

Digital Video Storage Array

RAID Controller Module Failure Recovery on the 2U Chassis



BOSCH

AutoDome, Bilinx, Bosch, the Bosch logo, DiBos, FastAddress and VIDOS are registered trademarks of Bosch Security Systems, inc.

The following trademarks are registered with the United States Patent and Trademark Office:

Pentium is a registered trademark of Intel Corporation

.NET, DirectX, Internet Explorer, Microsoft, Windows, Windows 2000 and Windows XP are registered trademarks of Microsoft Corporation

Due to the nature of this material, this document refers to numerous hardware and software products by their trade names. In most, if not all cases, these designations are claimed as trademarks or registered trademarks by their respective companies in the United States of America. It is not this publisher's intent to use any of these names generically. The reader is therefore cautioned to investigate all claimed trademark rights before using any of these names other than to refer to the product described.

Preface

This document provides detailed procedures dealing with a failed or malfunctioning RAID controller module and covers the following topics:

- Answers to the following questions:
 - How Do I Know a RAID Controller Module Has Failed?
 - What Does the Error Message Mean?
 - Is It Possible a RAID Controller Has Not Actually Failed?
 - How to Locate a Failed Controller Module?
 - How to Replace a Failed Controller Module?
 - How to Install a Memory Module?
- Procedures to recover from RAID controller 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

Refer to the latest Bosch Security Systems, Inc. Databook for the most up-to-date datasheets. To obtain a copy of the Databook, please contact your local Bosch representative.

You can also visit the Bosch Security Systems World Wide Web site at: <http://www.boschsecurity.com> to view a current listings of our publications.

Table of Contents

1	Identifying a Raid Controller Module Failure	1
1.1	How Do I Know a RAID Controller Module Has Failed?	1
1.1.1	Forced Shutdown	1
1.1.2	LCD Display and LCD Screen Messages	2
1.1.3	Controller Failure During Active Service	2
1.1.4	Controller Failure During the Initialization Process	3
1.1.5	Controller Module LEDs	3
1.1.6	Hyper Terminal	4
1.1.7	Bosch RAIDWatch and the RAIDWatch Server	4
1.2	What Does the Error Message Mean?	4
1.2.1	Event Description	5
1.3	Is It Possible a Controller Module Has Not Actually Failed?	5
1.4	How to Locate a Failed Controller Module?	6
2	Controller Module Replacement Procedures	7
2.1	How to Replace a Failed Controller Module?	7
2.2	Removing the Controller Module	7

1 Identifying a Raid Controller Module Failure

1.1 How Do I Know a RAID Controller Module Has Failed?

This document focuses on the procedures for restoring operation after a controller failure. Make sure all other interruptions to system operation, e.g., cable failure, power outage, etc., have been excluded or corrected before assuming the fault was caused by a RAID controller. Because all of the monitoring and event notification algorithms are managed by the RAID controller module, an administrator may or may not receive event messages if the RAID controller fails or is about to fail. Some critical conditions, such as channel processor failure, may also render the system useless. If critical conditions were detected before controller failure, you may receive a warning message through the following:

- LCD keypad panel display
- LED indicators on the controller module
- Audible alarm
- Event notification via the 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 RAIDWatch graphical user interface
- RS-232C hyper terminal screen

Before replacing a RAID controller module, perform the following steps to ensure that you can identify the exact failed module for removal.

1.1.1 Forced Shutdown

Another possibility is that a RAID controller has become non-responsive if the preset temperature threshold is exceeded due to a cooling fan or power supply failure. Verify the working condition of every enclosure module. Before shutting down, you should receive one or more of the following messages:

```
Force Controller Write-Through on Trigger Cause
Peripheral Device ALERT: Elevated Temperature Alert
Peripheral Set_ Device ALERT: Cooling Fan_ Failure Detected
Peripheral Set_ Device ALERT: Power Supply_ Failure Detected
Controller Shutdown Start
Controller Shutdown Complete
```

If the shutdown was caused by elevated temperature and component failure, restore the normal working condition by replacing the failed fan module, failed power supply, etc. The first event occurs when the preset safety mechanisms are activated. Event Triggered Operation is determined by a user's preference settings and may not apply to all subsystems. The subsystem might disable Write-Back caching or stop charging batteries when it detects critical events.



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

1.1.2 LCD Display and LCD Screen Messages

Since all 2U-profile subsystems are equipped with a single RAID controller, controller failure means the whole subsystem comes to a stop.

1.1.3 Controller Failure During Active Service

The following conditions may happen if a RAID controller fails or malfunctions.

1. There may or may not be symptoms showing the operation is already unstable. Before controller failure, problems with the voltage readings and I/O timeout might generate event messages. If the controller hangs, you may no longer access the terminal or LCD event log. The error messages may look like these:


```
Peripheral Device ALERT: +12V <upper/lower> Voltage Detected ( _ )
Controller SDRAM ECC Multi-bits Error Detected
Controller PCI Bus Parity Error Detected
```
2. If the RAID controller fails or hangs, you may see the following conditions:
 - a. If the RAID controller has failed electronically, the LCD backlight may completely go out. The LEDs on subsystem modules may have also gone out.
 - b. If the controller hangs, the LCD may only show the backlight with or without text being displayed. There will be no response when pushing the LCD keypad buttons.
3. Since there is one controller in the 2U subsystems, it is not possible to see the controller failure event on the LCD screen. If a controller fails, you will be prompted by the message, "Controller connection failed, this application will close now!" The current management session will be ended.
4. Unless your connection to a managed subsystem is made through the "In-Band" method (management link using the existing host bus connection), the event log previously shown on either the RAIDWatch Server screen will be lost. If using the In-band method, a copy of the event list will be stored on the management computer. Open the event log to discover what might have caused the failure.

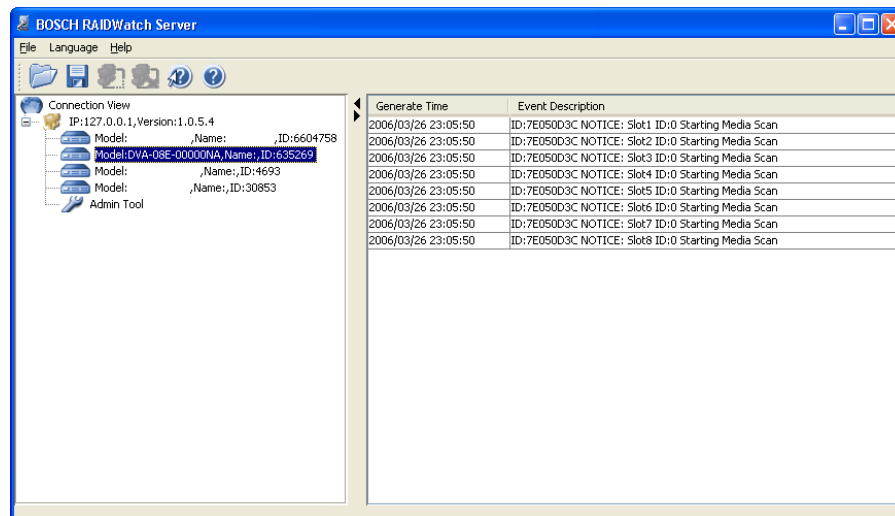


Fig. 1.1 RaidWatch Server Event Screen

1.1.4

Controller Failure During the Initialization Process

1. The following are the error messages that might occur when you reset or power cycle the subsystem for a specific reason:
 - An error message may look like this on the LCD screen:

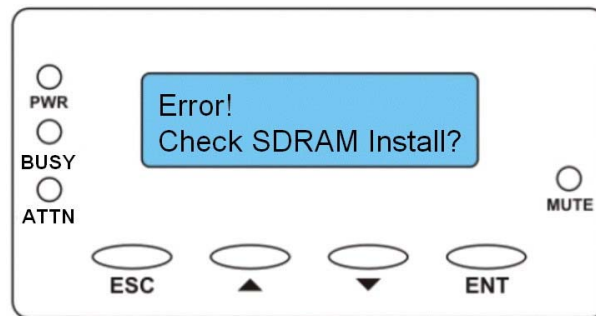


Fig. 1.2 An Error During the Initialization Process

- Possible error messages may be:
Error! Check SDRAM Install?
NVRAM CRC Error! <ENT> to Confirm
Controller SDRAM ECC Multi-bits Error Detected
Controller SDRAM ECC Single-bit Error Detected
Controller SDRAM Parity Error Detected

What to Do?

1. If any message appears, note the message.
2. Press the ESC button to clear the currently displayed message and to return to the configuration menu screen. If the audible alarm was triggered, the alarm will not stop until it is manually turned off.



NOTICE! The event log will be saved in the subsystem's NVRAM even if you press the Esc key to clear the message. To access an existing event log, please refer to the Administrator's manual in the Product Utility CD that came with your subsystem.

3. Refer to Section 1.2 for more details about the related event messages.

1.1.5

Controller Module LEDs

Check the LEDs on the rear-side faceplate of the controller module and the ATTN LED on the LCD keypad panel. If a controller has ceased to function, the LEDs should all go off. It is possible for the LEDs to remain on even though the controller has stopped responding to host and user commands (e.g., board temperature threshold was exceeded). Since 2U subsystems have only one controller module, the LEDs might not be able to indicate controller faults if fatal errors have occurred.

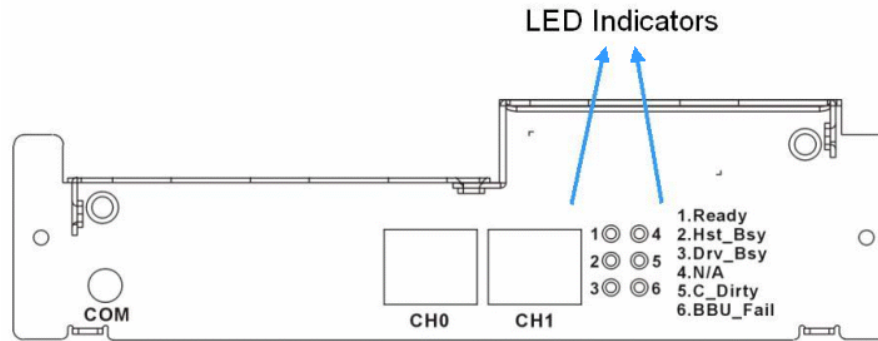


Fig. 1.3 Controller Module LEDs

As with other fault-indicating mechanisms, the audible alarm might not be triggered to indicate controller faults if fatal errors have occurred.

1.1.6

Hyper Terminal

You will probably be prompted with an event message before a controller fails. The message could be one of the following:

Controller PCI Bus Parity Error Detected

Controller SDRAM ECC Multi-bits Error Detected

If a controller ceases to function, the terminal connection will be terminated, and the access to firmware-embedded utility will be ended.

1.1.7

Bosch RAIDWatch and RAIDWatch Server

A software session with a redundant-controller subsystem will receive a controller failure message in the event of controller failure. However, in a software session with a single-controller subsystem, a controller failure will be reported as a connection failure. So, when you see the connection failure message shown below, it may either be a connection failure or controller failure.

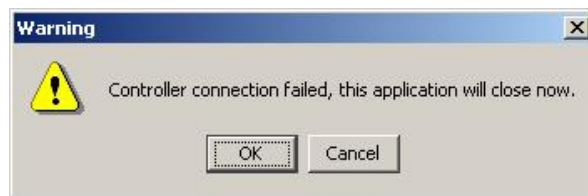


Fig. 1.4 Connection Failed Message

1.2

What Does the Error Message Mean?

You may or may not receive controller-related messages before the controller fails. The messages could be delivered through the hyper terminal screen, LCD screen, or RAIDWatch GUI; and the message may look like one of the following:

Controller PCI Bus Parity Error Detected

Controller SDRAM ECC Multi-bits Error Detected

Controller SDRAM ECC Single-bit Error Detected

Controller SDRAM Parity Error Detected

Error! Check SDRAM Install?

NVRAM CRC Error! <ENT> to Confirm

1.2.1

Event Description

Event Message	Description
PCI Bus Parity Error	Internal faults might have occurred. This event often appears before a serious hardware fault renders a controller inoperable.
SDRAM ECC Multi-bits, Single-bit, and Parity Errors	Either the memory module has become unstable or problems have occurred with internal calculations, etc.
Check SDRAM Install!	An unsupported memory module is installed or a module is not correctly installed. Try to re-install the memory module.
NVRAM CRC Error!	Unable to load and run firmware from NVRAM. The controller failed to initialize by loading the firmware. In addition to controller failure, this event also appears when an incompatible version of firmware is loaded into the controller.

1.3

Is It Possible a Controller Module Has Not Actually Failed?

When you have determined a subsystem has failed to respond to host I/O requests or user commands, follow the steps below to rectify the problem.

1. Exclude all external factors that might impact the subsystem's normal operation. For example, power outage, multi-point cabling failure, system overhear, etc.
2. If the subsystem has failed to respond to host I/Os, you may close the application programs.
3. If the following conditions exist, you may try to power down and then power on the subsystem:
 - a. The LCD or rear-end LEDs are still lit.
 - b. The subsystem stopped responding to I/O requests and user commands.
 - c. You made configuration changes or upgraded firmware before the subsystem malfunctioned.
 - d. You released the extraction levers or removed the screws on the controller module.
 - e. You upgraded the memory module mounted on the controller module.
 - f. Unreasonable I/Os were distributed to the subsystem, e.g., computer viruses.
 - g. Exceeded temperature thresholds or malfunctioning PSUs may cause the subsystem to stop receiving I/Os. Correct the operating conditions before attempting to reset the subsystem.
4. If all LEDs on the controller and LCD went off, and no other factors could have caused the shutdown, you may reinstall the controller and then power on. First, stop the application programs running on the hosts. If your subsystem has a battery backup module, the cached data will be safe. If not, the unfinished writes cached in memory will be lost.
5. If the controller is still not functioning properly, it should be replaced. Please refer to Chapter 2 for the controller module replacement procedure.

1.4 How to Locate a Failed Controller Module?

Refer to the figure below to locate the failed controller module. All controllers in the 2U-profile subsystems are located in the upper middle module slot.

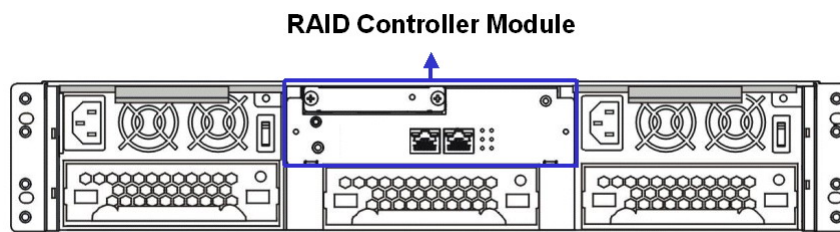


Fig. 1.5 Controller Module Location: Rear View of a 12-bay Model

2 Controller Module Replacement Procedures

2.1 How to Replace a Failed Controller Module?

Once you have located the failed controller, it should be replaced to restore system operation.



WARNING! When replacing the controller module, you must remember that the controller board is one of the most sensitive components in the subsystem. All safety precautions must be strictly adhered to. Failure to adhere to precautions can result in permanent damage to the controller board, resulting in timely delays.

For your own safety when replacing a controller in a 2U subsystem, make sure that no power is being supplied to the system prior to replacing the controller module.

The controller modules are secured to the chassis with the two (2) retention screws located at the end of the module. To replace the controller module, please follow these steps:

2.2 Removing the Controller Module

To remove the controller module:

1. Turn off the subsystem. If possible, power off the subsystem after you power off host computers and/or networking devices. If that is not possible, turn off both PSU modules and disconnect the power cords.
2. Disconnect all cables that are connected to the controller module you wish to replace. These include the Ethernet cables connected to the network, and any cable connected to the RS-232C audio jack connector.
3. Loosen the retention hand screws located on both sides of the RAID controller faceplate. Press these screws and loosen them using a Phillips screwdriver so that the controller can be removed from chassis (the DVA-12T is used as an example).

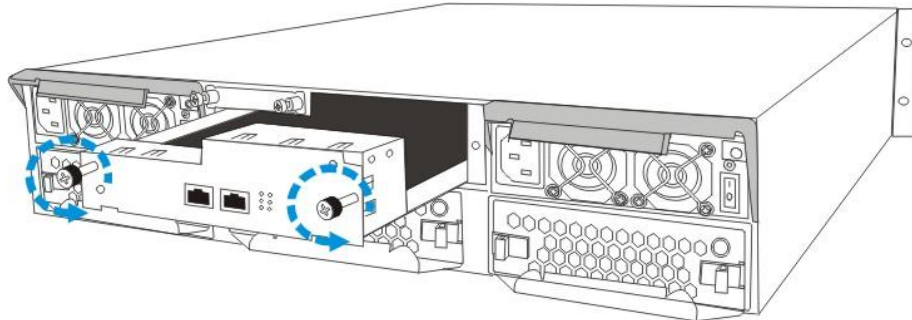


Fig. 2.1 Loosening the Hand Screws from the Controller Module

4. Remove the controller module by gently pulling the controller module out of the subsystem.
5. Insert the replacement controller. Align the controller module with the controller module bay at the rear of the subsystem. Gently slide the controller module in.
6. Fasten the hand screws to secure the controller module to the subsystem.
7. Re-attach all the cables that were removed. These include the cables that connect to the servers (host computers), the Ethernet cable, and any cable that was attached to the RS-232C audio jack connector.
8. Power up the system.

Americas:

Bosch Security Systems
130 Perinton Parkway
Fairport, New York, 14450
USA
Phone +1 800 289 0096
Fax +1 585 223 9180
www.boschsecurity.us

Europe, Middle East, Asia:

Bosch Security Systems B.V.
Postbus 80002
5600 JB Eindhoven
Phone: +31 40 2577 200
Fax: +31 40 2577 202
nl.securitysystems@bosch.com
www.boschsecurity.nl
www.boschsecurity.com

www.boschsecurity.com**Asia-Pacific:**

Bosch Security Systems Pte Ltd.
38C Jalan Pemimpin
Singapore 577180
Phone +65 6319 3450
Fax +65 63139 3499
www.boschsecurity.com