



# CHAPTER 8

## **Troubleshooting**

This chapter provides information to help you troubleshoot problems with your Dell PowerVault 660F and 224F storage system and its components. It includes a summary of common system faults along with corrective actions, including instructions for troubleshooting the system, hard-disk drives, Dell Fibre Disk RAID Controllers, advanced cooling modules (ACMs), and power supplies.

### **Overview**

This chapter focuses primarily on hardware-based troubleshooting. For more information on troubleshooting using configuration and management software, see the *Dell OpenManage Array Manager User's Guide*.

For help in identifying system components, see the illustrations in Chapter 1, "Introduction."

For help in using light-emitting diode (LED) indicators to verify system and component health, see Chapter 4, "Connecting and Operating Your Storage System."

### **Protecting Against Electrostatic Discharge**

Static electricity can harm delicate components inside your system. To prevent static damage, discharge static electricity from your body before you touch any of your computer's electronic components, such as the microprocessor. You can do so by touching an unpainted metal surface on the system chassis.

As you continue to work inside the system, periodically touch an unpainted metal surface to remove any static charge your body may have accumulated.

You can also take the following steps to prevent damage from electrostatic discharge (ESD):

- When unpacking a static-sensitive component from its shipping carton, do not remove the component from the antistatic packing material until you are ready to install the component in your system. Just before unwrapping the antistatic packaging, be sure to discharge static electricity from your body.

- When transporting a sensitive component, first place it in an antistatic container or packaging.
- Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.

## Common Faults and Corrective Actions

Table 8-1 summarizes some common fault indicator patterns and refers you to sections in this chapter for corrective actions.

**Table 8-1. Common Faults and Corrective Actions**

Indicator(s) Displayed	Corrective Action
No indicators are lit	See "Troubleshooting the Power Supply," found later in this chapter.
<i>Shelf fault indicator</i> and no other indicators lit	Use Dell OpenManage Array Manager to check the system temperature. See the <i>Dell OpenManage Array Manager User's Guide</i> for more information. If a temperature fault is not indicated, see "Troubleshooting the System," found in the next section.
<i>Shelf fault indicator</i> and <i>drive fault indicator</i> (see Table 4-3) are lit	See "Troubleshooting the Fibre Channel Hard-Disk Drives," found later in this chapter.
<i>Fault indicator</i> lit on hard-disk drive	See "Troubleshooting the Fibre Channel Hard-Disk Drives," found later in this chapter.
<i>Shelf fault indicator</i> and <i>power supply fault indicator</i> lit	See "Troubleshooting the Power Supply," found later in this chapter.
<i>Shelf fault indicator</i> and <i>ACM fault indicator</i> lit	See "Troubleshooting the Advanced Cooling Module," found later in this chapter.
<i>Shelf fault indicator</i> and <i>LS module fault indicator</i> lit	See "Troubleshooting the LS Module," found later in this chapter.
<i>Fibre Channel RX indicators</i> on I/O modules not lit	See "Troubleshooting the I/O Module," found later in this chapter.
<i>Shelf fault indicator</i> lit and <i>Dell Fibre Disk RAID Controller not ready indicator</i> lit or <i>ready indicator</i> not lit	See "Troubleshooting the Dell Fibre Disk RAID Controller," found later in this chapter.

# Troubleshooting the System

This section is used for troubleshooting when the *shelf fault indicator* is lit but no other fault indicators are lit.

When the PowerVault 660F or 224F is first turned on, the unit performs a power-on-self-test (POST), which checks all the components. During POST, all of the indicators for each hard-disk drive blink briefly. The green *online indicators* turn off for a short time, then turn back on, and then remain illuminated. The green *ready indicator* flashes slowly as the drives begin to spin. Following POST, normal LED status conditions are displayed (see Chapter, "Introduction," 1 for LED descriptions).

The PowerVault 660F and 224F audible alarm is preset to the disabled state. To enable the alarm, see the *Dell OpenManage Array Manager User's Guide*. Once enabled, the audible alarm will sound whenever the shelf fault LED lights.

The optional Dell PowerVault Fibre Disk RAID Controller monitors the internal Fibre Channel hard-disk drives connected to the midplane board on PowerVault 660F systems.

To troubleshoot the storage system, perform the following steps:

1. Is one of the following events occurring?

- A shelf fault LED is lit.
- An audible alarm is sounding.

**Yes.** Check for other fault indicators on both the front and back of the module. If any other fault indicators are lit, see Table 8-1 for instructions. If there are two LS modules in the unit, then both LS module *shelf fault indicators* should be lit. If no other fault indicators are lit, perform the following steps:

- a. The temperature sensors on the unit may be reporting an overtemperature condition. See the *Dell OpenManage Array Manager User's Guide* for information on diagnosing a temperature problem.
- b. One of the redundant integrated circuits used for enclosure communications or management may have failed. See the *Dell OpenManage Array Manager User's Guide* for information on diagnosing a midplane failure.

**No.** If no LEDs are lit, see "Troubleshooting the Power Supply," found later in this chapter.

2. Is the problem resolved?

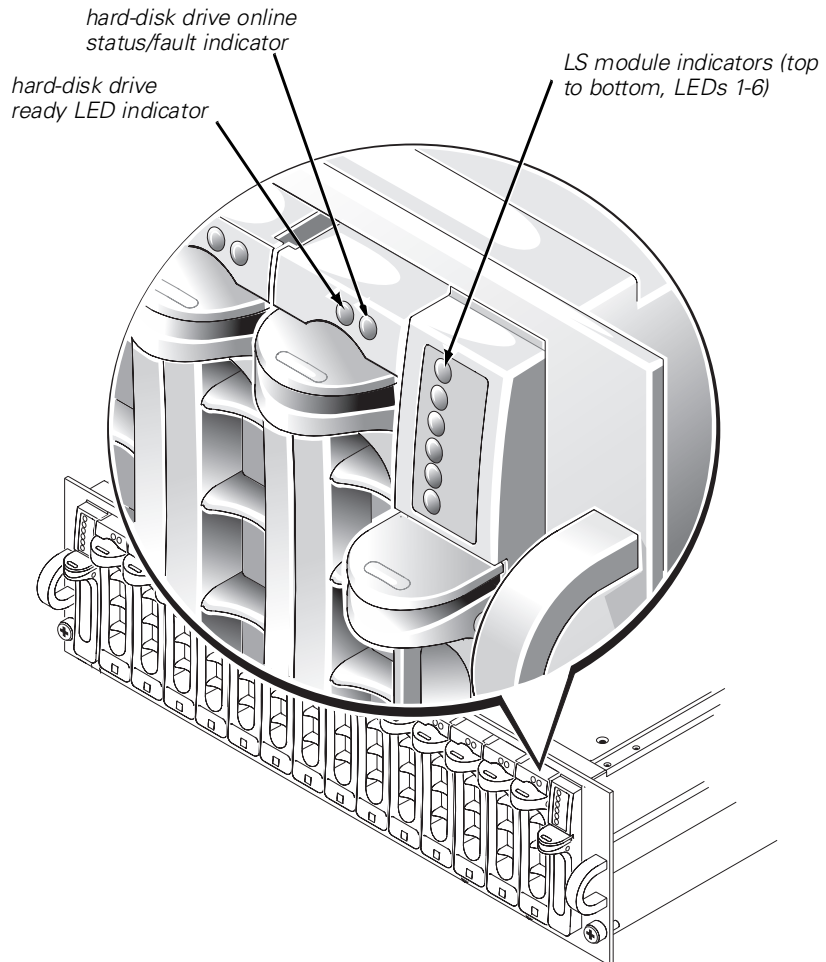
**Yes.** End troubleshooting.

**No.** See Chapter 9, "Getting Help," for instructions on obtaining technical assistance.

## Troubleshooting the Fibre Channel Hard-Disk Drives

This section is used for troubleshooting when the *shelf fault indicator* is lit and a hard-disk drive is indicating a drive failure flash pattern. A PowerVault 660F or 224F contains up to 14 Fibre Channel hard-disk drives.

All slots not occupied by a hard-disk drive must have a drive carrier blank panel to ensure proper airflow. The blanks have no LED indicators. If a hard-disk drive's status is normal, either both green LEDs are on, or the right LED is on steadily while the left *ready* LED blinks as data is being accessed.



**Figure 8-1. Front-Panel LED Indicators**

To troubleshoot the hard-disk drive, perform the following steps:

1. Are both hard-disk drive indicator lights off?

**Yes.** See the *Dell OpenManage Array Manager User's Guide* for the proper safeguards for protecting your data before proceeding any further, then perform the following steps:

- a. Verify that the slot is occupied by a hard-disk drive, not a blank. A blank has no LEDs. If this resolves the problem, end troubleshooting.
- b. Verify that the hard-disk drive is seated properly. If this resolves the problem, end troubleshooting.



*Dell Fibre Disk  
RAID controller*



*copper I/O expansion  
module*



*optical I/O expansion  
module*

### **Figure 8-2. Option Slot Modules**

- c. Verify that the LS modules are functional. If this resolves the problem, end troubleshooting.
- d. Verify that the I/O modules are functional and connected. If this resolves the problem, end troubleshooting.
- e. Replace the hard-disk drive. If this resolves the problem, end troubleshooting.

**No.** Proceed to step 2.

2. Is the fail flash pattern occurring, with the amber hard-disk drive LED flashing four times per second?

**Yes.** See the *Dell OpenManage Array Manager User's Guide* for the proper safeguards for protecting your data before proceeding any further. Replace the hard-disk drive. If this resolves the problem, end troubleshooting.

**No.** Proceed to step 3.

3. Is the hard-disk drive offline Loop A or Loop B pattern occurring, with the amber hard-disk drive LED flashing about once per second?

**Yes.** Perform the following steps:

- a. Verify that Loop A and Loop B indicators are lit on the LS module. If either indicator is off, go to "Troubleshooting the LS Module," found later in this chapter.
- b. If the loop indicators are lit, replace the hard-disk drive. See the *Dell OpenManage Array Manager User's Guide* for the proper safeguards for protecting your data before performing this procedure.

**No.** Proceed to step 4.

4. Is the predicted fail pattern occurring, with a green/amber/off pattern flashing every two seconds?

**Yes.** See the *Dell OpenManage Array Manager User's Guide* for the proper safeguards for protecting your data before proceeding any further. Replace the hard-disk drive. If this resolves the problem, end troubleshooting.

**No.** Proceed to step 5.

5. Is the problem resolved?

**Yes.** End troubleshooting.

**No.** See Chapter 9, "Getting Help," for instructions on obtaining technical assistance.

## **Troubleshooting the Dell Fibre Disk RAID Controller**

In a simplex configuration, if there is a fault with the RAID controller, the amber Not Ready LED is illuminated, and the green LED is off. (See Table 4-5 for LED definitions). In addition, on PowerVault 660F systems a controller fault triggers the *shelf fault indicator* LED on the LS module. (See Table 4-3 for LED descriptions).

In a duplex configuration, one Dell Fibre Disk RAID Controller can detect the failure of the other Dell Fibre Disk RAID Controller in the same PowerVault 660F enclosure. If this occurs, the amber *controller fail indicator* LED of the failed controller is illuminated by the healthy controller. This indicates the controller is failed.

The Dell Fibre Disk RAID Controllers perform the RAID function for your Fibre Channel system. The system may contain one or two Dell Fibre Disk RAID controllers. When facing the rear of the system, RAID controller 0 is on the right side and RAID controller 1 is on the left side. The DB 9 connectors on the Fibre Disk RAID Controller connect to the host or switch. The high-speed serial data connectors (HSSDCs) on the RAID controller connect to the daisy chain Fibre Channel loops for further drive expansion. The RAID controller 0 daisy chain connects to Fibre Channel Loop A. The RAID controller 1 daisy chain connects to Fibre Channel Loop B.

For more information on troubleshooting a Dell Fibre Disk RAID Controller, see your *Dell OpenManage Array Manager* documentation.

To troubleshoot the Dell Fibre Disk RAID Controller, perform the following steps:

1. Is one of the following events occurring?

- Green *controller ready indicator* is not lit
- Amber *controller not ready indicator* is lit.

**Yes.** See the *Dell OpenManage Array Manager User's Guide* for the proper safeguards for protecting your data before proceeding any further, then perform the following steps:

- a. Verify that the Dell Fibre Disk RAID Controller has had enough time to boot. The boot process can take several minutes. If this resolves the problem, end troubleshooting.
- b. Confirm that the Dell Fibre Disk RAID Controller is not inserted upside down into the unit by verifying that the DB9 connector is located at the top of the module. Remove and replace the module if necessary. If this resolves the problem, end troubleshooting.
- c. Replace the Dell Fibre Disk RAID Controller. If this resolves the problem, end troubleshooting.

**No.** Proceed to step 2.

2. Is the amber *partner fail indicator* light on?

**Yes.** See the *Dell OpenManage Array Manager User's Guide* for the proper safeguards for protecting your data before proceeding any further, and then perform the following steps:

- a. Confirm that the Dell Fibre Disk RAID Controller in the other slot is not inserted upside down into the unit by verifying that the DB9 connector is located at the top of the module. Remove and replace the module if necessary. If this resolves the problem, end troubleshooting.
- b. Replace the Dell Fibre Disk RAID Controller in the other slot. If this resolves the problem, end troubleshooting.

**No.** Proceed to step 3.

3. Is the problem resolved?

**Yes.** End troubleshooting.

**No.** See Chapter 9, "Getting Help," for instructions on obtaining technical assistance.

## **Replacing the Fibre Disk RAID Controller Cache Memory**

**NOTICE:** See "Protecting Against Electrostatic Discharge," found at the beginning of this chapter, before replacing the Fibre Disk RAID Controller cache memory.

To remove the dual in-line memory module (DIMM) from the Dell Fibre Disk RAID Controller, perform the following steps:

1. Ensure that access to the faulty RAID controller module is not restricted by power cords or cables.
2. Remove the RAID controller from its enclosure.
3. Loosen the two screws that secure the RAID controller module cover, and slide the cover off the module.
4. Press outward on the ejectors on the DIMM socket to unseat the memory module.
5. Align the DIMM's edge connector with the slot in the center of the DIMM socket, and insert the DIMM in the socket.

The DIMM socket has two alignment keys that allow the DIMM to be installed in the socket only one way.

6. Push the DIMM into the socket with your thumbs while pulling on the ejectors to lock it into place. Make sure to support the socket with your fingers to avoid damage.

When the ejectors have locked into place, the DIMM is seated.

7. Slide the RAID controller module cover back into place and replace the two screws.
8. Replace the RAID controller into the enclosure.

See the *Dell OpenManage Array Manager User's Guide* for information on bringing the controller online.



## Troubleshooting the I/O Module

The I/O modules are the connection points for Fibre Channel loops. They contain a hub function so that when a daisy chain connection is not made, the Fibre Channel loop is automatically closed within the unit. When facing the rear of the system, I/O module 0 is on the right side and I/O module 1 is on the left side. I/O module 0 connects to Fibre Channel Loop A. I/O module 1 connects to Fibre Channel Loop B.

To troubleshoot the I/O module, perform the following steps:

1. Is the green *RX indicator* off?

**Yes.** Perform the following steps:

- a. Confirm that power supply lights are on.
- b. Confirm that the I/O module is not inserted upside down into the unit.
- c. Confirm that the cable is plugged into the port next to the *RX indicator*.
- d. Confirm that the other end of the cable is connected to an active and powered Fibre Channel port.

**No.** Proceed to step 2.

2. Perform the following steps:

- a. Try another cable for the connection to the I/O module. If this resolves the problem, end troubleshooting.
- b. Replace the I/O module in the unit where the *RX indicator* does not light. If this resolves the problem, end troubleshooting.
- c. Replace the I/O module, Dell Fibre Disk RAID Controller, or other device that is connected to the I/O module. If this resolves the problem, end troubleshooting.

3. Is the problem resolved?

**Yes.** End troubleshooting.

**No.** See Chapter 9, "Getting Help," for instructions on obtaining technical assistance.

## Troubleshooting the LS Module

The LS module contains the loop resiliency circuit for the Fibre Channel loop. When you face the front of the system, LS Module A is on the left side and LS Module B is on the right side. LS Module A contains the loop resiliency circuit for Fibre Channel Loop A. LS Module B contains the loop resiliency circuit for Fibre Channel Loop B. The LS modules also contain the enclosure processor for all enclosure management. The enclosure processors operate in active/passive mode: only one enclosure processor

will be active at a time. If the master LS Module fails or is removed, the other LS Module will automatically take over the enclosure management functions.

To troubleshoot an LS module, perform the following steps:

1. Is the LS module fault indicator light on?

**Yes.** Replace the LS module with the lighted fault indicator. See the *Dell OpenManage Array Manager User's Guide* for the proper safeguards for protecting your data. Removing the LS module disables the associated Fibre Channel loop.

**No.** Proceed to step 2.

2. Is the Fibre Channel Loop A indicator light off for either LS module?

**Yes.** Perform the following step:

- a. Replace LS Module A. See the *Dell OpenManage Array Manager User's Guide* for the proper safeguards for protecting your data before performing this step. Removing the LS module disables the associated Fibre Channel loop.
- b. If the problem is not resolved, perform the following step.
- c. Replace I/O Module 0. See the *Dell OpenManage Array Manager User's Guide* for the proper safeguards for protecting your data before performing this step. Removing the I/O Module disables the associated Fibre Channel loop.
- d. Go to step 5.

**No.** Proceed to step 3.

3. Is the *Fibre Channel Loop B indicator* light off for either LS module?

**Yes.** Perform the following step:

- a. Replace LS Module B. See the *Dell OpenManage Array Manager User's Guide* for the proper safeguards for protecting your data before performing this step. Removing the LS module disables the associated Fibre Channel loop.
- b. Is the problem resolved? If not, perform the following step:
- c. Replace I/O module 1. See the *Dell OpenManage Array Manager User's Guide* for the proper safeguards for protecting your data before performing this step. Removing the I/O module disables the associated Fibre Channel loop.
- d. Go to step 5.

**No.** Proceed to step 4.

4. Is the problem resolved?

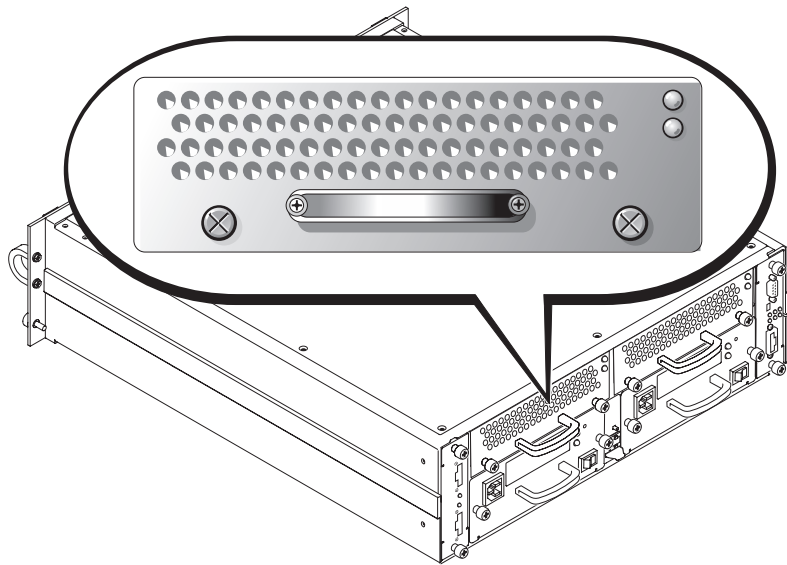
**Yes.** End troubleshooting.

**No.** See Chapter 9, "Getting Help," for instructions on obtaining technical assistance.

## Troubleshooting the Advanced Cooling Module

The system has two advanced cooling modules (ACMs). Each ACM contains two blowers, and each blower has its own fault LED, so there are two fault LEDs on the back of the ACM. Any one blower can fail without any danger of the PowerVault storage system overheating.

If the amber *ACM fault indicator* light is illuminated (see Figure 8-3) or the Dell OpenManage Array Manager program issues an ACM-related error message, follow the ACM troubleshooting procedure below.



**Figure 8-3. ACMs for PowerVault 660F and 224F Storage Systems**

To troubleshoot an ACM, perform the following steps:

1. Is one of the following events occurring?
  - Are both fault indicators lit on a single ACM?
  - Are fault indicators lit on both ACMs?

**Yes.** Replace the ACM(s) with the lit fault indicator as soon as possible. If a replacement ACM is not immediately available, the unit must be shut down to prevent overheating. See the *Dell OpenManage Array Manager User's Guide* for the proper procedure for shutting down the system without incurring data loss.

**No.** Proceed to step 2.

2. Is a single fault indicator on a single ACM lighted?

**Yes.** Replace the ACM with the lit fault indicator. The unit safely operates until the ACM is replaced.

**No.** Proceed to step 3.

3. Is the problem resolved?

**Yes.** End troubleshooting.

**No.** See Chapter 9, "Getting Help," for instructions on obtaining technical assistance.

## Removing the ACM

**NOTICE: Do not remove the ACM for more than 5 minutes because damage from overheating occurs to the PowerVault 660F and 224F. Review the following steps before performing the procedure.**

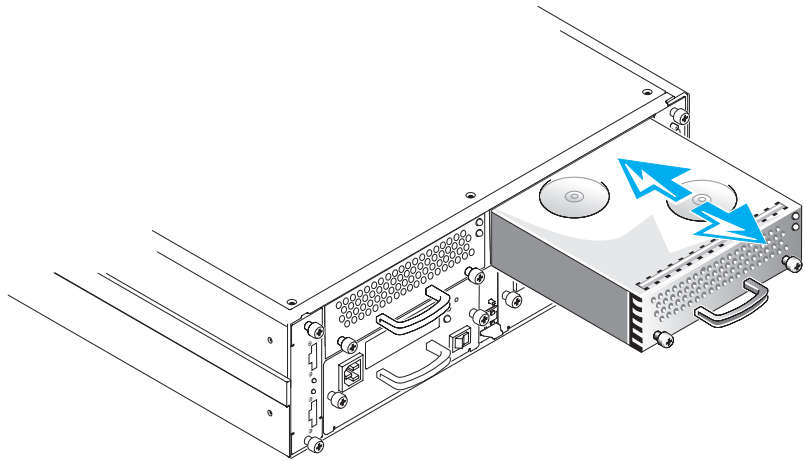
**NOTICE: See "Protecting Against Electrostatic Discharge," found at the beginning of this chapter before replacing the ACM.**



*NOTE: Removing the ACM also removes the battery pack. If the controller is not currently in conservative cache mode, once the ACM is removed, it will go into conservative cache mode. See the Dell OpenManage Array Manager documentation for information on troubleshooting the battery.*

To remove an ACM, perform the following steps:

1. Ensure that access to the faulty advanced cooling module is not restricted by power cords or cables.
2. Unscrew the captive screws that secure the ACM in its slot.
3. Pull the cooling module out of its slot and set it down on a smooth surface, upside down.



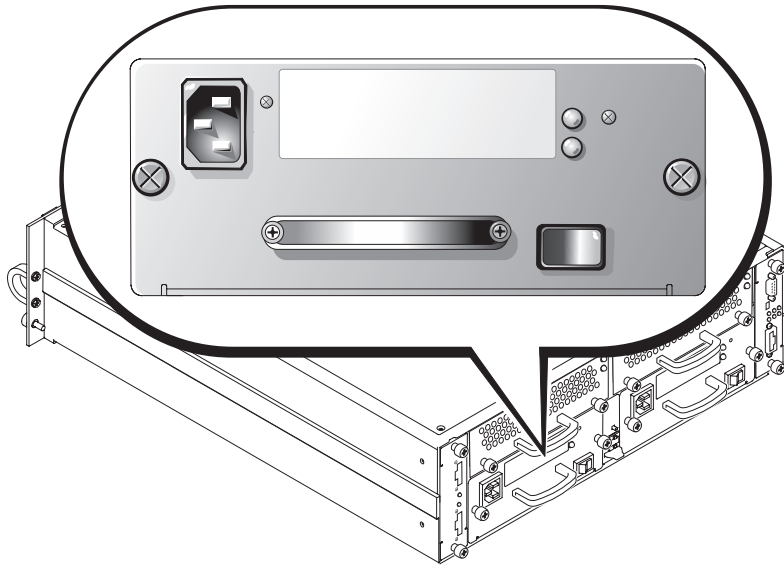
**Figure 8-4. Removing an ACM**

4. Remove the RAID memory backup battery module (if installed):
  - a. Disconnect the in-line connector on the battery cable.
  - b. Pull the battery pack/shield assembly away from the ACM—it is secured with a double-sided adhesive-backed foam tape.
  - c. If necessary, clean any residue from the adhesive-backed foam tape that secured the old battery pack to the cooling module. The replacement battery pack requires a clean, smooth surface.

## **Troubleshooting the Power Supply**

The system has two power supplies, and can safely operate with only one power supply working. The following two LEDs on the back of the power supply (see Figure 8-2) signal the status of the power supply when the supply is connected to the midplane board:

- Green *power supply indicator* (bottom LED) — lights when all DC output voltages are within normal operating ranges
- Amber *power supply fault indicator* (top LED) — lights if a fault is detected in the power supply



**Figure 8-5. Power Supply**

To troubleshoot the power supply, perform the following steps:

1. Are there any indicator lights illuminated on any module?

**No.** Perform the following steps:

- a. Verify that the AC cable to the power supply is properly inserted into the power supply. First turn the power supply switch off, then verify proper insertion by completely pulling the AC cable from the power supply, reinserting it firmly and turning the power switch back on. If this resolves the problem, end troubleshooting.
- b. Verify that the AC cable is plugged into an active AC source at the other end. First turn off the power supply switch, then turn it back on when the AC sources are confirmed. Verify that any fuses or breakers to which the power source may be connected are not disabling the AC power source. If this resolves the problem, end troubleshooting.
- c. Check that the power supplies are fully seated. First turn the power supply switch off. Check seating by completely pulling the power supply from the system, then reinserting it firmly. Turn the power supply switch back on. If this resolves the problem, end troubleshooting.
- d. Verify that the power supply switch in the ON (1) position for both power supplies. If this resolves the problem, end troubleshooting.

- e. Replace the power supplies. If this resolves the problem, end troubleshooting.
- f. Replace the midplane. If this resolves the problem, end troubleshooting.

**Yes.** Proceed to step 2.

- 2. Is the power supply amber *fault indicator* lit and the green *power indicator* not lit?

**Yes.** Perform the following steps:

- a. Verify that the AC cable to the power supply is properly inserted into the power supply. First turn the power supply switch off, then verify proper insertion by completely pulling the AC cable from the power supply, reinserting it firmly, and turning the power supply switch back on. If this fixes the problem, end troubleshooting.
- b. Verify the AC cable is plugged into an active AC source at the other end. First turn off the power supply switch, then turn it back on when the AC sources are confirmed. Verify that any fuses or breakers to which the power source may be connected are not disabling the AC power source. If this resolves the problem, end troubleshooting.
- c. Check that the power supplies are fully seated. First turn the power supply switch off. Check seating by completely pulling the power supply from the system, and then reinserting it firmly. If this resolves the problem, end troubleshooting.
- d. Verify that the power supply switch is in the ON (1) position for both power supplies. If this resolves the problem, end troubleshooting.
- e. Replace the power supply. If this resolves the problem, end troubleshooting.

**No.** Proceed to step 3.

- 3. Is the power supply amber *fault indicator* lit and the green *power indicator* lit?

**Yes.** Perform the following steps:

- a. Check that the power supplies are fully seated. First turn the power supply switch off. Check the seating by completely pulling the power supply from the PowerVault 660F or 224F storage systems, and then reinserting it firmly. Turn the power supply switch back on. If this resolves the problem, end troubleshooting.
- b. Replace the power supply. If this resolves the problem, end troubleshooting.

**No.** Proceed to step 4.

- 4. Is the problem resolved?

**Yes.** End troubleshooting.

**No.** See Chapter 9, "Getting Help," for instructions on obtaining technical assistance.

# Replacing the Power Supply

**NOTICE:** See "Protecting Against Electrostatic Discharge," found at the beginning of this chapter, before replacing the power supply.

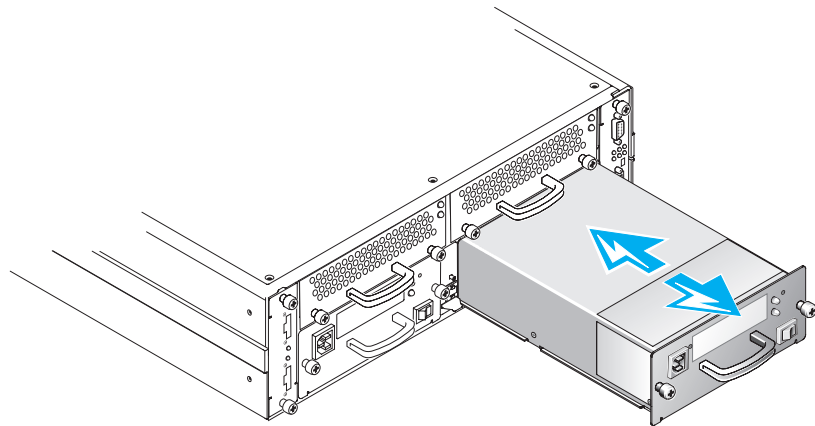
To remove a power supply, perform the following steps:



**CAUTION:** Avoid touching the output connectors on the power supply. Wait 10 to 20 seconds after disconnecting the AC power cable from its input receptacle before removing the power supply or coming into contact with its output connectors.

Two hot-swappable power supply modules are installed in the back of the system chassis. If you observe an amber fault LED lighted on one of the power supplies, perform the following steps to replace the faulty power supply:

1. At the back of the rack cabinet, identify the faulty power supply by observing the power supply with the amber fault LED lit.



## Figure 8-6. Removing the Power Supply

2. Turn off the power to the faulty power supply by pressing the power switch.  
Observe that the green LED is off and the amber LED stays lit.
3. Remove the power cord from the back of the faulty power supply module.  
Do not turn off or disconnect the power cord to the remaining functioning power supply.
4. Unscrew the captive screws that secure the power supply module in its slot.
5. Pull the faulty power supply module out of its slot.
6. Slide the new power supply into its slot.  
Ensure that the power supply switch is set to OFF (O).



7. Tighten the captive screws to secure the power supply in its slot.
8. Connect the AC power cable to the power input receptacle on the back panel of the power supply.
9. Turn on the power supply by pressing the power supply rocker switch to ON (I).  
Observe that the green LED on the back of the power supply is on and that the amber fault LED stays off.



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