

Digital Video Storage Array

Power Supply Module Failure Recovery on the 2U Chassis



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Preface

This document provides detailed procedures for dealing with a failed or malfunctioning power supply module. This document covers the following topics:

- Answers to the following questions:
 - How Do I Know a Power Supply Module Has Failed?
 - What Does the Error Message Mean?
 - Is It Possible a Power Supply Has Not Actually Failed?
 - How to Locate a Failed Power Supply Module?
 - How to Replace a Failed Power Supply Module?
- Procedures to recover from power supply failure.
- Notices and working theories behind the recovery operation.

Document Conventions

Convention	Meaning
Bold	Denotes a part, item, or assembly.
<i>Italic</i>	Denotes a reference to another paragraph, figure or table.
<u>Underline</u>	Used to emphasize a point.
<code>courier</code>	Denotes the actual name of an object, the exact code that should be typed or a message returned from a system.

Symbols

You may encounter these symbols within the document. Explanatory text accompanies each symbol, which provides additional information detailing the operation or highlighting safety information.



NOTICE! Notices inform you of essential but non-critical information. Read these messages carefully as any directions or instructions contained therein can help you avoid making mistakes.



CAUTION! Cautionary messages provide critical information that help you reduce the chance of losing data or damaging the system. Please heed these messages.



WARNING! Warnings highlight information, that if overlooked may cause damage to the system or result in personal injury. Take warnings seriously.



DANGER! Danger messages denote the presence of electrical equipment that may cause electric shock or electrocution. Take care when you see this symbol to avoid serious injury or death.

Related Publications

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Table of Contents

1	Identifying a Power Supply Module Failure	1
1.1	How Do I Know a Power Supply Module Has Failed?	1
1.1.1	LCD Screen Message	1
1.1.2	Power Supply LEDs	2
1.1.3	Audible Alarm	2
1.1.4	Terminal	3
1.1.5	Bosch RAIDWatch Server	4
1.1.6	Bosch RAIDWatch	4
1.2	What Does the Error Message Mean?	5
1.3	Is It Possible a Power Supply Has Not Actually Failed?	6
1.4	How to Locate a Failed Power Supply?	6
2	Power Supply Replacement Procedures	7
2.1	How to Replace a Failed Power Supply?	7

1 Identifying a Power Supply Module Failure

1.1 How Do I Know a Power Supply Module Has Failed?

There are various ways to be notified of the events occurring on a RAID subsystem, including:

- LCD keypad panel display
- LED indicators on the power supply module(s)
- Audible alarm
- Event notification via RAIDWatch Server or NPC sub-modules through the following methods: email, SNMP traps, fax, LAN broadcast, MSN, ICQ, and SMS messaging
- The graphical representation of enclosure elements through the Bosch RAIDWatch graphical user interface
- RS-232C terminal screen
- Before replacing a power supply module, perform the following steps to ensure that you can identify the exact failed module for removal.



NOTICE! Before attempting to replace a power supply module, make sure the rest of the subsystem components are operating normally. All external factors affecting normal subsystem operation should be corrected before determining that a module failure has occurred.

1.1.1 LCD Screen Message

If a power supply fails or malfunctions, the LCD panel on the front side of the subsystem will:

1. Light the third LED (ATTN) "red." The indicator is located on the lower left corner of your subsystem's keypad panel.
2. Display a power supply "failure," "absent," or "low voltage" message on the LCD screen.
(See Figure 1.1)

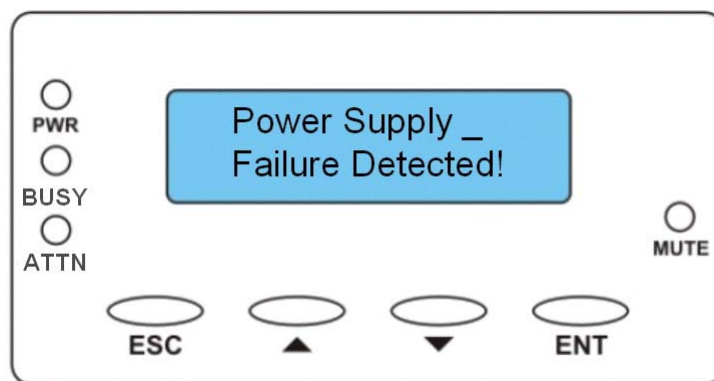


Fig. 1.1 LCD Keypad Panel

What to Do?

1. Note the pre-assigned slot number of the failed power supply. Refer to Section 1.4 for details on how to locate a power supply module. The number is crucial for finding the exact failed module.
2. Press the ESC button to clear the currently displayed message and to return to the configuration menu screen. The alarm will not stop until it is manually turned off.
3. Refer to Section 1.2 for the power supply failure rectification procedures.

1.1.2 Power Supply LEDs

All 2U subsystem power supplies have one (1) red LED on the back that indicates module failure (See Figure 1.2). If any of the power supply LEDs light up, the power supply may have failed or is considered faulty.

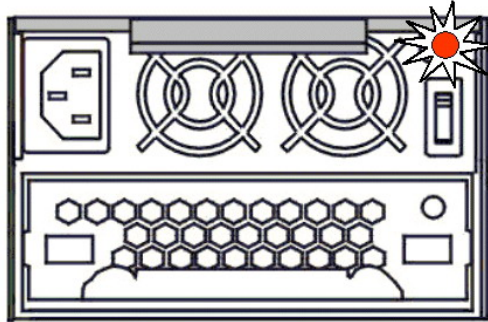


Fig. 1.2 Power Supply LED Indicator

1.1.3 Audible Alarm

Every Bosch RAID subsystem is equipped with an audible alarm. If any of the subsystem components fail, the audible alarm will automatically be triggered. If the system manager is on-site and hears an alarm, the manager should immediately check for error messages that are simultaneously displayed on the LCD screen, a management terminal, or the RAIDWatch user interface to determine what has triggered the alarm. If a power supply failure is detected, please follow the steps below to take appropriate actions and rectify the problem.

What to Do?

1. Physically check the LCD panel messages or power supply LEDs to verify the failed power supply location. Refer to Section 1.4 for details.
2. Press the MUTE button on the LCD panel to turn the alarm off temporarily for the current event. You may also mute the alarm through the firmware configuration utility.

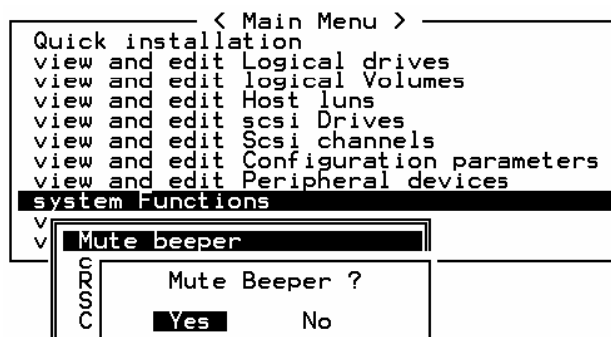


Fig. 1.3 The Mute Beeper Command

3. From the Main Menu, select "System Functions," and then press ENTER on "Mute beeper." Choose "Yes" and press ENTER in the next dialog box to turn the beeper off temporarily for the current event. The beeper will still activate on the next event. This function can also be accessed through the LCD keypad panel and RAIDWatch GUI.
4. Refer to Section 1.2 for the power supply failure event description and the rectification procedures.

1.1.4

Terminal

You will be prompted with an event message if a power supply failure occurred. You may also manually examine the operating status of power supplies.

A power supply message on the terminal screen should be similar to Figure 1.4.

```

Sat May  4 02:30:02 2002          Cache Status: Clean
                                BAT:#####

    < Main Menu >
    Quick installation
    view and edit Logical drives
    view and edit logical Volumes
    view and edit Host luns
    view a
    view a
    view a
    view a
    view a
    system
    view system Information
    view and edit Event logs

    Alert
    Peripheral Set 0 Device ALERT:Power Supply 0 Failure Detected

ESC:Quit Next Message  !Ctrl+C:Clear All Events  !Ctrl+L:Refresh Screen
  
```

Fig. 1.4 Alert Message on the RS-232C Terminal Screen

To check the operating status of the power supply modules, follow these steps:

1. Use the arrow keys to move the cursor bar through the menu items on the terminal screen, and then press ENTER to choose an item, or ESC to return to the previous menu/screen.
2. In the Main Menu screen, select "View and Edit Peripheral Devices."
3. Press ENTER on "View Peripheral Device Status."
4. Select "I2C Peripheral Device" by pressing ENTER.
5. A list of device sets will prompt; select the device set that you want to view.
6. Select "Power Supply."

A power supply status list will appear. See an example in Figure 1.5.

```

Fri Apr 26 17:56:25 2002          Cache Status: Clean
                                BAT:+++++

PSU0 status      Normal
PSU1 status      Normal
PSU0 +3.3V       3.300V
PSU0 +5V         5.00V
PSU0 +12V        12.100V
PSU1 +3.3V       3.300V
PSU1 +5V         5.00V
PSU1 +12V        12.100V

v  View Pe      Drive Failure Output Definition
v  S           Cooling FAN
  A           Power Supply
  C           Temperature Sensor
  S           I2C P Device Set Descriptor
           Device Set 0

           LOCATION
           Normal

Arrow Keys:Move Cursor  !Enter:Select  !Esc:Exit  !Ctrl+L:Refresh Screen
  
```

Fig. 1.5 Power Supply Status in the Terminal Screen

Look for the power supply "Status" column. The status may be indicated as one of the followings:

Status	Description
Failure Detected	The cooling fan has failed
Normal	Normal working condition
Voltage Reading	Displays voltage readings of +5V, +3.3V, and +12V output

What to Do?

1. If you see any of the faults listed above, be sure to write down the slot number of the malfunctioning power supply. Refer to Section 1.4 for details on locating the power supply. The power supply's slot number is crucial for finding the exact failed module.
2. Press ESC several times to return to the terminal main screen.
3. Refer to Section 1.2 to rectify a power supply module failure.

1.1.5 Bosch RAIDWatch Server

The RAIDWatch Server is a sub-module of the RAIDWatch GUI software that is used to manage and deliver system events. If you have properly configured and started this sub-module utility, you will be notified of system events regardless of RAID subsystem locations via email, SNMP traps, fax, LAN broadcast, MSN, ICQ, or SMS messaging. For a power supply failure on a standard enclosure, the message may look like the following:

Name: ID xxxxxxxx, Peripheral Set _ Device ALERT: Power Supply __ Failure Detected

Refer to Section 1.2 for interpretations of event messages.

1.1.6 Bosch RAIDWatch

Bosch RAIDWatch provides easy access to component status through its visualized representations of enclosure elements. RAIDWatch recognizes each subsystem by its board serial number, and displays an exact replica of it in its panel view. Although power supply problems can only be solved on-site, an administrator can use the RAIDWatch manager to remotely identify a problem and then contact the engineer nearest the installation site.

To view the power supply module information in the RAIDWatch Enclosure View window, select either the Enclosure icon from the navigation tree or select the Enclosure View from the Action menu, as shown in Figure 1.6. The command allows you to access the graphical display of the enclosure's front and rear view window.

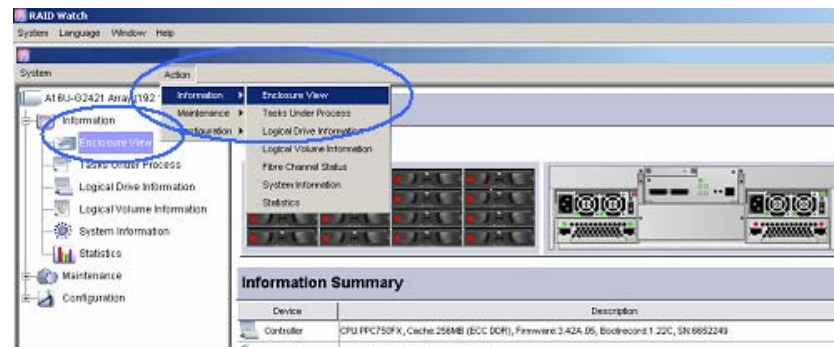


Fig. 1.6 Opening RAIDWatch Enclosure View Window

If multiple enclosures have been cascaded, you can select a different enclosure by clicking its tabbed icons as displayed in Figure 1.7.

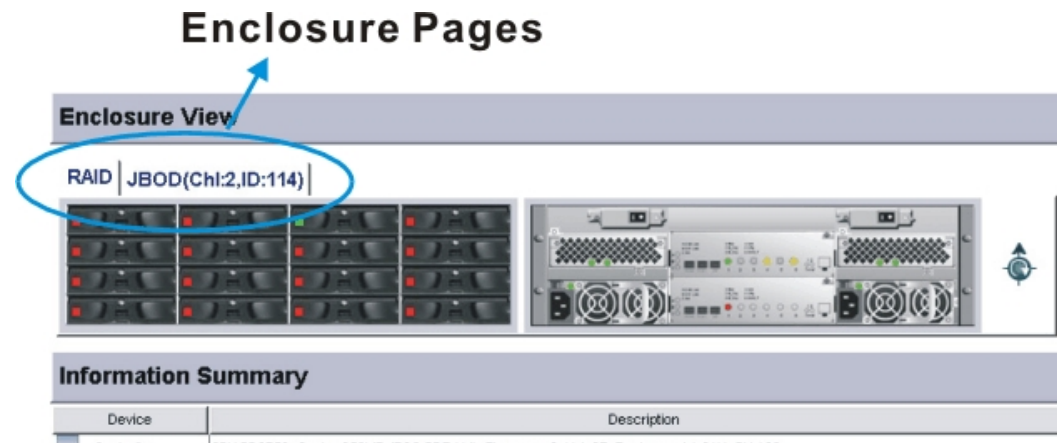


Fig. 1.7 Enclosure Tabbed Pane

Select an enclosure and start viewing the device status in the Enclosure View window.

The LED icons in the enclosure view show the real working status of the corresponding LEDs on the subsystem's rear panel. (See Figure 1.8)

When a power supply fails, RAIDWatch notifies you by the following:

1. On the Enclosure View page, the corresponding power supply LED(s) on the subsystem rear panel will turn red.
2. If the LED corresponding to a failed power supply is lit red, place your mouse cursor on the enclosure rear panel for a second to display a summary of the enclosure status (including failure information).
3. The power supply failure messages will appear on the event log list at the lower half of the GUI screen.

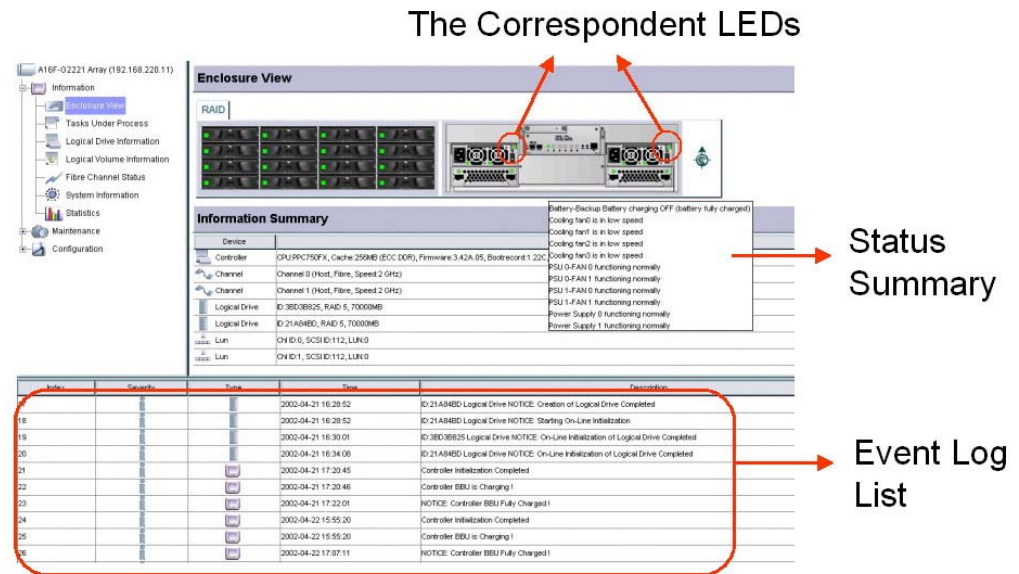


Fig. 1.8 RAIDWatch Enclosure View Information

If the corresponding power supply LED is lit or a related event is shown on the GUI screen, refer to Section 1.2 to rectify the problem.

1.2

What Does the Error Message Mean?

You may receive power supply failure messages through the terminal screen, LCD screen, or RAIDWatch GUI; and the message may look like one of the following:

```
SAF-TE Device (__) ALERT: Power Supply Failure Detected (__._)
Peripheral Set __ Device ALERT: Low Power Supply __ Voltage Detected
(.___V)
Peripheral Set __ Device ALERT: Power Supply __ Failure Detected
Peripheral Set __ Device ALERT: Power Supply __ Not Present
```



NOTICE! The SES enclosure service is made through two FC disk drives in standard FC JBODs. Events collected through the SES service will display the channel numbers and ID of the pass-through disk drive.

Event Description

Event Message	Description
Failure Detected	A power supply could have been removed or the connection/installation of the power supply is incorrect; could also indicate a failed module
Low Voltage Detected	Low voltage output is detected
AC Failed	A C input failure detected, could be power supply converter failure or loss of power source by cabling failure
Over Temp Failed	The module has overheated (or defined by PSU vendor as the temperature difference measured at the two ends) and then forced to shut down.
DC Over Voltage	High voltage readings received
DC Under Voltage	Low voltage readings received
Over Temp Warn	Elevated temperature warning

1.3**Is It Possible a Power Supply Has Not Actually Failed?**

When you received any of the alert messages, or see that a power supply LED is lit red on the Bosch RAIDWatch screen, follow the steps below to rectify the problem.

1. Be sure to write down the failed power supply's device number. Use this number to identify the location of the failed module. Refer to Section 1.4 for details on locating the power supplies. This number is crucial for finding the exact failed module.
2. A power supply malfunction may simply be the result of improper handling; for example, the power supply is not properly installed. Check carefully that all of the power supplies are firmly seated in the module slots.
3. Reinstall the power supply showing problems.
4. If the power supply is still not functioning properly, it should be replaced. Please refer to Chapter 2 for the power supply replacement procedure.

1.4**How to Locate a Failed Power Supply?**

Refer to the figure below to locate a failed power supply:

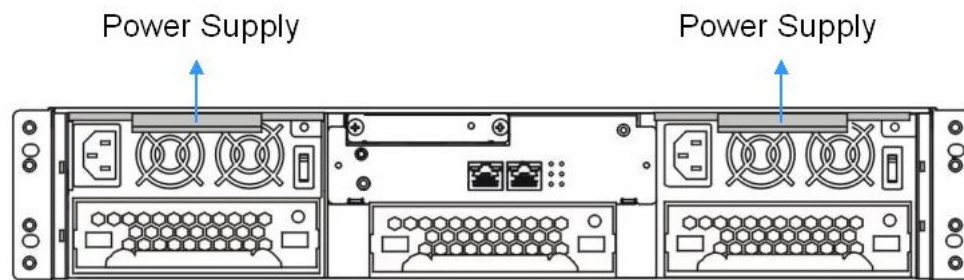


Fig. 1.9 Power Supply Locations: Rear View of a 12-bay Model

The 8-bay and 12-bay, 2U-profile models are equipped with one (1) or two (2) redundant, hot-swappable, 350W power supplies, which are accessed through the rear of the enclosure. The power supply is permanently mounted into a 2U (dual-level) bracket especially designed to house both the power supply and a cooling fan module, which is mounted in the lower part of the 2U bracket.

For today's mission-critical applications, subsystem downtime is not allowed. A failed module should immediately be replaced with a new one. The power supply should be replaced as a whole causing minimum interference to system operation. Please refer to Chapter 2 for the procedures on replacing a power supply.

2 Power Supply Replacement Procedures

2.1 How to Replace a Failed Power Supply?

Once you are notified of power supply failure and have located the failed module, it should be replaced as soon as possible.

A failed module may simply be the result of improper handling; for example, when a power supply module is not properly installed. Check carefully that all the power supplies are firmly seated in the subsystem.

If it is necessary to replace a failed power supply, the faulty module should only be removed from the subsystem when you have a replacement immediately available that can be installed as soon as the failed module has been removed.



NOTICE! Although the power supplies are fully redundant, it is not advisable to run the subsystem with a single power supply for an extended period of time. If the remaining power supply fails, the system may overheat and is at risk of sustaining irreparable damage. Keep a failed module in its enclosure bay until a replacement unit is in hand.

Power supplies are secured to the chassis with a retention screw and an extraction lever located on the rear of the module. To replace a power supply, please follow these steps:

1. Turn off the PSU. The power switch is located at the rear of the PSU. (See Figure 2.1)
2. Disconnect the power cord that connects the subsystem to the main power. The power cord socket is found on the left-hand side of the module.
3. Remove the retention screw at the top right-hand side of the PSU.

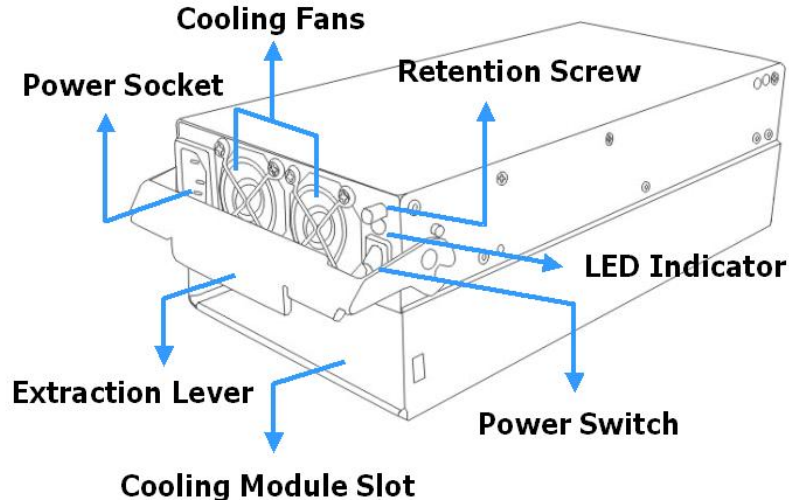


Fig. 2.1 PSU Parts Identification

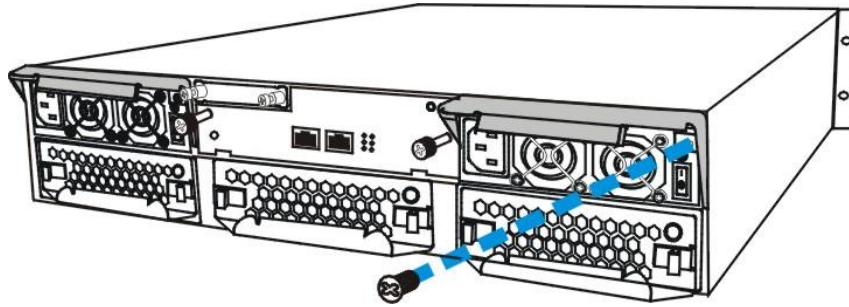


Fig. 2.2 Removing the PSU Retention Screw

4. Remove the PSU module by pushing the extraction lever at the back of the PSU module downwards. This will dislodge the PSU module from the subsystem. Gently pull the PSU module out of the subsystem. (See Figure 2.3)

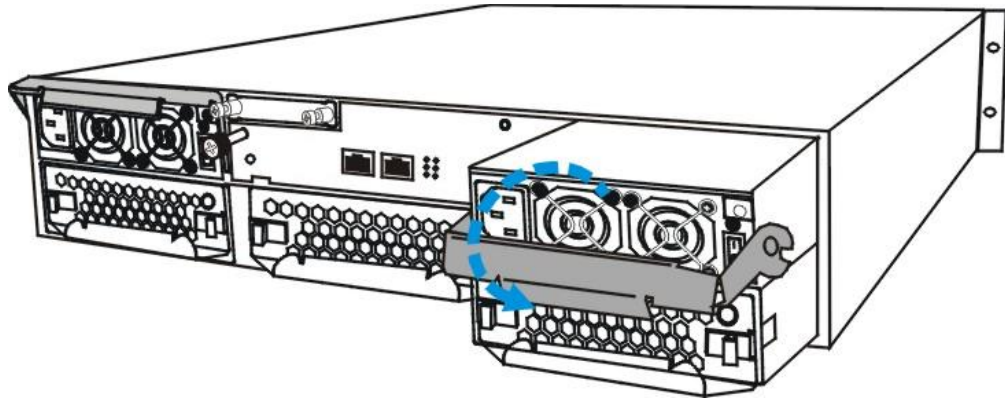


Fig. 2.3 Removing the PSU Module

5. Remove the cooling module by pushing the clips on either side of the cooling module rear panel together. Then gently pull the cooling module out of the lower level of the PSU bracket. (See Figure 2.4)

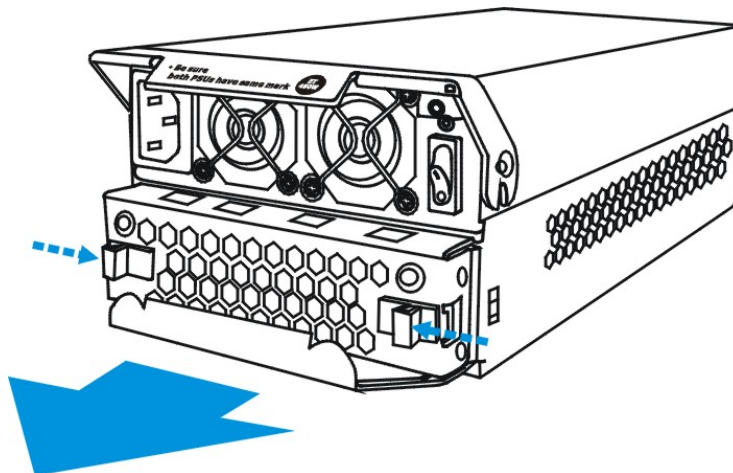


Fig. 2.4 Removing the Cooling Module

6. Reinstall the cooling module into the new PSU module by aligning the cooling module with the lower level of the PSU bracket and gently sliding the cooling module in.
7. Reinstall the PSU module by aligning the PSU module with the empty bay from which the faulty module was removed. Gently slide the replacement PSU module into the subsystem.
8. Plug the previously removed power cord into the PSU module socket. Turn the power switch on.

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