. Repeat these steps to install the other ESM.
8. Install both original power supplies and disk drives.
- a. Replace all the disk drives, following the “Disk Unit” on page 15 replacement procedures.
  - b. Hold the replacement power supply so that the handle is fully extended downward.
  - c. Gently slide the power supply into the bay until it stops.
  - d. Rotate the handle upward into the closed position until it clicks.
  - e. Reconnect the power cable to the power supply.
  - f. Turn on the power supply switch on the right side of the power supply being replaced.
  - g. Repeat these steps to install the other power supply.

---

## Power Supply

How to service the power supply.

Use this procedure to service the power supply.

**The power supply may be serviced concurrently or nonconcurrently.**

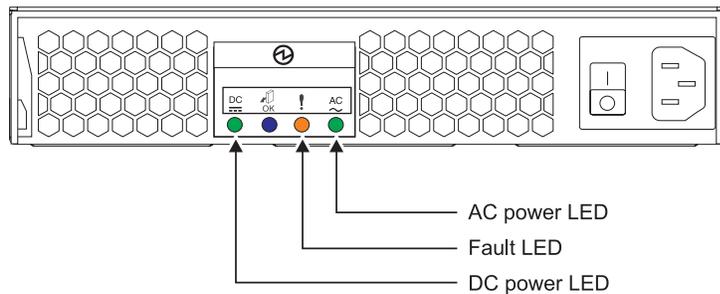


Figure 4. Rear view of power supply

1. You must determine if the repair can continue concurrently. To continue the repair concurrently, the following conditions must be true:
  - A second power supply must already be installed.
  - The second power supply LEDs must be set as follows:
    - DC power LED (green) - solid on
    - Fault LED (amber) - off
    - AC power LED (green) - solid on

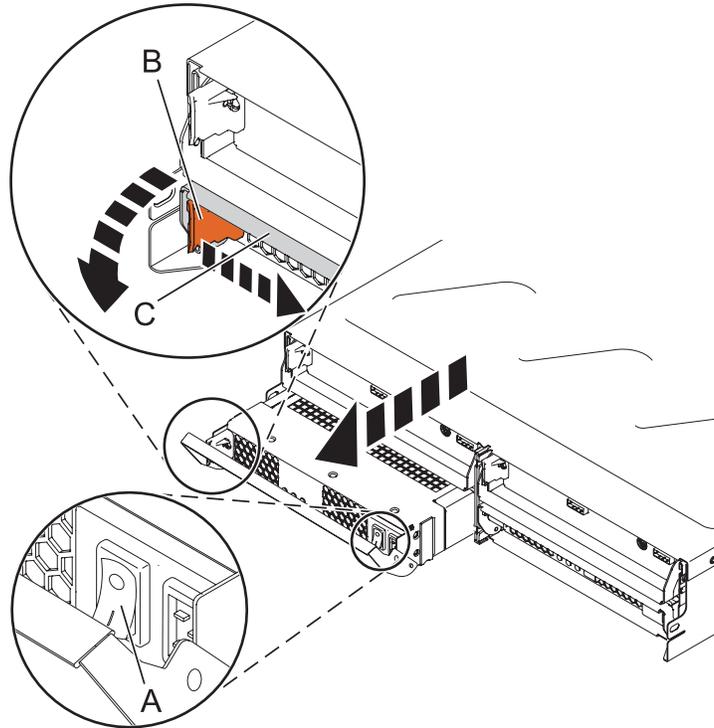
**Note:** If you choose to remove and replace the failing power supply with the power on, it **must** be performed in less than 15 minutes to prevent overheating.

2. If any of these conditions are **not** true, the repair can continue only after powering off the unit containing the FRU that is being repaired, and you must begin with **The power supply will be serviced nonconcurrently**. Otherwise, continue with **The power supply will be serviced concurrently**.
  - **The power supply will be serviced concurrently.**  
Do not remove power from the working power supply during this procedure. Continue with the next step.
  - **The power supply will be serviced nonconcurrently.**
  - Failure to follow the step-by-step sequence for this FRU removal or installation may result in FRU or system damage.

Use the following precautions whenever you handle electronic components or cables.

- Attach a wrist strap to an unpainted metal surface of your hardware to prevent electrostatic discharge from damaging your hardware.
- If you do not have a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds.

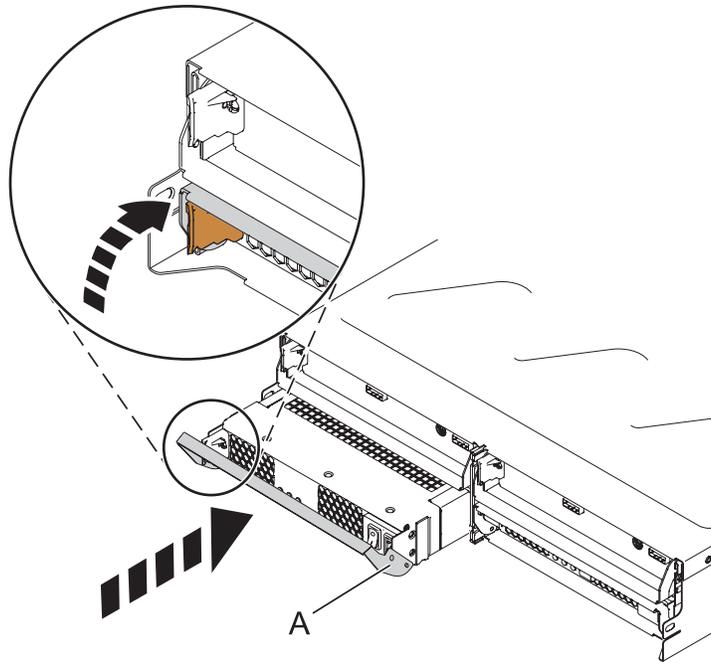
- Keep all electronic components in the shipping container or envelope until you are ready to install them.
- If you remove, then reinstall an electronic component, temporarily place the component on an ESD pad or blanket, if available.



### 3. Remove the power supply.

**Note:** If you are removing the power supply with the power on, this operation **must** be performed within 15 minutes to prevent overheating.

- Turn off power switch on right side of the power supply (A) to be removed.
- Label and remove the power cable from the power supply to be removed.
- On the left side of the power supply, press the orange release tab (B) to the right as you rotate the handle (C) downward.
- Using the handle, gently slide the power supply out of the enclosure, supporting the bottom while you do this.



#### 4. Install the power supply.

- a. Hold the replacement power supply so that the handle (A) is fully extended downward.
- b. Gently slide the power supply into the bay until it stops.
- c. Rotate the handle upward into the closed position until it clicks.
- d. Reconnect the power cable to the power supply.
- e. Turn on the power supply switch on the right side of the power supply being replaced.

Note the state of the LEDs on the power supply.

- a. If the LEDs indicate that the power supply is not operating correctly; that is, after 15 seconds both of the green LEDs are not on solid, turn off the power supply switch on right side of the power supply being replaced, wait 5 seconds, then turn on the power supply switch on right side of the power supply being replaced.
- b. If the LEDs still indicate that the power supply is not operating correctly; that is, after 15 seconds both of the green LEDs are not on solid, remove the power supply from the system and reinstall it. Do not proceed until the LEDs indicate that the new power supply is operating correctly.



## Chapter 4. Part information

This topic contains indexed drawings and tables that cross-reference the enclosure's FRUs (field replaceable units) to part numbers and a part description.

### Assembly

**Note:** For external cable FRU part number and description, see the *Site and Hardware Planning Guide*, order number SA76-0091.

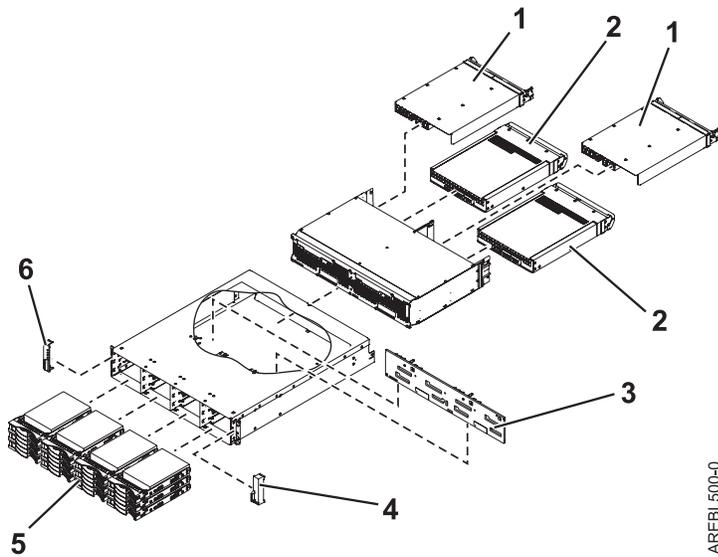


Table 15. I/O backplane and cabling assembly part numbers

Index number	CCIN	Part number	Units	Description
1	509A	44V3937	2	Enclosure Services Manager (ESM)
2	509C	39R6547	2	Power supply
3	509B	42R7898	1	Midplane
4		39R6584	1	Right bezel
5		10N7232	1	146 GB 15K RPM ASM DASDs
5		10N7204	1	146 GB 15K RPM ASM DASDs
5		10N7234	1	300 GB 15K RPM ASM DASDs
5		10N7208	1	300 GB 15K RPM ASM DASDs
6		39R6583	1	Left bezel

Table 16. Cables

CCIN	Part number	Description
	44V4041	1 meter SAS 4x AI cable
	44V4163	3 meter SAS 4x AE cable
	44V4164	6 meter SAS 4x AE cable
	44V4147	1 meter SAS 4x EE cable
	44V4148	3 meter SAS 4x EE cable
	44V4149	6 meter SAS 4x EE cable
	44V4151	3 meter SAS 2x cable
	44V4152	6 meter SAS 2x cable
	44V4157	1.5 meter SAS YO cable
	44V4158	3 meter SAS YO cable
	44V4159	6 meter SAS YO cable
	44V4160	15 meter SAS YO cable
	44V4161	1.5 meter SAS YI cable
	44V4162	3 meter SAS YI cable
	44V4154	3 meter SAS X cable
	44V4155	6 meter SAS X cable
	44V4156	15 meter SAS X cable
	42R6748	SAS W cable

Table 17. Miscellaneous parts

CCIN	Part number	Description
	External cables and cords	Refer to <i>Site Preparation and Physical Planning Guide</i> , SA76-0091
	Cable configuration	Refer to <i>Enclosures and Expansion Units</i> , SA76-0151
	42R6748	Wrap plug
	39R6548	ESM blank
	39M4375	DASD blank
	39M5377	Power cord rack jumper
	39R6550	Rail kit
	22R2809	DASD filler

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## Chapter 5. Common service procedures

Use common service procedures to find the most frequently used procedures for servicing your system or expansion unit.

The following list contains the common service procedures for your expansion unit.

*Table 18. Service procedures for:*

Procedure title
"Disk Unit" on page 15
"Enclosure Services Manager (ESM)" on page 16
"Midplane" on page 18
"Power Supply" on page 22

---

### AIX periodic diagnostics

AIX diagnostics query each of the SAS SCSI Enclosure Services (SES) devices once a day after the AIX diagnostics task is set up.

AIX Periodic Diagnostics for the SES is enabled by default. After it is set up, periodic Diagnostics queries each of the SAS SES devices once a day. The default time is 5:00 a.m. This action queries the SAS SES devices for the status of non-storage components in the enclosure. These components are the enclosure services manager, power supplies, and fans.

The Periodic Diagnostic Task can be configured by running the `diag` command, choosing **Task Selection** and selecting **Periodic Diagnostics**. Configuration options include changing the time of the query or disabling the query. Also, the time of the query can be configured differently for each of the SAS SES devices. E-mail notification of any problem found can be configured using the Automatic Error Log Analysis and Task.

### Detecting Serial Attached SCSI errors in SCSI Enclosure Services

Errors detected by the Serial Attached SCSI (SAS) in the SCSI Enclosure Services (SES) device can be automatically monitored through daily (default) or more frequent polling.

For installations that are comfortable with daily monitoring, the default daily diagnostic option is already set when the devices are configured. The default checking is done at 5 AM. To change when this is done, use the Periodic Diagnostics options within the Diag Task Selection menus to change the time for each SES device.

For installations that prefer more frequent monitoring, create a custom cron job:

- Add SAS SES Healthcheck cron job to the system cron table to collect enclosure errors.
- Edit the system crons with the `crontab -e` command. At the bottom of the file, enter the following:
  - `15 * * * * /usr/lpp/diagnostics/bin/run_sasses_healthcheck 1>/dev/null 2>/dev/null`

This cron job runs at 15 minutes after each hour every day, and sends notification to those enabled for Enterprise License Agreement (ELA) alerts with details of any errors that are present in the enclosure. It also presents a primary console message, which indicates the enclosure that has a problem. You can view and verify your crontab entry using `crontab -l`. Be sure that the **Automatic error Log Analysis and Notification settings** are as desired in **Diags** under **Task Selection**.

The cron requires a script. To create this script, generate a file named **run\_sasses\_healthcheck** in directory `/usr/lpp/diagnostics/bin`. The contents of the file must contain the following. Use the code between the `<start>` and `<end>` tags:

```
<start>
#!/bin/ksh
#Name: run_sasses_healthcheck
#Location: /usr/lpp/diagnostics/bin
#Function: SAS SES hourly healthcheck
/usr/sbin/lssdev -Cc container -t ses -s sas -F name -S available | /
usr/bin/xargs -n1 -i /bin/nice --10 /usr/lpp/diagnostics/bin/diagela -t
{}
<end>
```

**Note:** If you want both SAS and SAS SES devices checked, remove the portion that says `-s sas`.

Finally, enable the file to be run by inserting the following:

```
chmod +x /usr/lpp/diagnostics/bin/run_sasses_healthcheck
```

For further crontab command information go to [http://publib16.boulder.ibm.com/pseries/en\\_US/cmds/aixcm](http://publib16.boulder.ibm.com/pseries/en_US/cmds/aixcm).

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## Deactivating a disk drive using AIX

Concurrent maintenance can be accomplished on disk drives without removing power to either the enclosure or the server. Use the following procedure in conjunction with the removal and replacement procedures to concurrently remove or replace a disk drive using AIX.

To deactivate the disk drive and disk drive slot, and to perform concurrent maintenance on your disk drives, do the following:

1. Log in as root user or use CE Login.
2. At the command line, type **diag** and press Enter.
3. Press Enter to continue.
4. On the Function Selection display, select **Task Selection**.
5. Select **Hot Plug Task**.
6. Select **RAID Hot Plug Devices**.
7. Select the adapter that is connected to the array that contains the disk drive you want to deactivate and press Enter.
8. Select **Commit**.
9. On the Identify and Remove Resources display, select **Identify**.
10. Select the disk drive you want to remove and press Enter.  
The disk drive slot enters the Identify state. The concurrent maintenance light for the slot begins flashing. Verify that the flashing light corresponds to the location for the disk drive you want to deactivate, and press Enter.  
The disk drive slot exits the Identify state.
11. On the Identify and Remove Resources display, select **Remove**.  
A list of the disk drives that you can remove is displayed. If the disk drive is not displayed in the list, ask your system administrator to put the disk drive in the Failed state before continuing with this procedure. For information, see the system-management topics in the IBM System p and AIX Information Center at: <http://publib.boulder.ibm.com/infocenter/pseries/v5r3>
12. Select the disk drive you want to deactivate and press Enter.  
The disk drive slot enters the Remove state and power is removed from the slot. The concurrent maintenance light for the slot begins flashing rapidly.

13. If you are removing a disk drive from your system, go to “Disk Unit” on page 15 and complete the disk drive hardware-removal portion of this procedure.

---

## Adding the new disk drive as a resource using AIX

After replacing or installing a disk drive, use this procedure to have the system add the disk drive as a resource.

After replacing or installing a disk drive, you *must* add the new disk drive as a resource. To add the disk drive as a resource, do the following:

1. Press Enter.  
The disk drive slot exits the Remove state and enters the Normal state.
2. Exit to the RAID Hot-Plug Devices menu. Press the F3 or simultaneously press the ESC key and the number 3 key.
3. Exit to the Task selection display.
4. Select **Log Repair Action**.
5. Select the disk drive that you replaced and then press Enter.
6. Select **Commit** and then press Enter.
7. Exit to the command line.
8. Go to Verify a repair in your host server’s service guide. **This completes this procedure.**

**Note:** To rebuild data on the replacement disk drive, refer to the information for the controller to which the disk drive is attached.

- If the disk drive is attached to a PCI-X SCSI RAID controller, see the *PCI-X SCSI RAID Controller Reference Guide for AIX*.
- If the disk drive is attached to a PCI SCSI RAID adapter (feature code 2498), see the *PCI 4-Channel Ultra3 SCSI RAID Adapter Reference Guide*.

---

## Deactivating a disk drive using Linux

Concurrent maintenance can be accomplished on disk drives without removing power to either the enclosure or the server. Use the following procedure in conjunction with the removal and replacement procedures to concurrently remove or replace a disk drive that uses the Linux® operating system.

You must have the Linux 2.6 kernel installed.

1. Log in as root user.
2. Type `iprconfig` on the command line of the Linux session and press Enter.  
The IBM Power RAID Configuration Utility opens.
3. Select **Analyze log** and press Enter. The Kernel Messages Log display is shown.
4. From the Kernel Messages Log display, select **View most recent ipr error messages** . Press Enter.
5. Find the entry in the log for the disk drive you want to deactivate.
6. Record the location information for the disk drive.

**Note:** The location information has the form of 2:0:8:0. In this example, 2 is the SCSI host number, 0 is the SCSI bus, 8 is the SCSI target ID, and 0 is the LUN (logical unit number).

7. Return to the command line and type the following:  
`ls -ld /sys/class/scsi_host/host#/device`  
where # is the SCSI host number. Press Enter.
8. Record the PCI location information. The PCI location information has the form of 61:01:0:2.
9. Type `iprconfig` on the command line and press Enter.

The IBM Power RAID Configuration Utility display opens.

10. Select **Display hardware status** from the IBM Power RAID Configuration Utility display. Press Enter. The Display Hardware Status display is shown.
11. Look for the disk drive at the PCI location you recorded. The disk drive might have a Failed status.
12. If the disk drive you want to deactivate is unprotected or in use, move the data from the disk drive before continuing with this procedure.  
For information, see the *PCI-X SCSI RAID Controller Reference Guide for Linux*.
13. Type option **1** (Display hardware resource information details) next to the disk drive you want to deactivate. Press Enter.  
Hardware Resource Information Details opens.
14. Record the physical location information.
15. Return to the IBM Power RAID Configuration Utility display.
16. From the IBM Power RAID Configuration Utility display, select **Work with disk unit recovery**. Press Enter.
17. From the Work with Disk Unit Recovery display, select **Concurrent remove device**. Press Enter. A Concurrent Device Remove display is shown.
18. Select option **1** next to the location for the disk drive you want to deactivate. Press Enter. The Verify Device Concurrent Remove display is shown. The concurrent maintenance light turns on for that disk drive slot.
19. On the Verify Device Concurrent Remove display, verify that the selected disk drive is the disk drive you want to deactivate, then press Enter. The identify light turns on for the disk drive.  
**Attention:** Ensure that the disk drive is not in use to prevent loss of data.  
The Complete Device Concurrent Remove display is shown.  
**Attention:**
  - Attach a wrist strap to an unpainted metal surface of your hardware to prevent electrostatic discharge from damaging your hardware.
  - When using a wrist strap, follow all electrical safety procedures. A wrist strap is for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
  - If you do not have a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds.
20. Press Enter to indicate that you have deactivated the disk drive on the IBM Power RAID Configuration Utility.
21. If you are removing a disk drive from your system, go back to “Disk Unit” on page 15 and complete the disk drive hardware-removal portion of this procedure.

---

## Adding the new disk drive as a resource using Linux

After replacing or installing a disk drive, use this procedure to have the system add the disk drive as a resource.

After replacing or installing a disk drive, you *must* add the new disk drive as a resource. To add the disk drive as a resource using Linux, do the following:

1. From the IBM Power RAID Configuration Utility display, select **Work with disk unit recovery**. Press Enter.
2. From the Work with Disk Unit Recovery display, select **Concurrent add device**. Press Enter.  
A Concurrent Device Add displays.
3. Type select **1** next to the location from which you removed the disk drive.

The Verify Device Concurrent Add display is shown.

4. Press Enter on the Verify Device Concurrent Add display. The Complete Device Concurrent Add display is shown.
5. Press Enter to indicate that the disk drive is installed on the Complete Device Concurrent Add display.
6. Rebuild the data on the replacement disk drive. For instructions, go to “Rebuilding data on a replacement disk drive using Linux.”
7. Go to Verify a repair in your host server’s service guide. **This completes this procedure.**

---

## Closing a service call

Use this information to close a service call for your I/O enclosure.

Closing a service call for your I/O enclosure is accomplished through the enclosure’s host server. For information on closing a service call for your server, go to the topic *Closing a service call* located in the host server’s service guide.

---

## Rebuilding data on a replacement disk drive using Linux

To rebuild data on the replacement disk drive, complete the steps listed here. Use this procedure on an unprotected disk drive.

If the disk drive you are replacing is in a RAID Level 0 disk array or in a failed RAID Level 5 or RAID Level 10 disk array, perform these tasks:

1. Re-create the disk array.
2. Re-create the file systems on the disk array.
3. Copy the data from your backup media back to the restored disk array.

---

## Disk-drive-enclosure problem-determination procedures

Problem determination procedures are provided by power-on self-tests (POSTs), service request numbers, and maintenance analysis procedures (MAPs). Some of these procedures use the service aids that are described in the user or maintenance information for your system’s SAS attachment.

### Disk drive module power-on self-tests

The disk drive module power-on self-tests (POSTs) start each time that the module is switched on, or when a Send Diagnostic command is received. They check whether the disk drive module is working correctly. The POSTs also help verify a repair after a field replaceable unit (FRU) has been exchanged. The tests are designated POST-1 and POST-2.

#### POST-1 test:

POST-1 runs immediately after the power-on reset line goes inactive, and before the disk drive module motor starts. POST-1 includes the following tests:

- Microprocessor
- ROM
- Checking circuits

If POST-1 completes successfully, POST-2 is enabled.

If POST-1 fails, the disk drive module is not configured into the system.

## POST-2 test:

POST-2 runs after the disk drive module motor has started. POST-2 includes the following tests:

- Motor control
- Servo control
- Read and write on the diagnostic cylinder (repeated for all heads)
- Error checking and correction (ECC).

If POST-2 completes successfully, the disk drive module is ready for use with the system.

If POST-2 fails, the disk drive module is not configured into the system.

---

## Maintenance analysis procedures

The maintenance analysis procedures (MAPs) in this topic give detailed instructions about how to analyze a continuous failure that has occurred in your disk drive I/O enclosure that contains one or more Serial Attached SCSI (SAS) disk drive modules.

For more information about additional tools to identify missing resources on Linux, go to “Linux tools.”

### Using the MAPs

**Attention:** Do not remove power from the host system or enclosure unless you are instructed to do so.

To isolate the FRUs in the failing enclosure, perform the following actions and answer the questions given in these MAPs. When instructed to exchange two or more FRUs in sequence:

1. Exchange the first FRU in the list for a new one.
2. Go to “MAP 2410: Repair verification” on page 41 to verify the repair. For a server level repair verification, go to your host server’s service guide.
3. If the problem remains:
  - a. Reinstall the original FRU.
  - b. Exchange the next FRU in the list for a new one.
4. Repeat steps 1 and through 3 until either the problem is solved, or all the related FRUs have been exchanged.
5. Perform the next action that the MAP indicates.

Refer to “Service indicators” on page 1 often when servicing your server and enclosure. The LEDs are one of the diagnostic tools used by your server and enclosure to aid you in identifying failing components. They are also used to identify specific component locations on your system.

**Attention:** Disk drive modules are fragile. Handle them with care, and keep them well away from strong magnetic fields.

### Linux tools

Use the `lscfg` command to list all the resources that are available at startup. This information is also saved at each startup, and you can use it to identify any missing resources.

To determine if any devices or adapters are missing, compare the list of found resources and partition assignments to the customer’s known configuration. Record the location of any missing devices. You can also compare this list of found resources to a prior version of the device tree as the example in the following paragraph shows.

When the partition is restarted, the update device tree command is run and the device tree is stored in the `/var/lib/lsvpd/` directory in a file with the file name `device tree YYYY-MM-DDHH:MM:SS`, where `YYYY` is the year, `MM` is the month, `DD` is the day, and `HH`, `MM`, and `SS` are the hour, minute and second, respectively, of the date of creation.

1. Type the following command at the command line: `cd /var/lib/lsvpd/`
2. Then type the following command: `lscfg -vpd device-tree-2003-03-31-12:26:31`. This command displays the device tree that was created on 03/31/2003 at 12:26:31.

## MAP 2010: I/O enclosure problem determination

This MAP is the entry point to the MAPs for your I/O enclosure.

If you are not familiar with these procedures, first read through the system problem determination procedures found in your host system unit's service guide.

You might have been directed to this section because:

- The host system problem determination procedures sent you here.
- Action from a service request number (SRN) list sent you here.
- A problem occurred during the installation of the I/O enclosure or a disk drive module.
- Another procedure sent you here.
- A customer observed a problem that was not detected by the system problem determination procedures.

### Attention:

- Do not remove power from the host system or I/O enclosure unless you are told to in the instructions.
- Power cables and external Serial Attached SCSI (SAS) cables that connect the I/O enclosure to the host system can be disconnected while that system is running.

#### 1. Does the I/O enclosure emit smoke or is there a burning smell?

**NO** Go to step 2.

**YES** Go to "MAP 2022: Power-on problem determination" on page 38.

#### 2. Are you at this procedure because power is not removed completely from the I/O enclosure when the host systems are switched off?

**NO** Go to step 3.

**YES** Power is only removed from the enclosure by turning off its power supply switches. Go to "MAP 2020: I/O enclosure power problem determination" on page 37 if other power issues exist.

#### 3. Have you been sent to this procedure from an SRN?

**NO** Go to step 4.

**YES** Go to step 7.

#### 4. Have the system diagnostics or problem determination procedures given you an SRN for the I/O enclosure?

**NO**

- If the system diagnostics for the I/O enclosure is available, go to step 5.
- If the system online diagnostics for the I/O enclosure is not available, but the standalone diagnostics are available, do the following:
  - a. Run the standalone diagnostics.
  - b. Go to step 6.

- If neither the system online diagnostics nor the standalone diagnostics are available, go to step 7.

**YES** Go to *Service Request Numbers*, order number SA76-0097, and look up the description of the SRN.

5.

- Run the concurrent diagnostics to the I/O enclosure. For information about how to run concurrent diagnostics, go to the *AIX Diagnostics and Service Aids*, order number SA76-0106.
- When the concurrent diagnostics are complete, go to step 6.

6. **Did the diagnostics give you an SRN for the I/O enclosure?**

**NO** Go to step 7.

**YES** Go to *Service Request Numbers*, order number SA76-0097, and look up the description of the SRN.

7. **Is the I/O enclosure front amber LED flashing?**

**NO** Go to step 8.

**YES** A device is in the "Identify" mode. A power supply, SAS ESM, or disk-drive module is to be added or installed.

8. **Is the subsystem front amber LED on continuously?**

**NO** Go to step 12.

**YES** Go to step 9.

9. Make sure that power supplies have the power cord connected to them.

10. **Does the power-supply assembly have its FLT LED on because its dc On/Off switch is set to Off?**

**NO** Go to step 10.

**YES**

- Set the dc On/Off switch to On.
- If you still have a problem, return to step 2. Otherwise, go to "MAP 2410: Repair verification" on page 41 to verify the repair.

11. **Does any FRU have its amber Fault LED on?**

**Note:** The check LED might be on any of the following parts:

- An Enclosure Services Manager (ESM) assembly (CARD FAULT LED)
- A fan and power assembly (FLT LED)
- A disk drive module (CHK LED)

**NO** In the following sequence, exchange the following FRUs for new FRUs. Ensure that for each FRU exchanged, you follow the procedures in "MAP 2410: Repair verification" on page 41 to verify the repair.

- "Power Supply" on page 22
- "Enclosure Services Manager (ESM)" on page 16
- "Midplane" on page 18
- "Disk Unit" on page 15

**YES**

- If the FRU is a fan-and-power-supply assembly, go to step 11. Otherwise, exchange the FRU whose Check LED is on.
- Go to "MAP 2410: Repair verification" on page 41 to verify the repair.

12. Check the following on your fan-and-power-supply assembly:

- AC power cord is fully inserted.

- The dc On/Off switch is set to On.

If the FLT LED of a power supply is still on, pull out the power supply to disconnect it from the I/O enclosure and reseal it. If necessary, refer to “Power Supply” on page 22 for removal and replacement instructions.

If the FLT LED is still on, exchange, in the sequence shown, the following FRUs for new FRUs.

Ensure that for each FRU exchanged, you go to “MAP 2410: Repair verification” on page 41 to verify the repair before you proceed to replacing the next FRU listed.

- Power supply whose FLT LED is *not* on.
- “Enclosure Services Manager (ESM)” on page 16
- “Disk Unit” on page 15
- “Midplane” on page 18

**13. Is the I/O enclosure power LED on?**

**NO** Go to “MAP 2410: Repair verification” on page 41 to verify the repair.

**YES** Go to step 13.

**14. Does either power supply assembly have its dc PWR LED off when it should be on?**

**NO** Go to step 14.

**YES**

- Exchange the power-supply assembly whose LED is off.
- Go to “MAP 2410: Repair verification” on page 41 to verify the repair.

**15. Are you here because access to all the SAS devices that are in the I/O enclosure have been lost?**

**NO** No problem has been found on the I/O enclosure. For a final check, go to “MAP 2410: Repair verification” on page 41 to verify the repair.

**YES** Go to the “MAP 2340: SAS bus problem determination” on page 40.

## MAP 2020: I/O enclosure power problem determination

This procedure assists you in isolating field replaceable units (FRU)s that are causing a power problem on your I/O enclosure. This procedure that the disk subsystem is connected to a system that is powered on.

**Attention:** Do not remove power from the host system or the disk subsystem unless you are directed to in the following procedures. Power cables and external SAS cables that connect the disk subsystem to the host system can be disconnected while that system is running.

- You are here because the subsystem’s power light emitting diode (LED) is off.

**Are the 2 end green LEDs illuminated (ac and dc) on either power supply?**

**NO** Go to step 2.

**YES** In the sequence shown, exchange the following FRUs for new FRUs. Ensure that for *each* FRU exchange, you go to “MAP 2410: Repair verification” on page 41 to verify the repair.

- Power supply (or power supplies if two are present).

- Observe the power supply (or power supplies, if two are present).

**Does at least one power supply have its ac PWR LED on?**

**NO** Go to step 3.

**YES** Go to step 4 on page 38.

- Observe the power supplies.

**Note:** You were sent to this step because the ac PWR LED is off, ensure that the power cord is connected to ac power and that the switch is in the on position.

**Are the power cord(s) connected to an ac power source and is the power supply switch(s) in the on position?**

**NO**

- a. Set the On/Off switch to On.
- b. If the problem is still not solved, go to “MAP 2010: I/O enclosure problem determination” on page 35.

**YES** Go to step 4.

**4. Does either of the power supplies have its dc PWR LED on or flashing?**

**NO**

- a. Set the dc On/Off switch to Off, then to On again.
- b. Go to step 5.

**YES** In the sequence shown, exchange the following FRUs for new FRUs. Ensure that for *each* FRU exchange, you go to “MAP 2410: Repair verification” on page 41 to verify the repair.

- a. Power supply (two are present)

If the dc PWR LED is flashing go to 5.

**5. Does the power supply have its dc PWR LED on now?**

**NO** Replace the power supply (two are present).

**YES** Go to step 6.

**6. Is the subsystem power LED on continuously?**

**NO** In the sequence shown, exchange the following FRUs for new FRUs. Ensure that for *each* FRU exchange, you go to “MAP 2410: Repair verification” on page 41 to verify the repair.

- Enclosure Services Manager (ESM).

**YES** Go to step “MAP 2410: Repair verification” on page 41 to verify the repair.

**7. (from step 6)**

Observe the ESM assemblies.

**Does either ESM have its power good LED illuminated?**

**NO** Go to step 8.

**YES** In the sequence shown, exchange the following FRUs for new FRUs. Ensure that for *each* FRU exchange, you go to “MAP 2410: Repair verification” on page 41 to verify the repair.

- ESM, see “Enclosure Services Manager (ESM)” on page 16 for the ESM FRU part number.

**8. (from step 7)**

**Is the host system switched on?**

**NO** Switch on the host system (see the host system-service information). The 7031 Model D24 or Model T24 should switch on when the host server switches on.

If the problem is still not solved, go to “MAP 2010: I/O enclosure problem determination” on page 35.

**YES** In the sequence shown, exchange the following FRUs for new FRUs. Ensure that for *each* FRU exchange, you go to “MAP 2410: Repair verification” on page 41 to verify the repair.

- a. External SAS cables
- b. ESM, see “Enclosure Services Manager (ESM)” on page 16 for the ESM FRU part number.

## **MAP 2022: Power-on problem determination**

Use this problem determination procedure to isolate FRUs that are causing a power problem on your disk-drive I/O enclosure.

1. In this step, you remove most of the FRUs from the disk-drive I/O enclosure.
  - a. Remove both power supply assemblies.
  - b. Remove both Enclosure Services Managers (ESM).
  - c. Disconnect all the disk drive modules from the backplane.

**Note:** You do not need to completely remove the disk drive modules from the enclosure.

- d. Go to step 2.
2. Do the following procedure to check the disk-drive I/O enclosure as you reinstall parts.
  - a. Reinstall a power supply into position 1.
  - b. Connect a power cable to the power supply.
  - c. Reinstall one ESM and connect the appropriate SAS cables to a powered-on system.

**Note:** Unless a procedure requires that you switch off the disk-drive I/O enclosure, leave it switched on for the remainder of this isolation procedure.

- d. Set the dc On/Off switch of the power supply to On.

**Does the disk-drive I/O enclosure emit smoke or is there a burning smell?**

**NO** Go to step 3.

**YES**

- a. In the sequence shown, exchange the following FRUs for new FRUs. Ensure that for each FRU exchanged, you follow the procedures in “MAP 2410: Repair verification” on page 41.
  - 1) Power supply that you just reinstalled
  - 2) ESMs
- b. Go to step 3.

3. Reinstall the other power supply into position 2.
  - a. Connect a power cable to the power supply.
  - b. Set the dc On/Off switch of the power supply assembly to On.

**Note:** Unless a procedure requires that you switch off the disk-disk I/O enclosure, leave it switched on for the remainder of this isolation procedure.

**Does the disk-drive I/O enclosure emit smoke or is there a burning smell?**

**NO** Go to step 4.

**YES** Replace the power supplies.

4. Reinstall a ESM assembly into position 1.

**Does the disk-drive I/O enclosure emit smoke or is there a burning smell?**

**NO** Because the disk-drive I/O enclosure has ESMs, go to step 5.

**YES**

- a. Exchange, for a new one, the ESM that you have just reinstalled.
- b. Because the disk-drive I/O enclosure has ESMs, go to step 5.

5. Reinstall the other ESM assembly into position 2.

**Does the disk-drive I/O enclosure emit smoke or is there a burning smell?**

**NO** Go to step6.

**YES**

- a. Exchange, for a new one, the ESM assembly that you just reinstalled.
- b. Go to step 6.

6. Reconnect a disk drive.

**Note:** To engage the disk drive, you must close its handle.

**Does the disk-drive I/O enclosure emit smoke or is there a burning smell?**

**NO** Go to step 7.

**YES**

- a. Exchange, for a new one, the disk drive module that you just reconnected.
- b. Go to step 7.

7. Reconnect the next disk drive module.

**Note:** To engage the disk drive, you must close its handle.

**Does the disk-drive I/O enclosure emit smoke or is there a burning smell?**

**NO** Go to step 8.

**YES**

- a. Exchange, for a new one, the disk drive module that you just reconnected.
- b. Go to step 8.

8. **Have you reconnected all the disk drive modules?**

**NO** Return to step 7.

**YES** Go to step 9.

9. **Have you solved the problem?**

**NO** Remove all power from the disk-drive I/O enclosure, and call for assistance.

**YES** Go to "MAP 2410: Repair verification" on page 41.

## **MAP 2340: SAS bus problem determination**

Use this procedure when your host system cannot access any of the disk drives in your disk drive I/O enclosure.

**Attention:** Do not remove power from the host system or the disk subsystem unless you are directed to in the following procedures.

1. **Is the disk-drive I/O enclosure powered on?**

**NO** Ensure that a SAS cable is attached and seated correctly to a powered system, and the disk-drive I/O enclosure is powered on. Go to step 2.

**YES** Go to step 2.

2. **Is the amber LED illuminated on the Enclosure Services Manager (ESM)?**

**NO** Go to step 3.

**YES** Replace the ESM and then go to step 3.

3. **Is the green power LED illuminated on the ESM?**

**NO** Go to "MAP 2022: Power-on problem determination" on page 38.

**YES** Go to step 4.

4. Note the positions of all the disk-drive modules and disk-drive filler assemblies so that you can reinstall the modules into their correct slots later.

a. Remove all of the disk-drive modules.

b. Go to step 5.

5. **Can the host system access the I/O enclosure services?**

**NO** Exchange the following FRUs, in the order listed, for new FRUs. Ensure that for each FRU

exchanged, you have access to the disk-drive module and then follow the procedures in “MAP 2410: Repair verification” to verify the repair.

- a. External SAS cable
- b. ESM
- c. Power supplies

If the repair is successful, reinstall all of the disk-drive modules and cables that were removed in any of the previous steps.

Go to “MAP 2410: Repair verification” to verify the repair.

**YES** Go to step 6.

6. Reinsert, one at a time, the disk-drive modules that you just removed, checking for accessibility.

**Can the host system access this disk-drive module?**

**NO**

- a. In the sequence shown, exchange the following FRUs for new FRUs. Ensure that for each FRU exchanged, you can access the disk-drive module, then follow the procedures in “MAP 2410: Repair verification” to verify the repair.
  - 1) Exchange the disk-drive module.
  - 2) External SAS cable
  - 3) ESM
  - 4) Power supply
- b. If the repair is successful, reinstall all the disk-drive modules and if removed, the ESM.
- c. Go to “MAP 2410: Repair verification” to verify the repair.

**YES** Go to step 7.

7. **Have you reinstalled all the disk-drive modules?**

**NO** Go to step 6

**YES** Go to step 8.

8. **Can the host system get access to all of the plugged disk-drive module and I/O enclosure services?**

**NO** Call your support center for assistance.

- a. Exchange the disk-drive module for a new one.
- b. Return to step 8.

**YES** Go to “MAP 2410: Repair verification” to verify the repair.

## MAP 2410: Repair verification

Verify a repair after a FRU is exchanged on the enclosure.

**Attention:** Do not remove power from the host server or the I/O enclosure unless you are directed to in the following procedures.

1. Ensure that the dc On/Off power switch of each power supply assembly is set to On.

**Are all Check LEDs off?**

**NO** Go to “MAP 2010: I/O enclosure problem determination” on page 35.

**YES** Go to step 2.

2. **Can the host system access all Serial Attached SCSI (SAS) devices?**

**NO** Go to “MAP 2010: I/O enclosure problem determination” on page 35.

**YES** The repair is complete, go to “Closing a service call” on page 33. **This completes the procedure.**

**Note:** For system level repair verification, go to "Verify a repair" located in the host server's service guide.

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## **Powering on and Powering off**

To power on or power off the enclosure, use the enclosure's on and off switches.

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## Appendix. Accessibility features

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

The following list includes the major accessibility features:

- Keyboard-only operation
- Interfaces that are commonly used by screen readers
- Keys that are tactilely discernible and do not activate just by touching them
- Industry-standard devices for ports and connectors
- The attachment of alternative input and output devices

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## Electronic emission notices

### Class A Notices

The following Class A statements apply to the IBM servers that contain the POWER6 processor.

### Federal Communications Commission (FCC) statement

**Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with

the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

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

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

### **Industry Canada Compliance Statement**

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

### **Avis de conformité à la réglementation d'Industrie Canada**

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

### **European Community Compliance Statement**

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

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

European Community contact:  
IBM Technical Regulations  
Pascalstr. 100, Stuttgart, Germany 70569  
Tele: 0049 (0)711 785 1176  
Fax: 0049 (0)711 785 1283  
E-mail: tjahn@de.ibm.com

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

#### **声 明**

此为 A 级产品,在生活环境中,  
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### **Electromagnetic Interference (EMI) Statement - Taiwan**

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種情況下，使用者會被要  
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#### **IBM Taiwan Contact Information:**

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

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Verantwortlich für die Konformitätserklärung nach des EMVG ist die IBM Deutschland GmbH, 70548 Stuttgart.

Generelle Informationen:

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