

# EonRAID 2510FS

2Gbps FC-to-FC RAID Controller Head

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Installation and Hardware Reference Manual

Revision: 1.3



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## Warnings and Certifications

### **FCC** (applies in the U.S. and Canada)

This device complies with Part 15 of FCC Rules. Operation of this device 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.

**Warning:**

Use only shielded cables to connect I/O devices to this equipment.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

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This device is in conformity with the EMC

# Table of Contents

<b>Chapter 1: Introduction .....</b>	<b>1-1</b>
1.1. Product Overview .....	1-1
1.1.1 Product Introduction.....	1-1
1.1.2 Six Models.....	1-2
1.1.3 Pre-installed memory modules .....	1-2
1.1.4 ER 2510FS Controller Head Chassis .....	1-3
1.1.5 Technical Specifications .....	1-5
1.2. ER 2510FS Hardware Components.....	1-5
1.2.1 Front Panel.....	1-5
1.2.2 Rear Panel .....	1-6
1.3. Different Front Panels .....	1-7
1.3.1 Front Panel Variations .....	1-7
ER 2510FS-4S – FP-I.....	1-7
1.3.3 ER 2510FS-6S – FP-I.....	1-8
ER 2510FS-4D – FP-II.....	1-8
1.3.5 ER 2510FS-6D – FP-II.....	1-8
1.3.6 ER 2510FS-4RH – FP-I.....	1-9
1.3.7 ER 2510FS-6RH – FP-I.....	1-9
1.4. The Front Panel Components .....	1-10
1.4.1 LCD Module Display.....	1-10
1.4.2 IO Modules .....	1-11
1.4.3 LED Module.....	1-14
1.4.4 Maintenance Board.....	1-15
1.4.5 BBU Module .....	1-16
1.5. The Rear Panel Components .....	1-17
1.5.1 Controller Module/s.....	1-18
1.5.2 Dual FAN Cooling Module.....	1-19
1.5.3 PSU Module.....	1-20
1.6. ER 2510FS Controller Head Monitoring.....	1-21
1.6.1 SES Monitoring.....	1-21
1.6.2 LED Indicators .....	1-21
1.6.3 Management Firmware and RAIDWatch GUI .....	1-22
1.6.4 Audible Alarms .....	1-22
1.7. Hot-Swappable Components .....	1-22

## Hardware and User's Installation Guide

1.7.1 Hot-Swap Capabilities .....	1-22
1.7.2 Components .....	1-22
1.7.3 Normalized Airflow.....	1-23
<b>Chapter 2: Hardware Installation .....</b>	<b>2-1</b>
2.1. Installation Overview .....	2-1
2.2. Installation Pre-requisites .....	2-1
2.3. Static Free Installation .....	2-1
2.4. ER 2510FS Requirements .....	2-2
2.4.1 ER 2510FS Cabinet Requirements.....	2-2
2.4.2 ER 2510FS Cable Requirements.....	2-2
2.4.3 Host Requirements.....	2-2
2.5. Installation Overview .....	2-3
2.5.1 Pre-Installed Components .....	2-3
2.5.2 Uninstalled Components.....	2-3
2.5.3 General Installation Procedure .....	2-4
2.5.4 Installation Flowchart .....	2-5
2.6. Unpacking .....	2-6
2.6.1 Packaging .....	2-6
2.7. Component Identification .....	2-6
2.7.1 Front Panel Modules .....	2-6
2.7.2 IO Module Identification.....	2-7
2.7.3 Controller Module Location Identification.....	2-7
2.8. Memory Installation .....	2-8
2.8.1 DIMM Module Considerations.....	2-8
2.8.2 DIMM Module Installation Procedure .....	2-8
2.9. Controller Module Installation .....	2-11
2.9.1 Controller Module Considerations .....	2-11
2.9.2 Controller Module Installation Procedure .....	2-11
2.10. Dual FAN Cooling Module Installation.....	2-14
2.10.1 Dual FAN Cooling Module Considerations .....	2-14
2.10.2 Installation Steps .....	2-14
2.11. FC Speed Selection.....	2-15
2.12. Installation of the Front Panel Modules .....	2-16
2.12.1 Front Panel Module Installation Considerations.....	2-16
2.12.2 Front Panel Module Installation Steps.....	2-17
2.13. Mounting the ER 2510FS into the Rack.....	2-19

2.13.1 Pre-Installation Considerations .....	2-19
2.13.2 The Slide Rail .....	2-20
2.13.3 Slide Rail Installation Steps.....	2-21
<b>Chapter 3: Monitoring the System.....</b>	<b>3-1</b>
3.1. Controller head Monitoring Overview .....	3-1
3.2. Front Panel LEDs .....	3-2
3.2.1 IO Modules .....	3-2
3.2.2 LED Board.....	3-3
3.2.3 Maintenance Module .....	3-4
3.2.4 BBU Module .....	3-6
3.3. Audible Alarm.....	3-6
3.3.1 Default Threshold Values .....	3-7
3.3.2 Failed Devices .....	3-7
3.4. SES Monitoring.....	3-8
3.4.1 Using Terminal Emulation.....	3-8
3.4.2 Using the GUI for SES Monitoring.....	3-11
<b>Chapter 4: Connection and Operation .....</b>	<b>4-1</b>
4.1. Overview .....	4-1
4.2. FC Considerations .....	4-1
4.2.1 FC Speed Detection .....	4-1
4.2.2 Choosing the Fibre Cables .....	4-1
4.2.3 Lasers.....	4-2
4.2.4 SFP Transceivers.....	4-2
4.3. Topology and Configuration Pre-considerations .....	4-3
4.3.1 Basic Configuration Rules .....	4-3
4.3.2 FC Topologies.....	4-3
4.3.3 Host Side Topologies .....	4-3
4.3.4 Drive Side Topologies.....	4-4
4.3.5 Channel Default Settings .....	4-5
4.4. Single Controllers .....	4-6
4.4.1 ER2510FS-4S.....	4-6
4.4.2 ER2510FS-6S.....	4-6
4.5. Dual-Single Controllers.....	4-8
4.5.1 ER2510FS-4D.....	4-8

## Hardware and User's Installation Guide

4.5.2	<i>ER2510FS-6D</i> .....	4-9
4.6.	Redundant Controllers.....	4-11
4.6.1	<i>Redundant Controller Pre-requisites</i> .....	4-11
4.6.2	<i>Redundant Controller Modes</i> .....	4-11
4.6.3	<i>Internal Connections</i> .....	4-12
4.6.4	<i>Unique Identifier</i> .....	4-12
4.6.5	<i>Redundant Controller Configurations</i> .....	4-12
4.6.6	<i>ER2510FS-4RH</i> .....	4-13
4.6.7	<i>ER2510FS-6RH</i> .....	4-13
4.7.	Power On.....	4-15
4.7.1	<i>Check List</i> .....	4-15
4.7.2	<i>Power On Procedure</i> .....	4-16
4.7.3	<i>EonRAID Power On-Procedure</i> .....	4-17
4.7.4	<i>Power On Status Check</i> .....	4-17
4.7.5	<i>LCD Screen</i> .....	4-18
4.8.	Power Off Procedure .....	4-19
 <b>Chapter 5: Controller Head Maintenance.....</b>		<b>5-1</b>
5.1.	Overview .....	5-1
5.1.1	<i>About Controller head Maintenance</i> .....	5-1
5.1.2	<i>General Notes on Component Replacement</i> .....	5-1
5.2.	Replacing the PSU.....	5-2
5.3.	Replacing the Dual FAN Cooling Module .....	5-3
5.4.	Controller Module Maintenance.....	5-6
5.4.1	<i>Controller Hot-Swapping</i> .....	5-6
5.4.2	<i>Notes on Controller Module Maintenance</i> .....	5-6
5.4.3	<i>Removing the controller Module</i> .....	5-7
5.4.4	<i>Removing the DIMM module</i> .....	5-8
5.4.5	<i>Replace/Install the DIMM module</i> .....	5-9
5.4.6	<i>Controller Module Installation</i> .....	5-10
5.5.	Replacing Front Panel Modules.....	5-11
5.5.1	<i>The Hot-Swap Mechanism</i> .....	5-11
5.5.2	<i>Replacing a Failed Front Panel Module</i> .....	5-11
5.6.	LCD Panel Failure .....	5-12
 <b>Chapter 6: Upgrading the Controller Head.....</b>		<b>6-1</b>
6.1.	Overview .....	6-1



6.2. Notes on Model Upgrades .....	6-1
6.3. LCD Board Jumper Settings.....	6-2
6.3.1 Removing the top cover.....	6-2
6.3.2 Changing the Jumper Settings .....	6-4
6.3.3 Replace the Top Cover.....	6-5
6.4. Front Panel Replacement.....	6-6
6.4.1 Front Panel variations.....	6-6
6.4.2 Replacing the Front Panel.....	6-7
6.5. Single Controller Model Upgrades.....	6-8
6.5.1 Single to Dual-Single Upgrade.....	6-8
6.5.2 General Procedure .....	6-8
6.6. Dual-Single Controller Model Upgrade .....	6-9
6.6.1 Dual-Single to Dual-Redundant Upgrade .....	6-9

**Appendix A: System Features ..... A-1**

A.1. Overview .....	A-1
A.2. Flexible Configuration Options.....	A-1
A.2.1 Six Models.....	A-1
A.2.2 Front Panel Variations .....	A-1
A.2.3 FC Configuration.....	A-2
A.3. Redundant Features .....	A-2
A.3.1 Dual-Active Redundant Controllers.....	A-2
A.3.2 Redundant Data Paths .....	A-2
A.4. Fault Tolerance.....	A-2
A.4.1 Hot-swappable active components.....	A-2
A.4.2 Global and Local Spares .....	A-2
A.4.3 Hot-Swapping of Drives.....	A-2
A.4.4 S.M.A.R.T. Support .....	A-3
A.4.5 Other Fault Tolerant Features.....	A-3
A.5. SAN Features.....	A-3
A.5.1 Logical Unit Numbers.....	A-3
A.5.2 LUN Masking.....	A-3
A.6. Mechanical Features.....	A-3
A.6.1 Modular Design.....	A-3
A.6.2 Hot-swap mechanisms .....	A-4
A.6.3 Cableless Design.....	A-4

## Hardware and User's Installation Guide

<i>A.6.4 Slide rails and support handles</i> .....	A-4
<i>A.6.5 Dummy Canisters and Brackets</i> .....	A-4

## **Appendix B: Hardware Specifications ..... B-1**

B.1. Overview .....	B-1
B.2. Technical Specifications.....	B-1
B.3. Controller Specifications .....	B-2
<i>B.3.1 Configuration</i> .....	B-2
<i>B.3.2 Architecture</i> .....	B-2
<i>B.3.3 Environmental Specifications</i> .....	B-3
B.4. RAID Management.....	B-3
B.5. Fault Tolerance Management .....	B-4
B.6. Cooling Fan Specifications.....	B-5
B.7. Power Supply Specifications .....	B-5
<i>B.7.1 Input Characteristics</i> .....	B-5
<i>B.7.2 Other PSU Specifications</i> .....	B-6
<i>B.7.3 PSU Protective Features</i> .....	B-6

## **Appendix C: Packaging ..... C-1**

C.1. Overview .....	C-1
C.2. Upper Box .....	C-1
C.3. Container Contents for Each Model .....	C-2
<i>C.3.1 ER2510FS-4S</i> .....	C-2
<i>C.3.2 ER2510FS-6S</i> .....	C-3
<i>C.3.3 ER2510FS-4D</i> .....	C-3
<i>C.3.4 ER2510FS-6D</i> .....	C-4
<i>C.3.5 ER2510FS-4RH</i> .....	C-4
<i>C.3.6 ER2510FS-6RH</i> .....	C-5

## **Appendix D: Upgrade Kits..... D-1**

D.1. Overview .....	D-1
D.2. Upgrade Kits.....	D-1
D.3. Upgrade Kit Contents .....	D-2
<i>D.3.1 IFT-9560UP4S4D</i> .....	D-2
<i>D.3.2 IFT-9560UP4S4RH</i> .....	D-2
<i>D.3.3 IFT-9560UP4D4RH</i> .....	D-2

*D.3.4 IFT-9560UP6S6D*..... D-3  
*D.3.5 IFT-9560UP6S6RH* ..... D-3  
*D.3.6 IFT-9560UP6D6RH*..... D-3

**Appendix E: Spare Parts and Accessories..... E-1**

E.1. Overview .....E-1  
E.2. Spare Parts .....E-2  
E.3. E.3 Accessories.....E-3

**Appendix F: Pin Outs.....F-1**

F.1. SFP Connector Pin Outs ..... F-1  
F.2. PS2 Pinouts -D-Sub (DB9) Pinouts (1 to 1) ..... F-3  
F.3. LAN pin out..... F-4

# Safety Precautions

## Precautions and instructions

- ◆ *Prior to powering on the controller head, ensure that the correct power range is being used.*
- ◆ *If a module fails, leave it in place until you have a replacement unit and you are ready to replace it.*
- ◆ *Airflow Consideration: The controller head requires an airflow clearance especially at the front and at the rear.*
- ◆ *To handle controller head modules, use the retention screws, eject levers, and the metal frames/face plates. Avoid touching PCB boards or connector pins.*
- ◆ *To comply with safety, emission, or thermal requirements, none of the covers or replaceable modules should be removed. Make sure that during operation, all enclosure modules and covers are securely in place.*
- ◆ *Be sure that the rack cabinet into which the controller head chassis is to be installed provides sufficient ventilation channels and airflow circulation around the controller head.*
- ◆ *Provide a soft, clean surface to place your controller head on before working on it. Servicing on a rough surface may damage the exterior of the chassis.*
- ◆ *If it is necessary to transport the controller head, repackage all replaceable modules separately.*

## ESD Precautions

Observe all conventional anti-ESD methods while handling system modules. The use of grounded wrist-strap and an anti-static work pad are recommended. **Avoid dust or debris in your work area.**

# About This Manual

## Chapter Descriptions

This Hardware and User's Installation Guide for the EonRAID 2510FS RAID controller head is divided into 6 chapters and 6 appendices.

- ◆ *Chapter 1: EonRAID 2510FS Introduction*

This chapter introduces the EonRAID 2510FS along with all its major components. The location of active components is described and the brief

descriptions of each component are also given. After reading this chapter a user should be familiar with the different active components and their location on the controller head. A brief introduction to controller head monitoring and hot-swappable components is also given.

◆ ***Chapter 2: Installation***

This chapter shows users how to correctly install the EonRAID 2510FS (ER 2510FS) RAID controller head. Installation pre-requisites, precautions and unpacking instructions are also given. Components that need to be installed include the optional battery backup unit and the battery charger board, the hard drives and the drive trays. A description of DIMM module upgrading is also given.

◆ ***Chapter 3: Controller head Monitoring***

This chapter teaches the user how to use LEDs to monitor the status of ER 2510FS active components. The RAIDWatch GUI and Firmware is briefly introduced and audible alarms, with activation thresholds are also described.

◆ ***Chapter 4: Controller head Connection and Operation***

This chapter teaches users how to connect the ER 2510FS to a host computer. Two different configurations are shown with brief descriptions of each. This chapter also describes both the power on and power off procedure of the ER 2510FS.

◆ ***Chapter 5: System Maintenance***

This chapter instructs users on how to maintain their controller head. The replacement and maintenance of a number of active components including the controller module, the power supply units and the cooling FAN modules are discussed. Replacement of failed battery modules and DIMM modules are also described.

◆ ***Chapter 6: Upgrading***

This chapter instructs users how to upgrade a variety of models to a different model. Single controller models can be upgraded to dual-single and dual-redundant controller models. The dual-single controller models can also be updated to dual-redundant models. This chapter fully describes these upgrade procedures.

◆ ***Appendix A: System Features***

This appendix describes a few of the many features of the ER 2510FS.

◆ ***Appendix B: Hardware Specifications***

This appendix lists all the technical specifications of the ER 2510FS RAID controller head.

## Hardware and User's Installation Guide

### ◆ *Appendix C: Packaging*

This appendix completely describes the ER 2510FS package that a user will receive.

### ◆ *Appendix D: Upgrade Kits*

This appendix completely describes the different ER 2510FS upgrade kits that enable users to change their models to a different model. Complete upgrade kit contents are described.

### ◆ *Appendix E: Accessories and Spare Parts*

This appendix lists all the part numbers for the different accessories and spare parts that are available for the ER 2510FS

### ◆ *Appendix F: Pin Outs*

This appendix shows the different pin outs of the ER 2510FS controller head. Pin outs for the SFP connectors, RS-232C Audio Jack and the RJ-45 Ethernet connector are among those specified.

## Who should read this manual?

This manual assumes that its readers are experienced with computer hardware installation and are familiar with storage enclosures.

## Related Documentation

### ◆ *Generic Operation Manual*

### ◆ *RAIDWatch User's Manual*

## Conventions

### **Naming**

From this point on and throughout the rest of this manual the EonRAID series is referred to as simply the “controller head” or the “system” and EonRAID is frequently abbreviated as ER.

### **Warnings**

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously. Warnings are easy to recognize. The word “warning” is written as “**WARNING**”, both capitalized and bold and is followed by text in italics. The italicized text is the warning message.

## Cautions

Cautionary messages should also be heeded for the messages can help you reduce the chance of losing data or damaging the system. Cautions are easy to recognize. The word "caution" is written as "CAUTION", both capitalized and bold and is followed by text in italics. The italicized text is the cautionary message.

## Notes

These are messages that are used to inform the reader of essential but non-critical information. These messages should be read carefully and any directions or instructions contained herein can help you avoid making mistakes. Notes are easy to recognize. The word "note" is written as "NOTE", it is both capitalized and bold and is followed by text in italics. The italicized text is the cautionary message.

## Lists

**Bulleted Lists:** - Bulleted lists are statements of non-sequential facts. They can be read in any order. Each statement is preceded by a round black dot "•".

**Numbered Lists:** - Numbered lists are used to describe sequential steps a user should follow in order.

# Software and Firmware Updates

Please contact your system vendor or visit Infortrend's FTP site (<ftp.infortrend.com.tw>) for the latest software or firmware updates. **NOTE** that the firmware version installed on your system should provide the complete functionality listed in the specification sheet/user's manual. We provide special revisions for various application purposes. Therefore, **DO NOT** upgrade your firmware unless you fully understand what a firmware revision will do.

Problems that occur during the updating process may cause unrecoverable errors and system down time. Always consult technical personnel before proceeding with any firmware upgrade.

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# Chapter 1: Introduction

## 1.1. Product Overview

### 1.1.1 Product Introduction

This hardware manual briefly introduces the EonRAID (ER) 2510FS Fibre Channel (FC)-to-FC RAID controller head shown in *Figure 1-1*.



**Figure 1-1: EonRAID 2510FS RAID Controller Head**

The ER 2510FS controller head series consists of six models (see *Section 1.1.2*). They include two single, two dual-single and two dual-redundant controller models. All six models come with 2Gbps FC (FC-2G) input/output (IO) channels that are connected to the host computers and to the FC JBODs.

Located on the rear panel, the controller modules are cooled directly by dual fan cooling modules. All the ER 2510FS models come with two, hot-swappable power supply unit (PSU) modules that provide a constant power supply to the controller head. The PSU modules are also located on the rear panel and are easily accessible to end-users.

The front panel shown in *Figure 1-1* contains a variety of front panel modules. These include the LCD panel, IO modules, an LED module, maintenance modules (with serial port and Ethernet port connectors) and the battery backup unit (BBU) modules.

## 1.1.2 Six Models

The six models can be separated into three controller categories (see *Table 1-1*) single-controller, dual single and dual redundant controller models.

Model	Controller/s	Controller Mode
ER2510FS-4S	1 x IFT5251F-4	Single
ER2510FS-6S	1 x IFT5251F-6	Single
ER2510FS-4D	2 x IFT5251F-4	Dual-Single
ER2510FS-6D	2 x IFT5251F-6	Dual-Single
ER2510FS-4RH	2 x IFT5251F-4	Dual-Redundant
ER2510FS-6RH	2 x IFT5251F-6	Dual-Redundant

**Table 1-1: ER2510FS Models**

- ◆ **Single Controller Models:** - These models should be used when there is a low demand on data availability and a fully redundant system is not a critical requirement for the system.
- ◆ **Dual-Single Models:** - These models should be used when the demand for data availability is low. Examples include streaming media purposes.
- ◆ **Dual Redundant Models:** - Dual-active configurations may require dual loops to create full path redundancy. There are no single points of failure in a dual-active configuration and they should therefore be used when data accessibility is a critical requirement of the storage network that is being implemented.

## 1.1.3 Pre-installed memory modules

It is possible to purchase ER 2510FS controller heads with 512MB pre-installed SDRAM DIMM modules. For these modules, it is not necessary to install memory DIMM modules during the installation procedure. The model numbers of those controller heads that come with pre-installed memory modules are listed below:

- ◆ ER 2510FS-4S-M5
- ◆ ER 2510FS-6S-M5
- ◆ ER 2510FS-4D-M5
- ◆ ER 2510FS-6D-M5
- ◆ ER 2510FS-4RH-M5
- ◆ ER 2510FS-6RH-M5

### 1.1.4 ER 2510FS Controller Head Chassis

The ER 2510FS RAID Controller Head is, as shown in *Figure 1-2*, a rectangular enclosure divided into a front and rear section.

- ◆ **Rear Section:** - The rear section of the enclosure is accessed through the rear panel and is reserved for the following hot swappable components:
  - 2 RAID controller modules
  - 2 cooling FAN modules
  - 2 PSU modules
  
- ◆ **Front Section:** - The front section of the enclosure is accessed through the front panel and is reserved for the following components:
  - 1 LCD module
  - 6 IO modules
  - 1 LED module,
  - 2 maintenance modules
  - 2 BBU modules

---

**NOTE:**

*With the exception of the LCD panel, all the front panel modules are hot-swappable*

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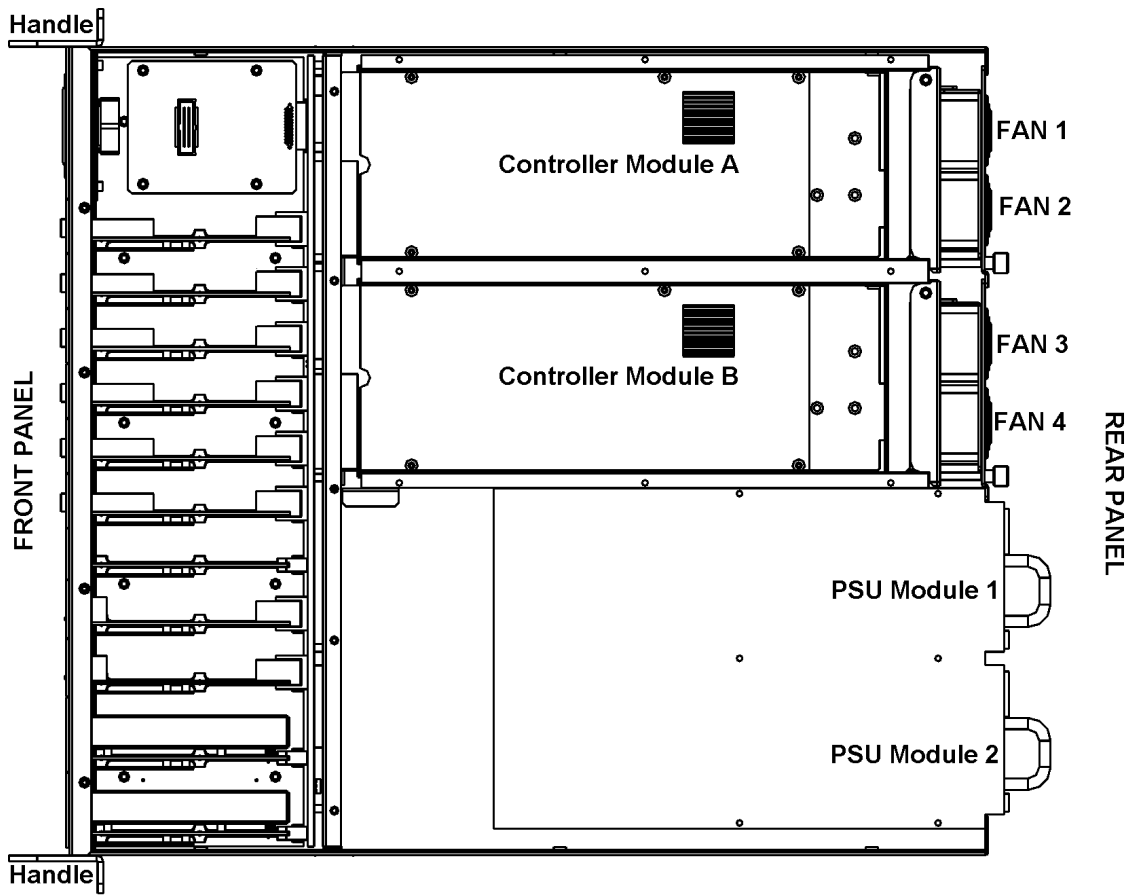


Figure 1-2: ER 2510FS Top View

## 1.1.5 Technical Specifications

TECHNICAL SPECIFICATIONS	
<b>Environment</b>	
<i>Humidity</i>	10 ~ 95% (non condensing)
<i>Temperature</i>	5° to 44°C
<i>Altitude</i>	Up to 40 000 ft
<b>Power Requirements</b>	
<i>Input Voltage</i>	+ 100V ~ + 240V AC (auto-switching)
<i>Frequency</i>	47 – 63Hz
<i>Power Consumption</i>	100 ~ 120V, 6A 200 ~ 240V, 3A
<b>Dimensions</b>	
<i>Height</i>	1U (4.8 mm)
<i>Width</i>	427 mm
<i>Length</i>	480 mm
<i>Weight</i>	20Kg (with carton)
<b>EMI/EMC</b>	FCC Class-A / CE / UL
<b>Safety Requirements</b>	UL60950
<b>Shock (Non-Operating)</b>	
<i>Half Sine</i>	71G, 2ms (6 shocks)
<i>Square</i>	40G, 166 in/s (6 shocks)
<b>Vibration (Non-Operating)</b>	
<i>Sine</i> (3 hrs in each plane)	5~500Hz, 0.6G (zero to peak)
<i>Random</i> (3 hrs in each plane)	5~500Hz, 2.0Grms (zero to peak)
<b>Warning Alarms</b>	Audible Alarms, System LEDs

Table 1-2: ER2510FS Technical Specifications

## 1.2. ER 2510FS Hardware Components

All the active components on the ER 2510FS RAID Controller Head are accessed through the front or rear panel (see *Section 1.1*). The modular nature of the active components facilitates their easy installation and removal. Hot-swappable mechanisms are incorporated so that they can be easily replaced while the system is running.

### 1.2.1 Front Panel

An example of a front panel is shown in *Figure 1-3*. Please note that different models have different front panels. For more information please refer to *Section 1.3*.

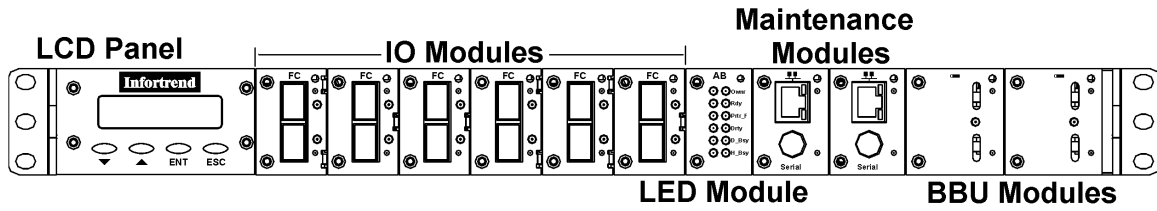


Figure 1-3: An example of the ER 2510FS Front Panel

The front panel is designed to accommodate the following components.

- ◆ **LCD Panel:** - The LCD Panel shows system information and can be used to configure and monitor the system.
- ◆ **IO Modules:** - Facilitates the transmission of data between the host and drives. All the IO modules have two Small Form-Factor Pluggable (SFP) connectors.
- ◆ **LED Module:** - Shows vital information on the controller status.
- ◆ **Maintenance Modules:** - Has an Ethernet port for internet connectivity that enables users to manage the controller head using the RAIDWatch GUI. It also has an RS-232C serial port for PC terminal emulation connectivity.
- ◆ **BBU Modules:** - If there is a power failure or the PSUs fail these modules will continue to supply power to the systems' SDRAM memory cache. It is able to supply a cache with power for more than 72 hours.

### 1.2.2 Rear Panel

The rear panel is shown in *Figure 1-4*. Please note that not all the rear panels are the same for all the models. The single controller models (ER 2510FS-4S and ER 2510FS-6S) only have one dual FAN cooling module on the rear panel as opposed to two.

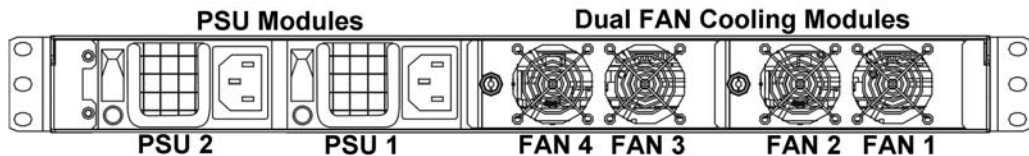


Figure 1-4: An example of an ER 2510FS Rear Panel

- ◆ **PSU:** - The PSU modules connect the system to the mains and provide power to the controller head .
- ◆ **Cooling FAN Modules:** - These consist of two fans. They are used to cool the system.

- ◆ **Controller Modules:** - These are located in front of the Cooling FAN Modules and cannot be seen on the rear panel. They contain the controller mainboard and the controller adapter board.

## 1.3. Different Front Panels

### 1.3.1 Front Panel Variations

Two different front panels, **FP-I** and **FP-II**, are available. The different front panel types are designed to accommodate two different IO module types. Type-1 IO modules have an onboard bypass circuit that is not on the Type-2 IO modules. IO Module variations are discussed in *Section 1.4.2* below.

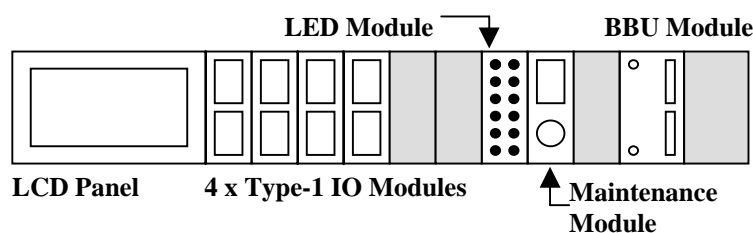
Slot 0 and Slot 1 of the **FP-I** front panels can accommodate both Type-1 and Type-2 IO modules. Slot 2 to Slot 5 of the FP-I front panels can only accommodate Type-1 IO modules.

All the slots on the **FP-II** front panel can only accommodate Type-2 IO modules. The front panel you receive depends on the ER 2510FS model you have ordered. See *Table 1-3* below.

Model	Front Panel	Type-1 IO Modules	Type-2 IO Modules	See
ER 2510FS-4S	<b>FP-I</b>	4	0	<i>Figure 1-5</i>
ER 2510FS-6S	<b>FP-I</b>	6	0	<i>Figure 1-6</i>
ER 2510FS-4D	<b>FP-II</b>	0	4	<i>Figure 1-7</i>
ER 2510FS-6D	<b>FP-II</b>	0	6	<i>Figure 1-8</i>
ER 2510FS-4RH	<b>FP-I</b>	4	0	<i>Figure 1-9</i>
ER 2510FS-6RH	<b>FP-I</b>	6	0	<i>Figure 1-10</i>

**Table 1-3:** Front Panel Designations

### 1.3.2 ER 2510FS-4S – FP-I



**Figure 1-5:** ER 2510FS-4S Front Panel

#### **NOTE:**

The SFP connectors in the top row are functional and can be connected to an external FC device. The SFP connectors in the bottom row are not connected to a controller and are therefore not functional. These SFP connectors are reserved for system upgrades.

### 1.3.3 ER 2510FS-6S – FP-I

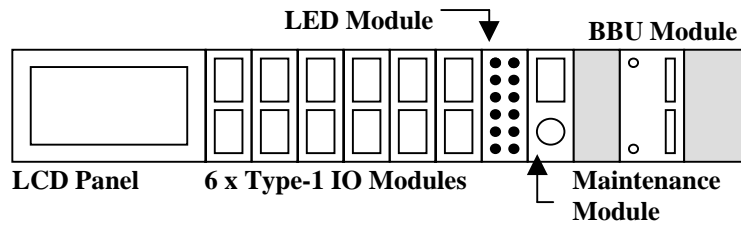


Figure 1-6: ER 2510FS-6S Front Panel

---

**NOTE:**

The SFP connectors in the top row are functional and can be connected to an external FC device. The SFP connectors in the bottom row are not connected to a controller and are therefore not functional. These SFP connectors are reserved for system upgrades.

---

### 1.3.4 ER 2510FS-4D – FP-II

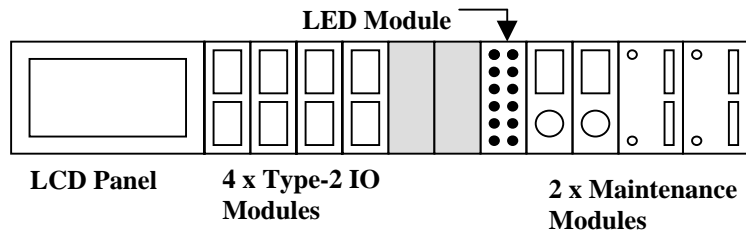


Figure 1-7: ER 2510FS-4D Front Panel

### 1.3.5 ER 2510FS-6D – FP-II

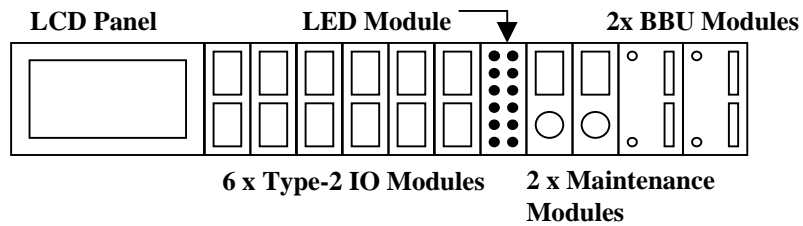


Figure 1-8: ER 2510FS-6D Front Panel



### 1.3.6 ER 2510FS-4RH – FP-I

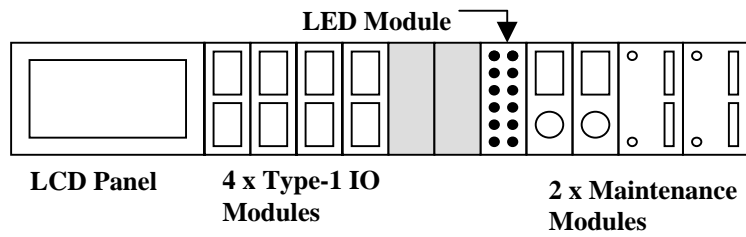


Figure 1-9: ER 2510FS-4RH Front Panel

### 1.3.7 ER 2510FS-6RH – FP-I

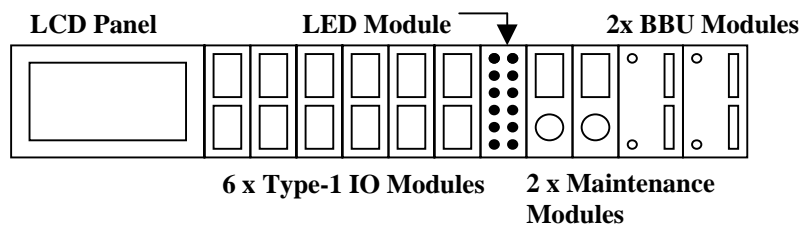


Figure 1-10: ER 2510FS-6RH Front Panel

## 1.4. The Front Panel Components

### 1.4.1 LCD Module Display

**Part Number:** - IFT-9560LCDMod

The Front Panel LCD shown in *Figure 1-11* is initially used to identify the system. When a user powers up the system the model name will appear on the screen.

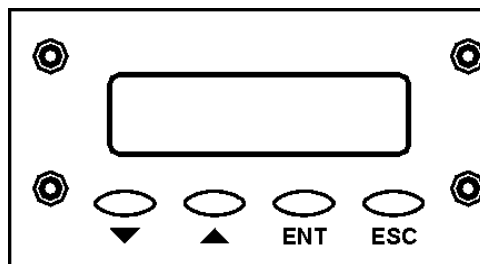
---

**NOTE**

*When a user powers up the system they must check the model name that appears on the LCD panel to make sure that they have received the correct model. If the model name that appears on the screen is not the same as the model the user ordered they should notify their distributor immediately.*

---

The LCD Module Display also shows relevant and important system information and can be used to both configure and monitor the system. Some models have a single controller and other models have dual-single or dual-redundant controllers. The following specifies the information that is shown on the screen for each configuration type.



**Figure 1-11:** Front Panel LCD Module

- ◆ **Single Controller:** The LCD module shows Controller A status. The controller **MUST** be inserted into the slot reserved for controller A (see *Figure 1-1*)
- ◆ **Dual-single Controller:** The LCD initially shows primary controller status. When “▲” and “▼” are pressed simultaneously, the LCD will switch the controller status that is currently being shown. Therefore if “▲” and “▼” are pressed simultaneously after the controller head has been powered up, the status of the secondary controller will be shown.
- ◆ **Dual-Redundant Controllers:** During the boot-up process the status of Controller A will be shown. It will then swap to show the Primary controller status. The primary controller is determined automatically.

## 1.4.2 IO Modules

The first six slots (slot 0 - slot 5) on the Front Panel of the ER 2510FS RAID Controller Head are reserved for IO Modules. Each model comes with either four or six IO Modules. If you have purchased a four-channel model (ER 2510FS-4S, ER 2510FS-4D or ER 2510FS-4RH), you will receive two dummy IO canisters that must be installed.

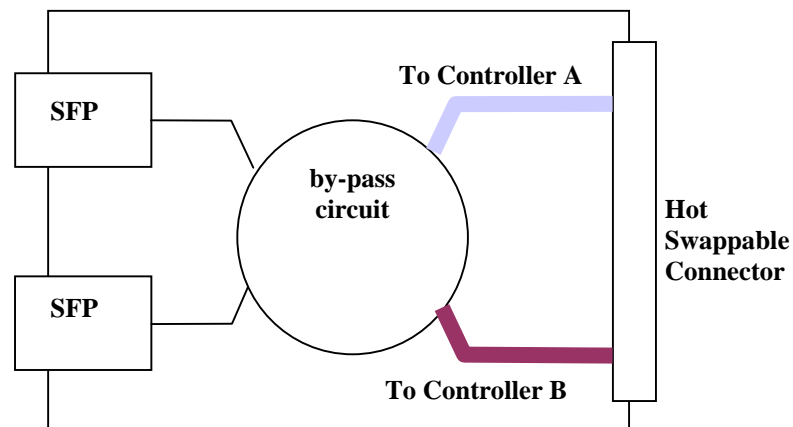
The ER 2510FS RAID Controller Head supports two different IO Module variants. These IO modules are referred to as either Type-1 or Type-2 IO Modules.

Both Type-1 and Type-2 IO Modules come with two SFP connectors. These SFP connectors facilitate the connection of external FC devices to the controllers through the controller head. (Please refer to to *Section 4.4.1* for the LED definitions.)

### 1.4.2.1 Type-1 IO Modules

**Part Number:** IFT-9560-IO1

Type-1 IO Modules come with an onboard bypass circuit as shown in *Figure 1-12*.



**Figure 1-12:** Type-1 IO Module Bypass circuit

The bypass circuit connects the FC channels of both controllers together and negates the need for the provision of an external bypass device. The bypass circuits on the Type-1 IO modules help users to easily configure fully redundant data paths to both the Host and the storage enclosure. Type-1 IO modules also come with a single speed selection jumper that allows user to specify the FC transmission rate as either 1Gbps or 2Gbps. A Type-1 IO module is shown in *Figure 1-13*.

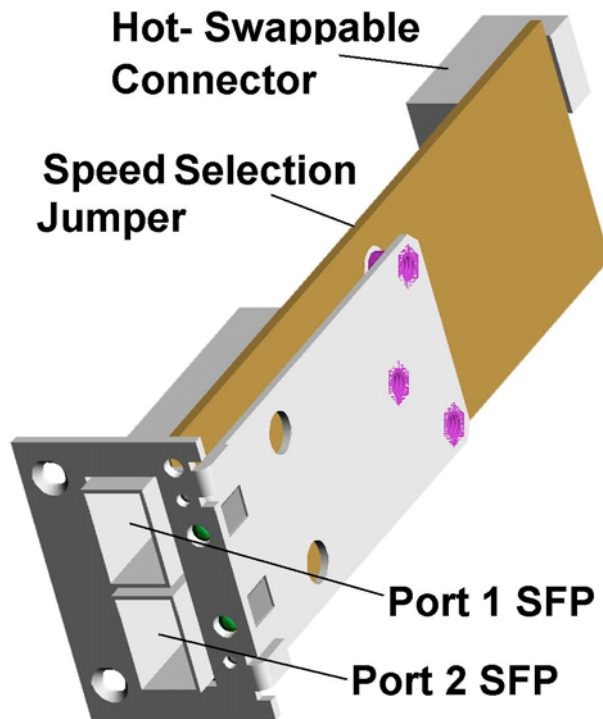


Figure 1-13: Type-1 IO Module

### 1.4.2.2 Type-2 IO Modules

Part Number: IFT-9560-IO2

Type-2 IO modules come without an onboard bypass circuit (see *Figure 1-14*).

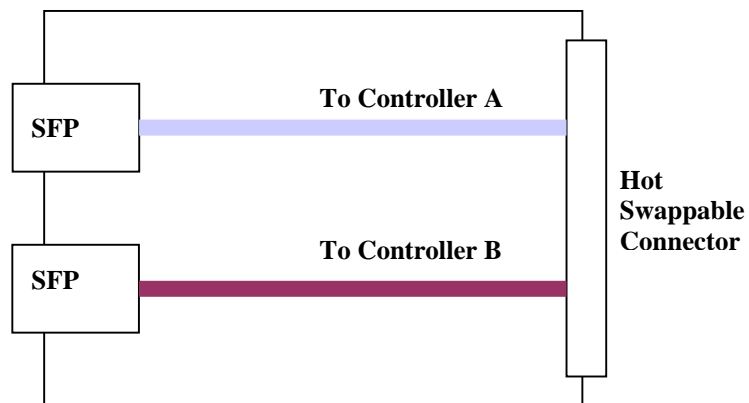


Figure 1-14: Type-2 IO Module Without Bypass Circuit

Type-2 IO module FC traces are connected directly to their respective controllers and do not pass through a bypass circuit. To create fully redundant loops, users need to provide some kind of external bypass device.

Type-2 IO Modules come with two green LEDs (see *Figure 1-15*). The LEDs are used to inform the user of the status of the FC link. The upper LED belongs to controller A and the lower LED belongs to controller B.

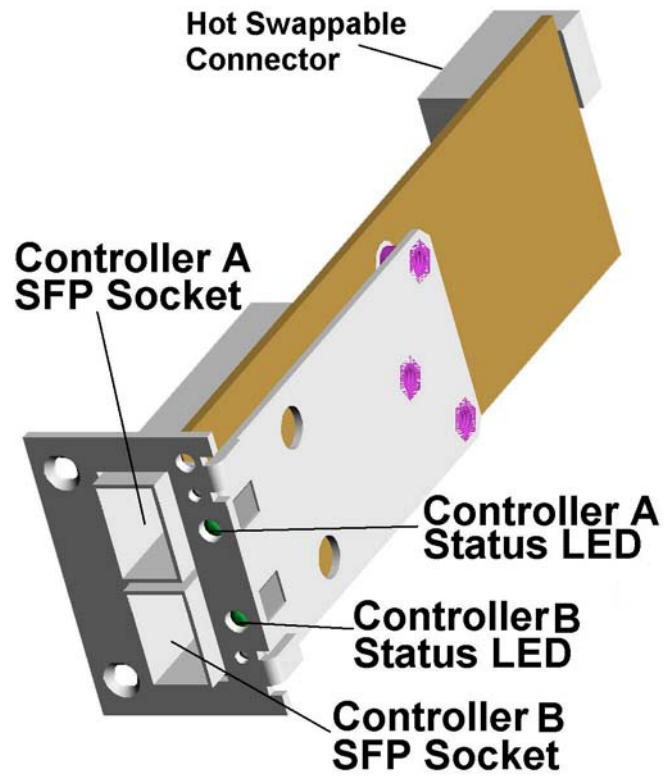


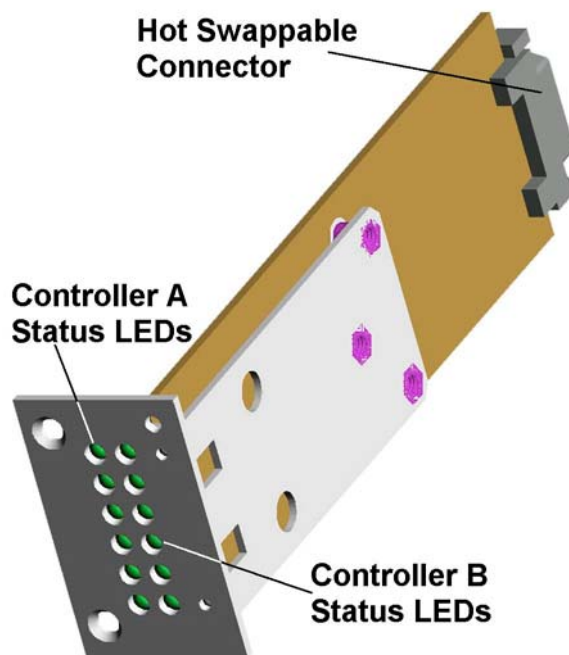
Figure 1-15: Type-2 IO Module

### 1.4.3 LED Module

**Part Number:** IFT-9560-IOLED

The LED module shown in *Figure 1-16* is plugged into slot 6 on the front panel. It is used to monitor the status of the two controllers. Twelve LED's, six for each controller, are used for this purpose. The LED's are placed in two vertical arrays. The LED column on the left/right belongs to controller A/B. The LED's are listed below (from top to bottom). Please refer to *Section 4.4.2* for more details on the LED definitions.

- ◆ **GREEN:**- LCD Module Owner
- ◆ **GREEN:**- Controller Ready
- ◆ **AMBER:**- Cache Dirty
- ◆ **AMBER:**- Partner Fail
- ◆ **GREEN:**- Drive Busy
- ◆ **GREEN:**- *Host Busy*

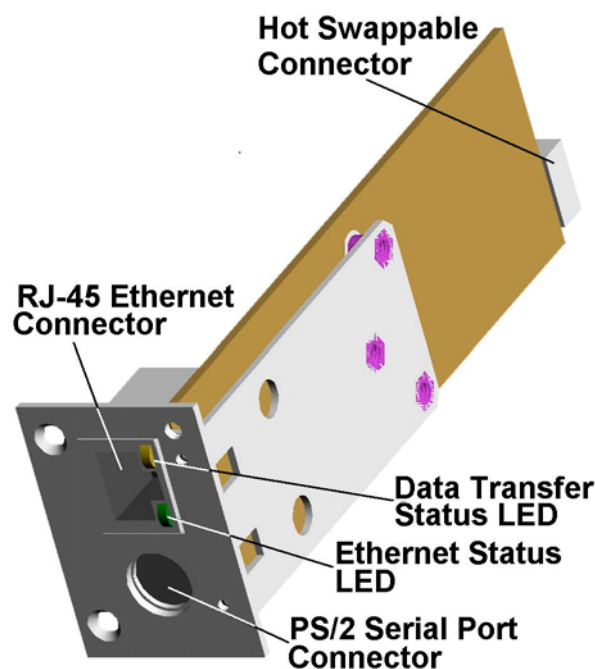


**Figure 1-16:** LED Module

## 1.4.4 Maintenance Board

**Part Number:** IFT-9560-IOMT

The controller head has two maintenance modules (one for each controller). The maintenance module (shown in *Figure 1-17*), for controller A/B is plugged into slot 7/8 on the front panel. Each maintenance board has a PS/2 connector for RS-232C connectivity and modem support. They also have a RJ-45 connector for 10/100 Ethernet connection. The RJ-45 connector has two LEDs (please refer to *Section 4.4.3* for the LED definitions). The LAN port is used to connect to the RAIDWatch GUI and enables users to manage the controller head using their web browser. The LAN port can also be used for telnet access.



**Figure 1-17:** Maintenance Module

- ◆ **Single Mode:** - If the model you are using is a single controller model (either the ER 2510FS-4S or ER 2510FS-6S) then you will receive a single maintenance module and a dummy canister. The maintenance module must be installed in slot 7 and the dummy canister in slot 8.
- ◆ **Dual-Single Mode:** - In the dual-single mode, each serial port is dedicated to a single controller. The serial port on the maintenance module in slot 7 is used to configure Controller A and the serial port on the maintenance module in slot 8 is used to configure controller B.
- ◆ **Dual-Redundant Mode:** - Dual-redundant models come with two maintenance boards. In the dual-redundant mode the primary controller's serial port can be used to configure the system. The secondary controller's serial port can only be used to

view the system configuration but cannot be used to change the configuration settings.

A Y-cable is provided with the dual-redundant models that will enable users to connect both maintenance modules simultaneously to the Host. If one controller fails the system can still be managed through the second, alternate maintenance module.

### 1.4.5 BBU Module

**Part Number:** IFT-9560-IOBT

The BBU modules (see *Figure 1-18*) are found in slot 9 (controller A) and slot 10 (controller B) of the front panel. The single controller models come with a single BBU module and dummy canister. Both the redundant models come with two BBU modules.

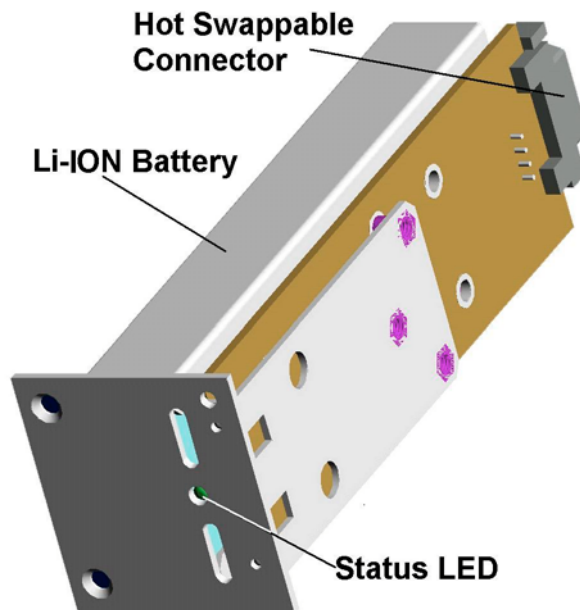
Hot-swappable connectors connect the BBU modules to the Mid-Plane board. A maintenance LED can be found at the front of each BBU module. The Li-ION Battery is mounted on the PCB with screws. One Li-ION BBU can sustain a cache for 72 hours.

---

**WARNING**

*A serial number is placed at the rear of the battery unit. If this serial number is damaged, the warranty will be void.*

---



**Figure 1-18:** BBU module

---

**CAUTION:**

*The BBU module cannot be swapped when it is backing up the cache memory.*

---



## 1.5. The Rear Panel Components

The Rear Panel is shown in *Figure 1-4* above. *Figure 1-19* below gives an overview of all the controller head modules that are accessible through the rear panel.

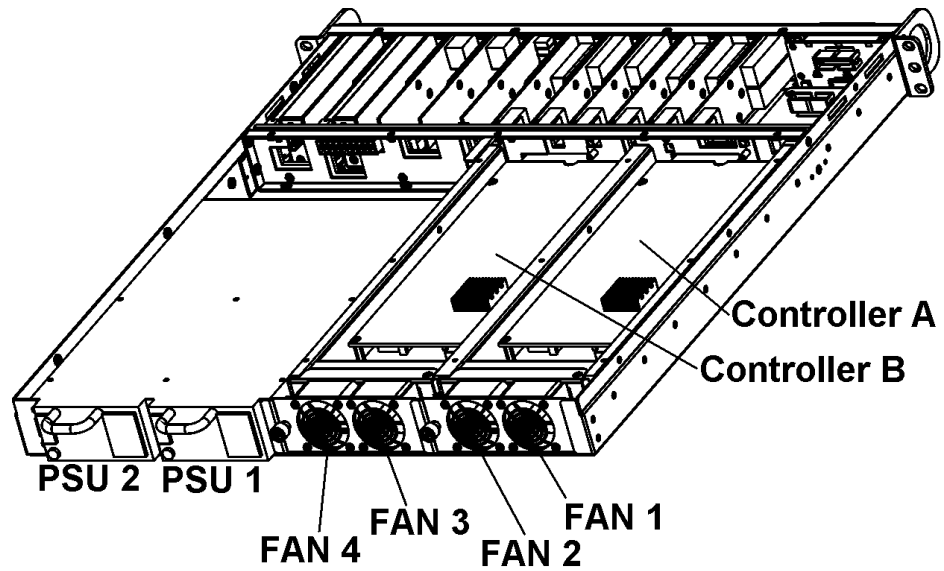


Figure 1-19: Rear Panel Overview

## 1.5.1 Controller Module/s

**Part Number:** IFT-9560-CTMod-4 (*four-channel model*)  
IFT-9560-CTMod-6 (*six-channel model*)

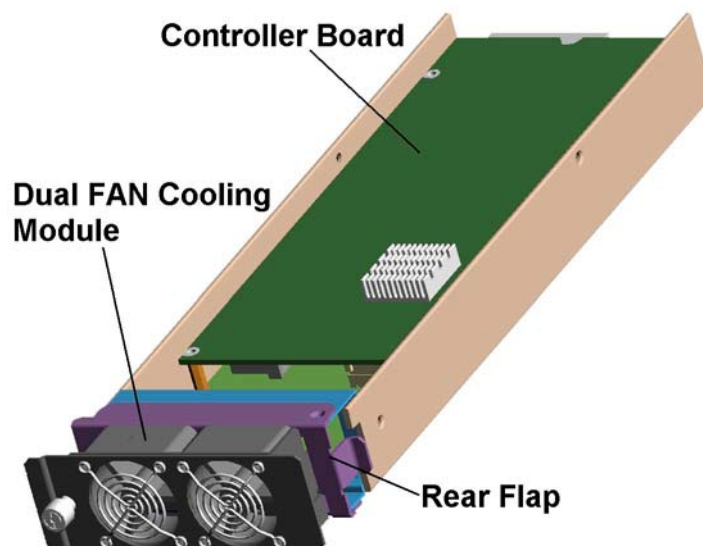
The controller modules are located in front of the dual FAN cooling modules as shown in **Figure 1-20** and, although they cannot be seen, they are accessed through the rear panel. The controller modules contain the RAID controller that facilitates the transfer of data between the host and the drive enclosure

---

### **WARNING**

*Although the RAID Controller can be removed, the only time a user should touch the controller itself is to install the memory modules (see Chapter 3). Unnecessary tampering with the RAID controller can damage the controller the system unusable.*

---



**Figure 1-20:** RAID Control Module with cooling FAN Module

Two RAID Controller Module variations can be used in the ER 2510FS RAID Controller Head. The IFT-9560-CTMod-4 has a pre-installed IFT5251F-4 controller, and the IFT-9560-CTMod-6 has a pre-installed IFT5251F-6 controller. Flaps at the back of the controller module are used to secure/remove the controller module in/from the chassis. If the controllers are installed in redundant configuration they can be hot-swapped.

The RAID Controllers used in these modules are 2Gbps FC-to-FC. They come with point-to-point and fully featured FC-AL support on the drive side. The host side supports point-to-point, fully featured FC-AL and Fibre Switch connectivity.

## 1.5.2 Dual FAN Cooling Module

**Part Number:** IFT-9560-FanMod (*cooling FAN module*)  
IFT-9560-Fan (*individual FAN unit*)

A single dual FAN cooling module and a dummy module accompany the single controller modules. The dual-single and dual-redundant models both come with two dual FAN cooling modules. These cooling modules, shown in **Figure 1-21**, must be installed. Each cooling FAN module is assigned to cool a single controller module.

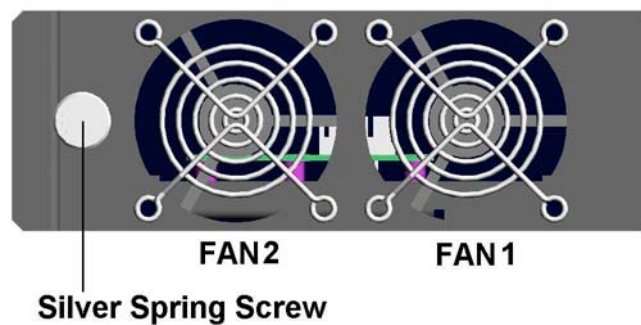
The cooling FAN module consists of two individual FANs, if one of these fans should fail the second individual fan can keep the controller module sufficiently cooled. Both cooling FAN modules have simple hot-swappable mechanisms, which are independent of each other and the controller modules and makes changing FAN modules fast and easy.

---

### CAUTION

*Although an individual FAN in the cooling FAN module can sufficiently cool a controller module it is not recommended. If you are using a single FAN and it should fail then the system can overheat. Failed FANs should be replaced as soon as possible. Delays in FAN replacements can lead to irreparable system damage.*

---



**Figure 1-21:** Cooling FAN Module

---

### NOTE

*A complete list of specifications for the individual fans contained in the cooling FAN module can be found in **Appendix B**.*

---

### 1.5.3 PSU Module

**Part Number:** IFT-9560-PSU

All the models in the ER 2510FS series come with two redundant PSU modules. If one PSU module fails the other PSU module can supply a sufficient amount of power for the system to continue running.

---

**CAUTION**

*Although it is possible to run the storage system with a single PSU, it is not recommended. If your system only has a single PSU and this unit fails then the data storage arrays and the storage network managed by the controller head will become inaccessible.*

---

**NOTE**

*A complete list of specifications for the PSUs can be found in **Appendix B**.*

---

The PSUs are contained in a single internal rack that is pre-mounted in the controller head. The PSUs are secured within this pre-mounted rack by an external crossbar that is passed through the rear handles of the PSUs and attached to either side of the internally installed rack. Please refer to **Figure 1-22**.

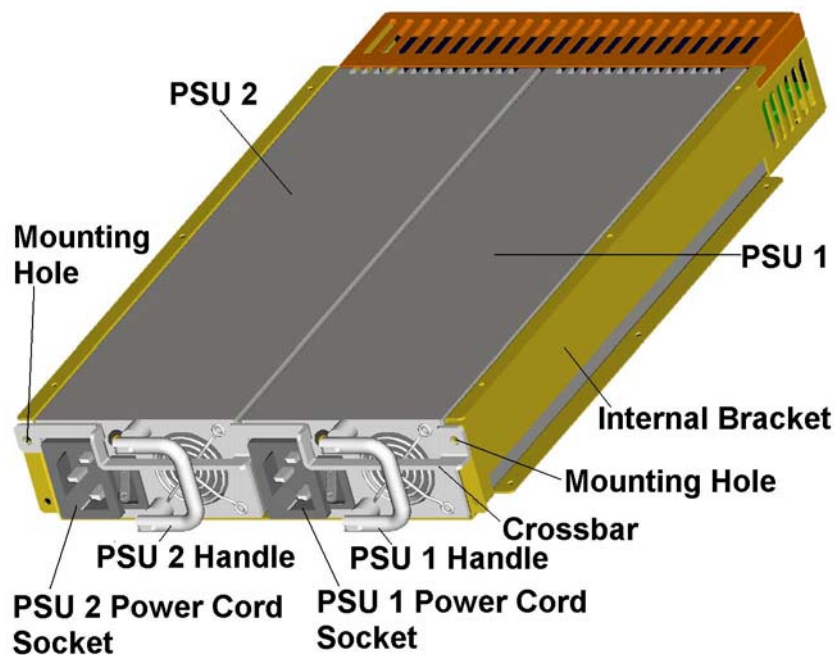


Figure 1-22: PSU Modules

## 1.6. ER 2510FS Controller Head Monitoring

The ER 2510FS comes with a number of different monitoring methods that enable users to constantly be updated on the status of the system and individual components. The following monitoring features are included in the controller head .

### 1.6.1 SES Monitoring

The ER2510FS RAID Controller Head supports SES. SES is a command set that is used to manage and sense the state of the following components:

- ◆ Power supplies
- ◆ Cooling devices
- ◆ Temperature sensors
- ◆ Individual drives
- ◆ Other non-SCSI elements installed in a FC JBOD enclosure.

If you have a SES-compliant enclosure the firmware on the controller boards will be able to decode and report this information.

### 1.6.2 LED Indicators

The following active components all come with LEDs that indicate the status of the individual component.

- ◆ RAID Controller
- ◆ LCD Panel
- ◆ Cooling FAN Modules
- ◆ PSU Modules
- ◆ IO Modules
- ◆ LED Panel
- ◆ Maintenance Modules
- ◆ BBU Modules

### 1.6.3 Management Firmware and RAIDWatch GUI

**Management Firmware:-** The firmware is a pre-installed software that is used to configure the controller head . The firmware can be accessed either through the LCD keypad panel or a terminal emulation program running on a management computer that is connected to the controller head 's serial port.

**RAIDWatch:-** RAIDWatch is a premier web-based graphics user interface (GUI) that can be installed on a remote computer and accessed via the web. The manager communicates with the array via the connection of the existing host interface or Ethernet link to the array's LAN port.

### 1.6.4 Audible Alarms

The ER 2510FS comes with audible alarms that will be triggered when certain active components fail or when certain thresholds are exceeded. If you hear an audible alarm being emitted from the ER 2510FS controller head it is imperative that you determine and rectify the problem immediately.

---

**WARNING:**

*Failing to respond when an audible alarm is heard can lead to permanent damage of the ER 2510FS controller head. If an audible alarm is heard, rectify the problem as soon as possible.*

---

## 1.7. Hot-Swappable Components

### 1.7.1 Hot-Swap Capabilities

The ER 2510FS comes with a number of hot-swappable components. A hot-swap component is one that can be exchanged while the controller head is still online without affecting the operational integrity of the controller head. These components should only be removed from the controller head when they are being replaced. These components should, at no other time, be removed from the controller head.

### 1.7.2 Components

The following components are all hot-swappable:

- ◆ Controller Modules (ER 2510FS-4RH and ER 2510FS-6RH **ONLY**)
- ◆ PSU Modules
- ◆ Cooling Modules
- ◆ IO Modules
- ◆ Maintenance Modules

- ◆ BBU Modules (not during a power failure)

### **1.7.3 Normalized Airflow**

Proper controller head cooling is referred to as “normalized” airflow. Normalized airflow is required to ensure the sufficient cooling of the controller head and is only attained when all the components are properly installed. A failed component should therefore only be hot-swapped when a replacement is available. If a failed component is removed but not replaced, permanent damage to the controller head can result.

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## Chapter 2: Hardware Installation

### 2.1. Installation Overview

The modular design of the ER 2510FS RAID Controller Head simplifies the installation process. This chapter describes the installation procedures for the ER 2510FS RAID Controller Head.

---

#### CAUTION

*Please note that the installation instructions described in this manual should be carefully followed. If they are not carefully followed, your system may be damaged.*

---

### 2.2. Installation Pre-requisites

- ◆ **Static Free Installation Environment** – The ER 2510FS must be installed in a static free environment to minimize the possibility of electrostatic discharge (ESD) damage.
- ◆ **Component Check** – Before the ER 2510FS is installed, users should, during the unpacking process, check to see that they have received all the required components.
- ◆ **Memory Modules** – If the users wish to change the pre-installed memory modules, the separately purchased modules must be installed by the end user.
- ◆ **Rack Installation** – the controller head can be installed into a 19” industry standard rack cabinet.
- ◆ **Cabling** – All the FC cables that are used to connect the ER 2510FS to the host must be purchased separately.

### 2.3. Static Free Installation

Static electricity can damage the electronic components of the system. Most of the controllers that are returned for repair are the results of improper installation and electrostatic discharge (ESD) damage. To prevent ESD damage to any of the PCBs, before touching or handling them follow these precautions:

- ◆ Discharge the static electricity from your body by touching a grounded metal surface.
- ◆ Use an anti-static wristband to ensure that all the static has been discharged from your body.

- ◆ Do not use carpets, plastic, vinyl or Styrofoam in your work area.
- ◆ Make sure all the PCBs are at room temperature before removing them.

---

**WARNING**

*Most controllers that are damaged and returned for repair have been damaged by ESD. When working with the controller boards, or any other circuit boards, ensure that you are working in a static free environment to minimize the chance of ESD damage.*

---

## 2.4. ER 2510FS Requirements

### 2.4.1 ER 2510FS Cabinet Requirements

The ER 2510FS RAID Controller Head can be fitted into a standard cabinet or rackmount rack. It is assumed that this cabinet/rack would be well ventilated and designed to allow the fibre channel cables to be easily connected to both the drives and host. The ER 2510FS controller head can be fitted into the cabinet by means of an easy to install slide-rail and secured to the cabinet/rack with screws. A full discussion of this will follow later.

### 2.4.2 ER 2510FS Cable Requirements

To connect the various hardware components to the appropriate external devices (JBOD enclosures, hubs, switches, HBAs, etc) specific cables are needed. These cables must not be bent or manhandled as they could be damaged. When installing the cables into the system take precautions that they are not damaged or cause damage in anyway. Please refer to Chapter 5 for more details.

### 2.4.3 Host Requirements

In order for the ER 2510FS RAID Controller Head to be connected to the host computer directly or through a fibre channel switch. The host must have a fibre host bus adapter (HBA) installed. Most commonly, a HBA is an add-on card that includes external fibre channel ports. These ports are used to connect with external fibre devices like the ER 2510FS RAID Controller Head.

In addition to an HBA, host computers that want to use the RAIDWatch Java GUI management software must meet the following minimum configuration: Pentium or above compatible (or equivalent PC or workstation) running Windows NT, Windows 2000 or UNIX (HP UNIX, Solaris, AIX or Linux). A host computer running RAIDWatch must also either have a network (LAN) card installed and running or MS Loopback Adapter installed and running.

## 2.5. Installation Overview

### 2.5.1 Pre-Installed Components

The following components have been pre-installed in the ER 2510FS and do not therefore need to be installed.

- ◆ Front Panel
- ◆ The LCD Panel
- ◆ The Mid-Plane Board
- ◆ PSU Modules

### 2.5.2 Uninstalled Components

The following components must be installed by the end user.

- ◆ DIMM Modules

---

**NOTE:**

*If you have purchased a model with 512MB pre-installed DIMM modules, it is not necessary to install DIMM modules. For more information please refer to **Section 1.1.3 in Chapter 1.***

---

- ◆ Controller modules
- ◆ PSU modules
- ◆ Cooling FAN Modules
- ◆ Front Panel IO Modules
- ◆ Front Panel LED Module
- ◆ Front Panel BBU Module/s
- ◆ Front Panel Maintenance Module/s
- ◆ Dummy Modules (for single controller and four channel models)

## 2.5.3 General Installation Procedure

**Step 1. *Unpack*** – Unpack the controller head and make sure that all the components that are meant to come with the controller head have indeed arrived.

**Step 2. *Identify Front Panel Modules*** – There are a variety of front panel modules that need to be installed. Prior to installation, these modules must be properly identified and their installation locations in the front panel ascertained.

**Step 3. *Install DIMM Module*** – A SDRAM DIMM module must be installed on each controller prior to installing the controller module

---

**NOTE:**

*If you have purchased a model with 512MB pre-installed DIMM modules, it is not necessary to install DIMM modules and step 2 can be skipped. For more information please refer to Section 1.1.3 in Chapter 1.*

---

**Step 4. *Install Cooling Module*** – The dual FAN cooling module must be installed behind the controller module.

**Step 5. *Install the Front Panel Modules*** – Once the front panel modules have been accurately identified and their locations correctly determined, they must be installed into the controller head.

**Step 6. *Rack/Cabinet installation*** – If the ER 2510FS is going to be installed in a rack or a cabinet, it should be installed prior to connecting it to any external FC devices.

**Step 7. *Cable connection*** – Use the power cables that came with the ER 2510FS to connect the controller head to the mains. Use separately purchased FC cables to connect the host ports to the host computers. (See **Chapter 4**)

**Step 8. *Power Up*** – Once all the components have been properly installed and all the cables properly connected, the ER 2510FS can be powered up and the RAID array configured. (See **Chapter 4**)

## 2.5.4 Installation Flowchart

**NOTE:**

If you have purchased a model with 512MB pre-installed DIMM modules, it is not necessary to install memory modules. For more information please refer to **Section 1.1.3 in Chapter 1**.

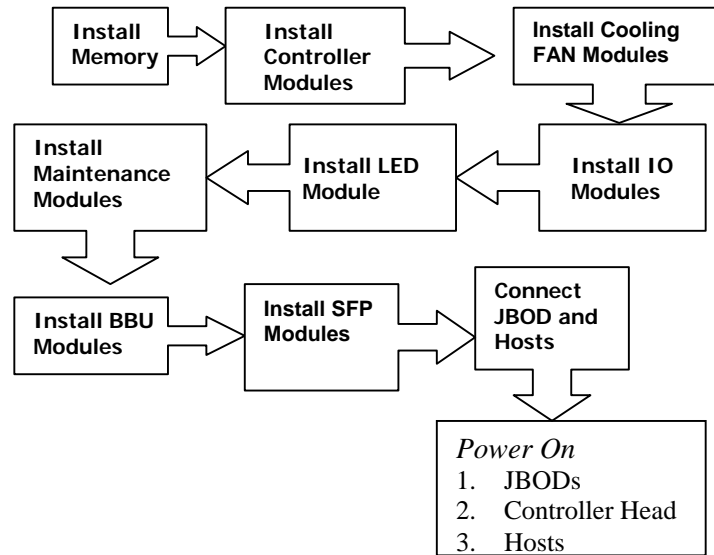


Figure 2-1: Installation Flowchart

## 2.6. Unpacking

### 2.6.1 Packaging

The ER 2510FS RAID Controller Head will be packaged in two separate boxes, which are packed together into a single larger box.

---

**NOTE:**

*A complete list of items that can be found in both the upper and lower boxes can be found in **Appendix C**. For an extensive list of the components contained by each of these boxes please refer to this Appendix.*

---

**Upper Box:** – The Upper Box will contain all the components that need to be installed, the screws for attaching these components, the cables necessary for connecting these components and a power cable. The contents of this box will depend on the model you have ordered.

**Lower Box:** – The Lower Box will contain the RAID Controller Head Chassis with all the pre-installed components. These components include the PSU's, the Mid-Plane, the Front Panel, the LCD board and the LCD module. The pre-installed components will vary according to the model you have ordered.

---

**CAUTION**

*When you open the package that contains your ER 2510FS RAID Controller Head, please ensure that it contains all the items that your system requires. Please refer to **Appendix C** for a complete list of items.*

---

## 2.7. Component Identification

### 2.7.1 Front Panel Modules

Each front panel module has an identification label placed on the outer side of the internal bracket. Corresponding names appear at the top of the front panel, above the slots, indicating where each front panel module should be installed. Matching the labels on the front panel modules with the labels on the modules allows a user to quickly identify the correct location. A list of the labels that appear on the front panel modules appears in **Table 2-1**.

Label	Module Description
<b>FC-CH0</b>	Slot 0 IO Module
<b>FC-CH1</b>	Slot 1 IO Module
<b>FC-CH2</b>	Slot 2 IO Module
<b>FC-CH3</b>	Slot 3 IO Module
<b>FC-CH4</b>	Slot 4 IO Module
<b>FC-CH5</b>	Slot 5 IO Module
<b>A B</b>	LED Module
<b>LAN/Serial-A</b>	Maintenance module for controller A
<b>LAN/Serial-B</b>	Maintenance module for controller B
<b>Battery A</b>	BBU Module for controller A
<b>Battery B</b>	BBU Module for controller B

Table 2-1: Front Panel Module Labels

## 2.7.2 IO Module Identification

The ER 2510FS comes with Type-1 and Type-2 IO modules. Their external, physical appearance is almost identical. To differentiate between the two IO modules, Type-1 IO modules have “**PCB**” printed beneath the lower SFP modules.

## 2.7.3 Controller Module Location Identification

ER 2510FS RAID Controller Head comes with either one or two controller modules (depending on the model you purchased). The controller slots are found at the rear of the controller head. The location of controller A and controller B are specified by two labels, which are placed on the top surface of the controller head. Controller A’s slot is indicated by a “**Controller A**” label and the controller B’s slot is indicated by a “**Controller B**” label.

## 2.8. Memory Installation

---

### NOTE:

*If you have purchased a model with 512MB pre-installed DIMM modules, it is not necessary to install any DIMM modules. For more information please refer to Section 1.1.3 in Chapter 1.*

---

### 2.8.1 DIMM Module Considerations

- ◆ **Purchasing considerations** – When purchasing an SDRAM DIMM to install on the ER 2510FS controller boards, contact the ER 2510FS controller head vendor for a list of suitably compatible SDRAM DIMM modules.
- ◆ **SDRAM DIMM modules supported** – The ER 2510FS is able to support SDRAM DIMMs with memory capacities between 64MB and 1GB with or without ECC support. The controllers only support 133MHz SDRAM.
- ◆ **Redundant Controller Considerations** – The DIMM modules on redundant controllers must be EXACTLY the same size.
- ◆ **Installation Considerations** – When installing the SDRAM DIMM module, it is necessary to remove the controller module. The controller boards are more susceptible to damage than the other components and must therefore be handled with extreme care.
- ◆ **Secure Installation** - When replacing the DIMM module, make sure that the new DIMM module is firmly in place prior to re-installing the controller module. If the DIMM module is not firmly in place, the controller head will not be able to run and the whole procedure repeated.

---

### WARNING

1. *When you install the cache memory chips it is necessary to remove the controller board from the controller module. Do this with care and consideration in order not to cause permanent damage to the board. This is the only time the controller board should be touched by the user.*
  2. *Please purchase the correct memory modules from your ER 2510FS Controller Head vendor/distributor.*
- 

### 2.8.2 DIMM Module Installation Procedure

To install the DIMM modules please follow these steps

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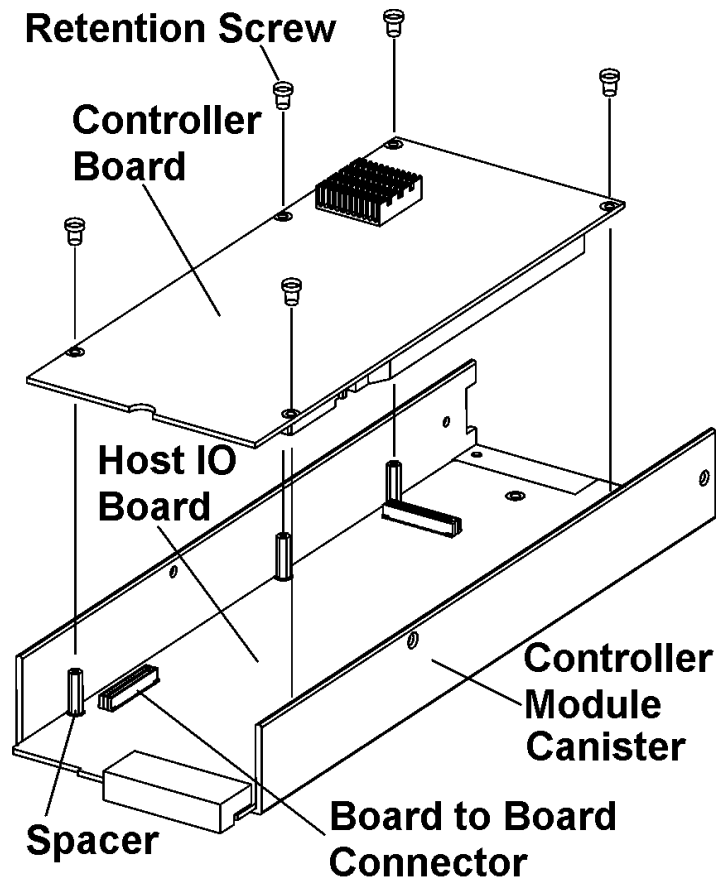
### CAUTION

*If you are installing the RAID Controllers in a Dual Redundant configuration, the memory capacity of the DIMMs should be identical*

---



**Step 1. Remove the Controller Board.** - The controller board is attached to the base adapter board with five retention screws and is connected to the host IO board (that lies beneath it) through three board-to-board connectors. As shown in *Figure 2-2*, remove all five retention screws and then gently lift the controller board in an upward direction, disconnecting the controller's board-to-board connectors from those on the host IO board. See *Figure 2-2*.



**Figure 2-2:** Remove the controller board from the controller module

---

#### CAUTION

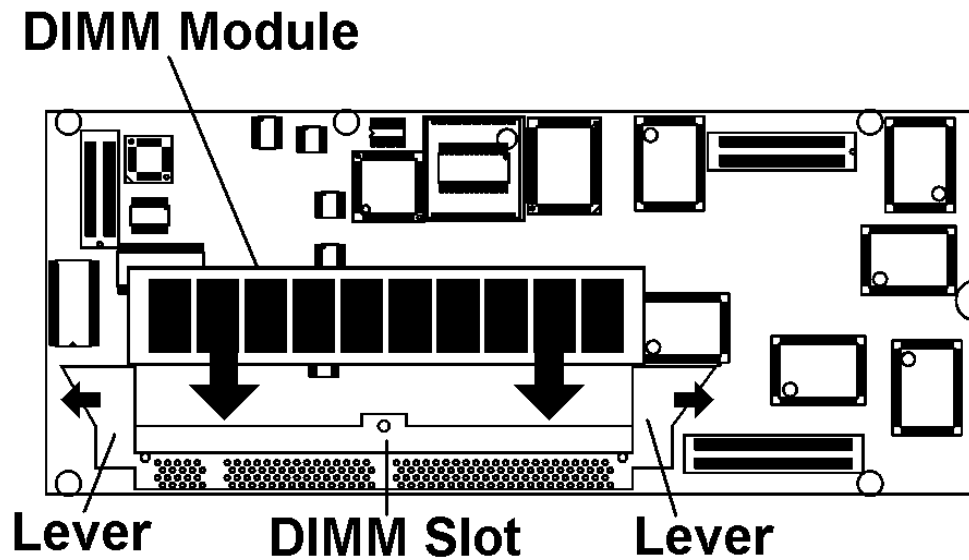
*When you remove the controllers from the controller modules to insert the DIMM slots, please place the controllers on an anti-static pad. This will help to protect against ESD damage.*

---

**Step 2. Turn the controller board over** – The DIMM slot is located on the lower side of the controller board. Once the controller board has been moved, turn it over and gently place it on an anti-static surface.

**Step 3. Open the white clips** – After the controller board has been removed from the controller module, push the white clips on either side of the DIMM slot in an outward direction.

**Step 4. Insert the DIMM Module** – Once the clips on either side of the DIMM slot have been opened, correctly align the DIMM module with the slot and gently insert it into the slot. Upon insertion the levers on either side of the DIMM slot will automatically move back to their original position and lock the DIMM in place.



**Figure 2-3:** Insert the DIMM module in to the DIMM slot on the controller board.

**Step 5. Re-install the controller** - After the DIMM module is securely installed, the controller board must be re-installed into the controller module. Align the board-to-board connectors on the controller board with those on the host IO board. Gently push the board down such that the connectors are securely connected. Re-insert the five previously removed retention screws.

## 2.9. Controller Module Installation

### 2.9.1 Controller Module Considerations

- ◆ **Location:** - Two controller module bays are located at the back of the controller head, on the left-hand side.
- ◆ **Controller Modules:** - When the controller modules arrive in the packaging, the dual FAN cooling modules are attached. It is necessary to remove the cooling FAN modules first.
- ◆ **DIMM Modules** – Before installing the controller module into the ER 2510FS chassis, the DIMM modules must be installed. To see how to install the DIMM modules please refer to **Section 2.8**.
- ◆ **Dummy Canisters:** - The ER 2510FS-4S and ER 2510FS-6S models come with a single controller module. They should also come with a dummy controller module canister. The controller should be installed in the space reserved for Controller A. The dummy canister **MUST** be installed into the space reserved for Controller B. This normalizes the airflow through the system.

---

#### **WARNING**

*If you do not install the dummy controller canisters the airflow from the cooling fan module will not be normalized and the system will overheat. This can lead to permanent system damage.*

---

### 2.9.2 Controller Module Installation Procedure

To install the controller module please follow these steps:

- Step 1. Remove the cooling FAN module** – When shipped, the dual FAN cooling module will be installed at the back of the controller module. Prior to installing the controller module the cooling module must first be removed. To remove the cooling module locate the silver “spring-screw” on the rear of the cooling FAN module. To loosen it turn the screw in an “anti-clockwise” direction. Once the screw has been loosened, gently pull the cooling FAN module out of the controller module. Please see **Figure 2-4**.

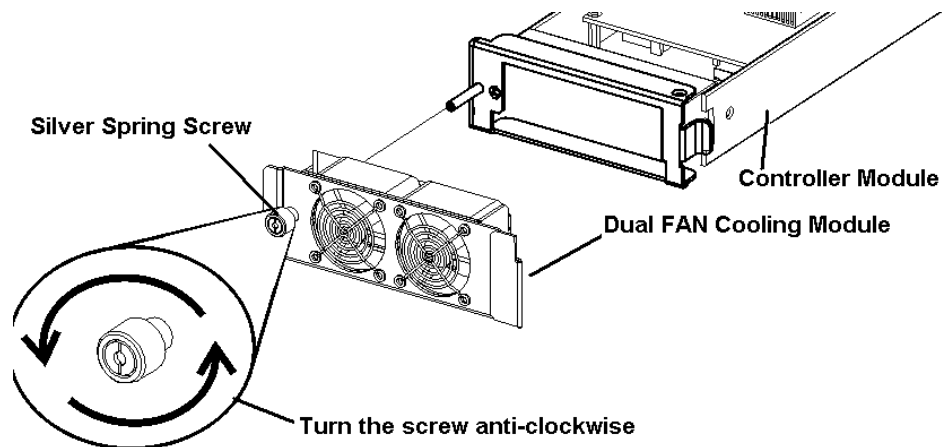


Figure 2-4: Remove the dual FAN Cooling Module

**Step 2. Open the rear flap** – After the dual FAN cooling module has been removed from the rear of the controller module, open the silver flap at the back of the controller module. The silver flap is secured to the controller module with a single retention screw. Remove the retention screw (*Figure 2-5*) and open the flap (*Figure 2-6*).

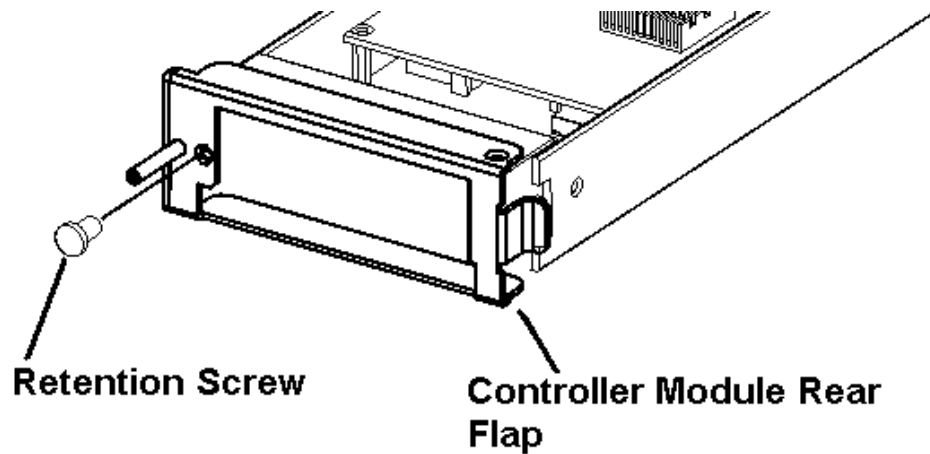
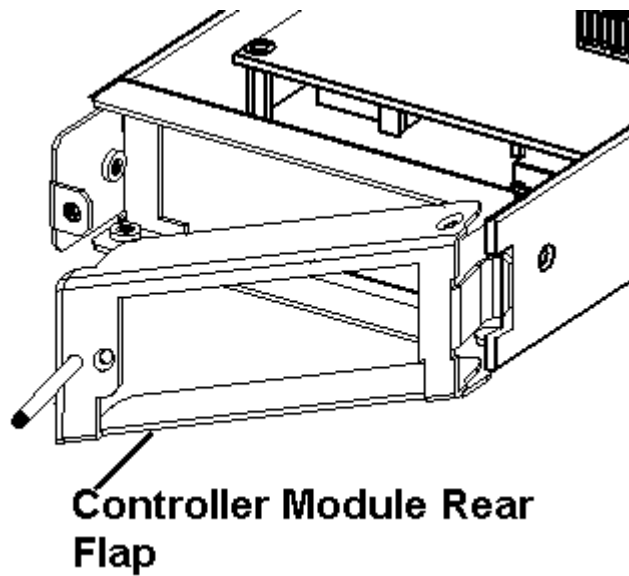
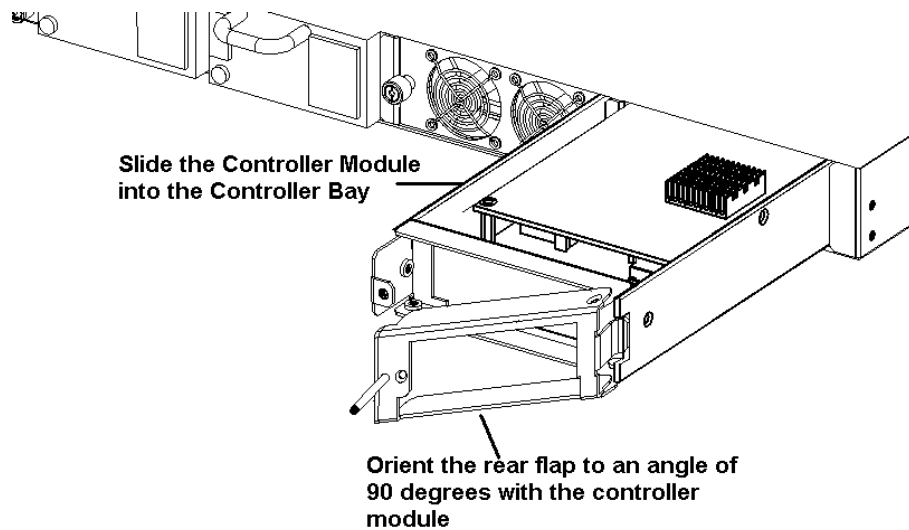


Figure 2-5: Remove the Controller Module Rear Flap Retention Screw



**Figure 2-6:** Open the controller module rear flap

**Step 3. Insert the controller module** – Once the rear flap has been opened, orient the rear flap to an angle of 90° with the controller module. Align the controller module with the relevant controller bay and gently push the controller module into the controller bay. See *Figure 2-7*.



**Figure 2-7:** Insert the controller module into the controller bay

**Step 4. Secure the Controller Module** – Once the controller module has been completely inserted into the controller bay, close the flap and re-insert the retention screw that was removed in *Step 2* above. This will secure the flap to the controller module and ensure that it does not come loose.

## 2.10. Dual FAN Cooling Module Installation

### 2.10.1 Dual FAN Cooling Module Considerations

- ◆ **Location:** - The cooling FAN modules must be attached to the rear end of their respective controller modules.
- ◆ **Pre-installation check:** - Before you install the cooling FAN module check that the controller modules have already been installed.

### 2.10.2 Installation Steps

**Step 1.** The cooling FAN modules are installed at the back of the controller modules, on the rear panel of the controller head. To install the cooling FAN module hold it at a 45° angle and slide it into the controller head.

**Step 2.** Make sure the small clip (see *Figure 2-9*) on the right-hand side is hooked behind the rear flap of the controller module (see *Figure 2-8*).

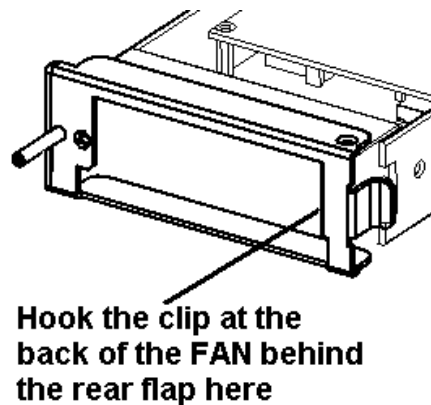
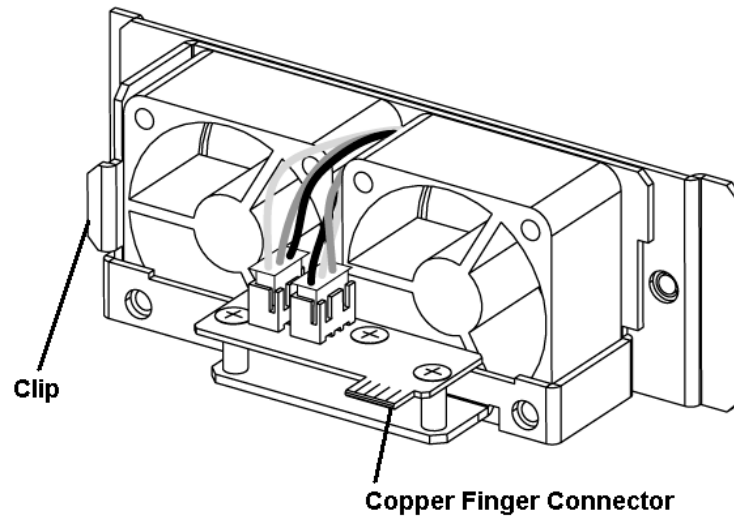


Figure 2-8: Rear Side of the controller Module



**Figure 2-9:** Rear view of the cooling FAN Module.

**Step 3.** Gently push the rest of the cooling FAN module into the chassis making sure the “Copper Finger Connector” at the back of the Cooling FAN module is firmly inserted into the connector on the controller adapter board.

**Step 4.** To secure the Cooling FAN Module, tighten the silver spring screw on the rear of the module.

## 2.11.FC Speed Selection

---

### NOTE

*This option is only available for all those who have Type-1 IO modules.*

---

Type-1 IO modules have a FC speed selection jumper on board. These have to be altered in accordance with your system requirements and custom needs. The jumper is located at the rear of the IO board. The default setting is for 2Gbps. By changing the jumper setting you can alter the speed to 1Gbps. Please refer to the following specifications and diagram.

- ◆ **Pin 1-2:** 1Gbps
  - ◆ **Pin 2-3:** 2Gbps (*Default*)
- 

### NOTE

*For Type-2 IO modules the FC speed is auto-negotiated.*

---

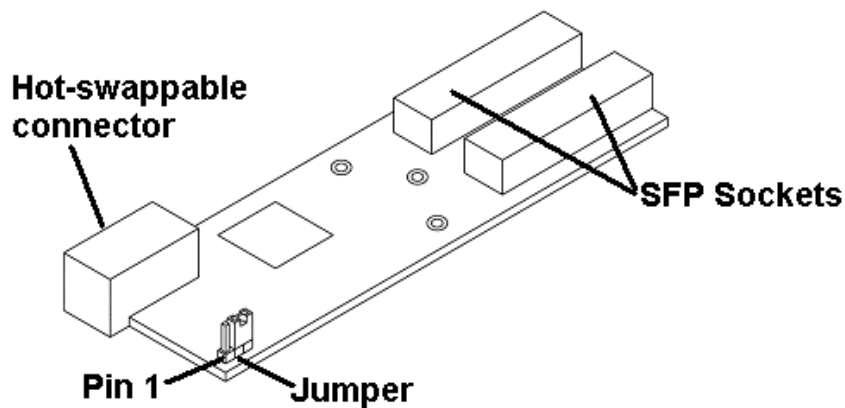


Figure 2-10: Type-1 IO Module Jumper

## 2.12. Installation of the Front Panel Modules

### 2.12.1 Front Panel Module Installation Considerations

- ◆ **LCD Panel** – The LCD Panel is pre-installed.
- ◆ **Configuration** – All the Front Panel Boards are uniform in configuration. They all have, when correctly oriented, internal brackets on the right hand side.
- ◆ **Grooves** - The front panel slots into which the boards are inserted all have grooves on the upper and lower surfaces. The front panel boards must be carefully aligned with these grooves before they are inserted into the Chassis.
- ◆ **Screws** – Screws are used attach the front panel boards securely to the front panel. Each front panel board has two screw holes, one each at the top and bottom. Both can be found on the left hand-side.
- ◆ **Dummy Canisters** – Some models only come with four IO modules, a single maintenance module, and one BBU module. To ensure that the airflow through the system is regulated dummy front panel canisters are provided. These dummy canisters **MUST** be installed. They are installed in the same way as the other front panel adapters.

---

#### **WARNING**

*If you do not install the dummy canisters in the front panel the airflow will not be normalized and the system will overheat. This can lead to permanent damage*

---



## 2.12.2 Front Panel Module Installation Steps

**Step 1. Determine where each Front Panel module must be installed** - The Front Panel modules can be connected in any order. But it is important that they are inserted into the correct slot. Slot 0 is next to the LCD Panel and slot 10 is the last slot on the right hand side. Please refer to **Table 2-2** to see the correct slot for each front panel module.

Slot	Component Name	Description
Slot 0 ~ slot 5	IFT-9560-IO1 or IFT-9560-IO2	Type 1 or Type 2 IO Adapter
Slot 6	IFT-9560-IOLED	LED Board
Slot 7 ~ slot 8	IFT-9560-IOMT	Maintenance Adapter
Slot 9 ~ slot 10	IFT-9560-IOBT	BBU Adapters

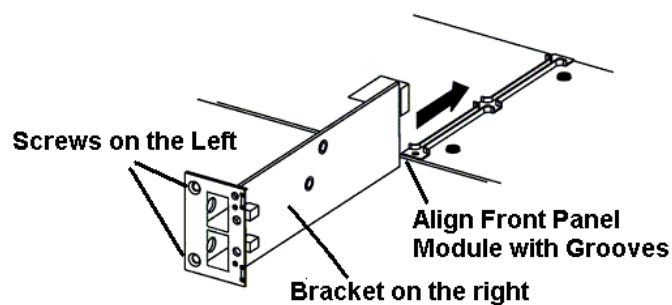
**Table 2-2:** Front Panel Slot Allocations

**Step 2. Select a front panel module** - Select the front panel module you wish to install and locate the corresponding slot in which to insert it.

### CAUTION

*Please make sure that you insert the correct Front Panel Module in to the correct slot. If you do not you may, by inserting the incorrect module into the incorrect slot damage the module and the channel itself.*

**Step 3. Check that the module is in the correct orientation.** - The bracket that is connected to the front panel module should be on the right and the two screw holes that are used to secure the module should be on the left. Refer to **Figure 2-11**.



**Figure 2-11:** Align the Front Panel adapters with the grooves in the channel slots.

**Step 4. Insert the Front Panel Module** - Gently slide the front panel Module into the Chassis. Continue to push until it is firmly in place.

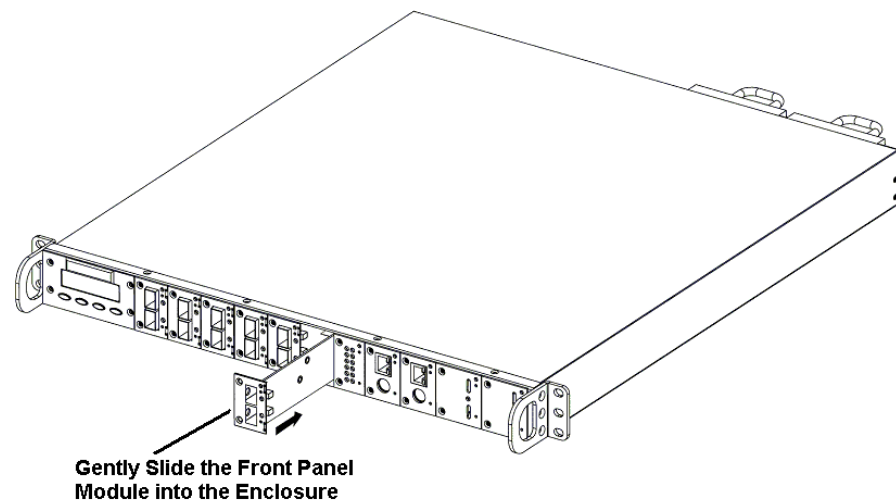


Figure 2-12: Gently slide the Front Panel Modules into the assigned slot.

**Step 5. Insert Retention Screws** - Secure the front panel module firmly into place by inserting two screws into the screw holes on the left side of the module.

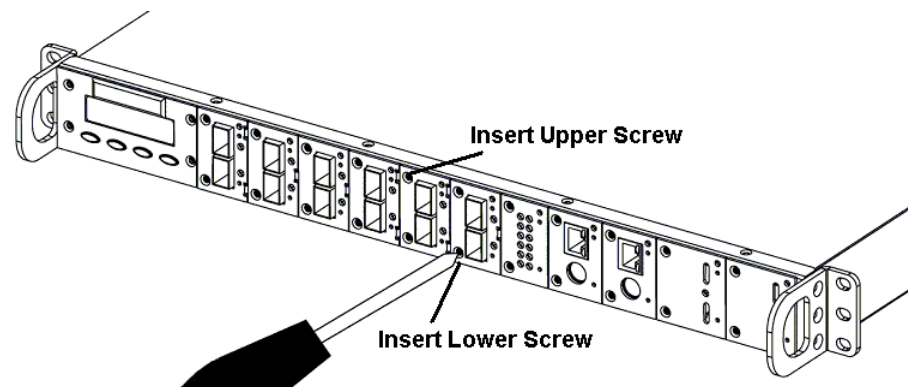


Figure 2-13: Secure the front panel modules into the chassis using two screws.

**Step 6. Install all the Front Panel Modules** - Repeat this process until all the front panel modules (*including the dummy canisters*) have been installed into their correct locations.

---

**WARNING**

*The dummy canisters must be installed. If these canisters are not installed then the cooling airflow will not be normalized and the system will be damaged.*

---

## 2.13. Mounting the ER 2510FS into the Rack

The ER 2510FS RAID Controller Head can be installed into a cabinet using different techniques and in different orientations. This section will describe how to mount the controller head into a cabinet using a *separately purchased* slide rail.

---

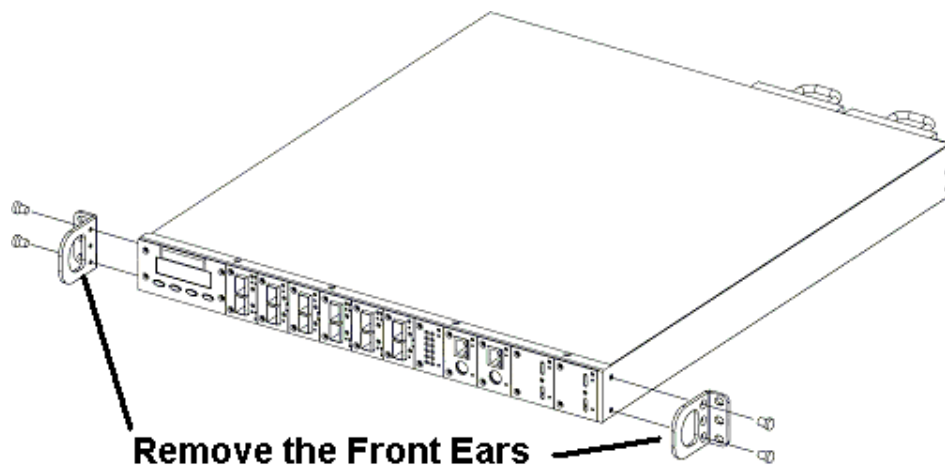
**CAUTION**

*When installing the RAID Controller head into the cabinet it is best to have two people assisting in the installation process. One person will need to hold the controller head while the second person will need to make the necessary attachments.*

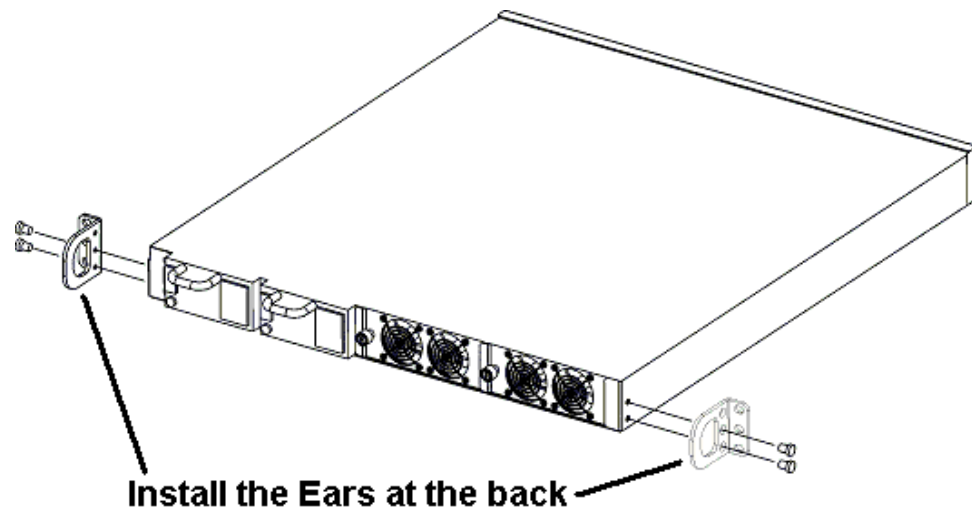
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### 2.13.1 Pre-Installation Considerations

- ◆ **Selecting the orientation:** - The ER 2510FS RAID Controller Head comes with two front ears that are used to secure it to the cabinet. These ears are reversible and can be placed at the rear of the Controller Head enabling users to select the orientation of the Controller Head. If you choose to install the chassis backwards it is necessary to remove the handles from the front of the chassis (see **Figure 2-14**) and replace them at the back (see **Figure 2-15**).



**Figure 2-14:** : Removing and replacing the handles at the front



**Figure 2-15:** Removing and replacing the handles at the back

- ◆ **Handles:** - Make sure the front/rear handles are firmly attached to the chassis of the controller head with two screws.
- ◆ **Location Selection:** - Carefully select the location in the Cabinet of where you want to place the Controller Head. Pay attention to the clearance between rackmount units.

### 2.13.2 The Slide Rail

---

**NOTE**

*Using a slide rail is an optional installation technique. The IFT-9253L18 slide rail can be purchased separately and used to install the ER 2510FS controller head into a cabinet.*

---

The slide rail kit includes the following components:

- ◆ 2 Slide Rails
- ◆ 18 M4x0.7 L=6 Phillips screws plus Kepnuts (8)
- ◆ 4 End Brackets

The slide rail assembly consists of four major parts:

- ◆ the inner slide rail (for the chassis)
- ◆ the middle slide rail (ball-bearing part)
- ◆ the outer slide rail (for the cabinet)
- ◆ two end brackets

### 2.13.3 Slide Rail Installation Steps

**Step 1. Separate the inner chassis slide rail from both rails.** To do this press the spring catch in each to release the inner section of the rail. Place the inner chassis slide rail in the correct orientation. To do this note that one end is level and one end has a protruding edge. The end with the protruding edge must be towards the back of the unit. (The open side of the inner rail section must face out as shown.)

**Step 2. Attach the inner chassis slide rails** to the sides of the ER 2510FS RAID Controller Head using the enclosed screws. See *Figure 2-16*.

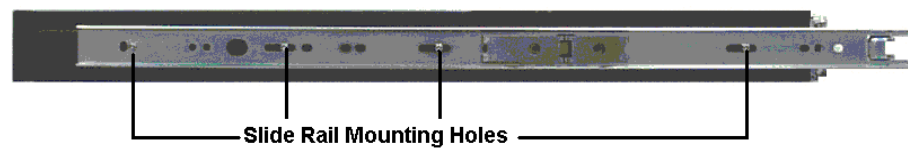


Figure 2-16: Mounting hole locations for the inner rail.

**Step 3. Install the slide rail end bracket** - Determine where in the network equipment cabinet the ER 2510FS management system will be installed. Pay attention to the clearance between rackmount units. Mount the end brackets on both the left and right (two on each side). Attach the end brackets to the mounting holes of cabinet. *The mounting positions for the end brackets within the cabinet must be carefully measured so that the rails can be mounted parallel.* Attach the end brackets to each side of the cabinet using screws provided with your cabinet.

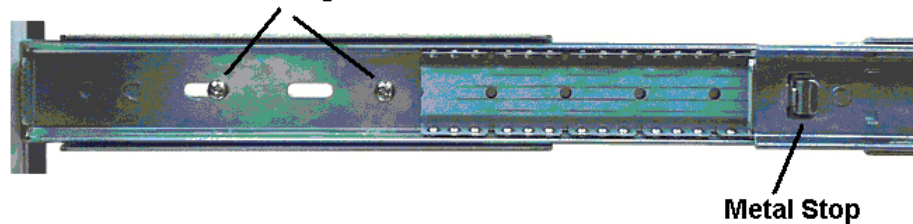


Figure 2-17: Slide End Bracket

**Step 4. Attach the middle and outer slide rails to end brackets** - Make sure the rail heights are aligned. Orient the slide rails so that the metal stop is toward the back of the cabinet so the middle slide can extend out the front of the cabinet.

Push the middle slide until the mounting holes of the outer slide rail are revealed. Insert screws from the inside and put a kepnut on the end of each screw. Align the round holes on the middle slide until screws can come through slot on the end bracket. Fasten the screws between end brackets and the outer slide rails. See *Figure 2-18*.

**To see the mounting screws slide the rail forward**



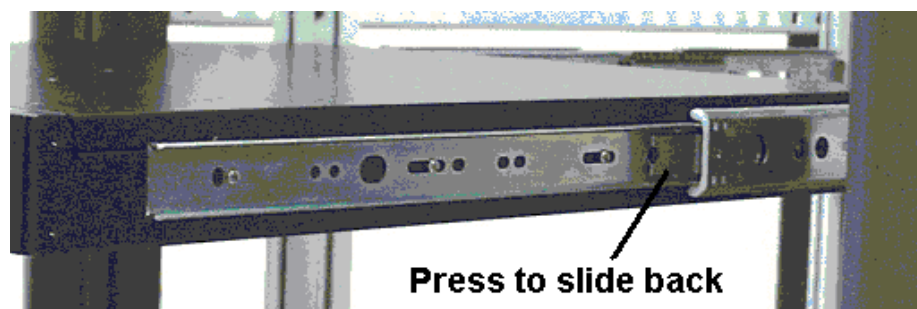
**Figure 2-18: Attach the middle and outer slide rails to the end brackets**

Pull the ball bearing part of slide rail forward and backward and secure screws through the two slots on end brackets. Adjust each slide rail before tightening it to the end brackets.

**Step 5. Pull the slide rails out** - Before installing the controller head, you may have to pull both slide rails out until you hear a “click” sound made by the metal stop.

Gently slide the controller head into the rack by aligning the inner sections of the rails (now mounted to the controller head) with the rail sections mounted to the equipment cabinet.

When the unit is inserted approximately half-way, you will need to press the spring catches on both sides as shown in *Figure 2-19* in order to continue mounting. Two persons are needed to carry the system. Slide the controller head as far in as it will go, then secure the system with four screws on the sides of front panel.



**Figure 2-19: Mount the controller head into the cabinet.**

**Step 6. Attach Ears to Cabinet** - Once you the Controller head has been mounted into the cabinet, push the ER 2510FS into the cabinet until the front ears are flush against the sides of the cabinet. To firmly secure the ER 2510FS to the cabinet, attach the front ears of the controller head to the cabinet sides.



Figure 2-20: Firmly secure the front ears to the sides of the cabinet

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# Chapter 3: Monitoring the System

## 3.1. Controller Head Monitoring Overview

The ER 2510FS is equipped with a variety of self-monitoring features that help to keep controller head managers informed of the controller head operational status. These monitoring features provide vital feedback that helps users maintain the operational integrity of the controller head. Prompt response to warnings and controller head component failure notifications will improve the overall operation of the controller head and help to ensure the longevity of the ER 2510FS.

Self-monitoring features include:-

- ◆ **Management Firmware (FW)** – The controllers on the ER 2510FS RAID comes with pre-installed FW (version 3.31 or above). The FW can be accessed using either the LCD panel or a PC hyper-terminal. The ER 2510FS controller head can be connected to a PC hyper-terminal through the RS-232C (Audio Jack) serial port. Device status information can be obtained from the FW. The FW has been fully described in the *Generic User's Manual* that came with the controller head. Please refer to this manual for further details.
- ◆ **RAIDWatch** – RAIDWatch is a fully integrated Java based Graphics User Interface (GUI) (that came with the controller head) and can be used to monitor the controller head remotely. The powerful *Notification Process Center* (NPC) sub-module can be used to keep user's informed over a variety of communication devices like FAX, pager, e-mail etc. The installation and operation of RAIDWatch has been fully described in the *RAIDWatch User's Manual*. Please refer to this manual for further details.
- ◆ **LEDs** – Device status indicating LEDs are placed on all the ER 2510FS active components. These LEDs are used to inform user's of the integrity of a given component or of a given FC link. A user should familiarize themselves with the different LEDs that are present on the controller head and be aware of their functions.
- ◆ **Audible Alarm** – An audible alarm is present on the controller head controller board and will be triggered if any of a number of threatening events occur. These events usually jeopardize the functional and operational integrity of the controller board and must be heeded at all times. Events such as a breaching of the temperature threshold will trigger the alarm and if an onsite controller head manager is present, the manager should, using either the LCD panel or the PC hyper-terminal, determine the cause of the alarm and take the appropriate corrective measures.

- ◆ **SES** – SES is a command set supported by the ER 2510FS that is used to manage and sense the state of the power supplies, cooling devices, temperature sensors, individual drives, and other non-SCSI elements installed in a FC JBOD enclosure. If you have a SES-compliant enclosure the firmware on the controller boards will be able to decode and report this information.

Controller head monitoring is a necessary part of controller head management. If failure events or other disruptive events are detected and reported, the controller head managers must take the appropriate action to rectify the problem. Failure to act in a properly specified manner to a system event (like overheating) can cause severe and permanent damage to the controller head.

## 3.2. Front Panel LEDs

### 3.2.1 IO Modules

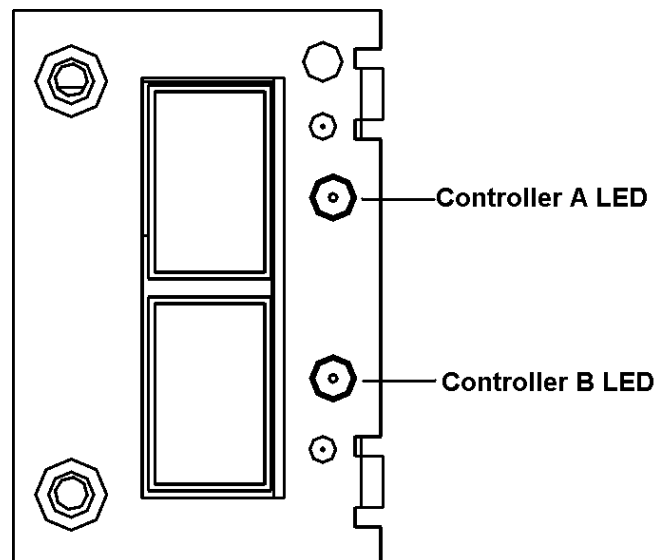
Both Type-1 and Type-2 IO modules have two green LEDs on the front side of the board. The upper LED belongs to controller A and the lower one to controller B. This LED informs the end user of the channel's current speed and status. The LEDs are shown in *Figure 3-1* and their definitions are shown in *Table 3-1*.

---

**NOTE:**

The physical appearance of the IO modules is the same. Type-1 IO modules will have "PCB" printed beneath the lower SFP connector.

---



**Figure 3-1:** IO Module LEDs

LED Name	Color	Status
Channel Speed and Status	GREEN	<p><b>ON</b> indicates that the FC speed is 2Gbps.</p> <p><b>OFF</b> indicates that the FC speed is 1Gbps</p> <p><b>BLINKING</b> indicates that the Loop Linked Failed (only for Type-2 IO Modules)</p>

Table 3-1: IO Module LED Definitions

If a controller is removed from the controller bay and replaced with a blank controller module, the corresponding LED will not have any function.

### 3.2.2 LED Board

The LED Board comes with two vertical LED arrays. Each array contains six LEDs . These LEDs inform the user of the status of both controllers. The column on the left informs the user of the status of controller A and the column on the right informs the user on the status of controller B. *Figure 3-2* shows the LED panel with all the LEDs labeled.

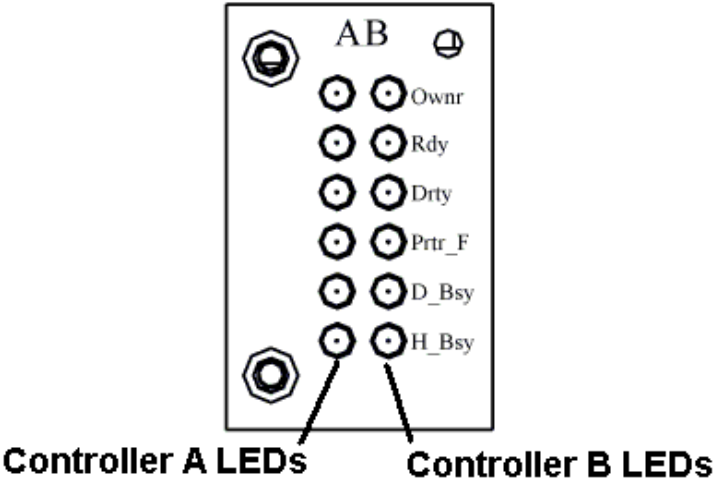


Figure 3-2: Front Panel LED module

The LEDs on the front panel LED module are described in *Table 3-2*.

Name	Label	Color	Status
LCD Module Owner	Ownr	GREEN	<p><b>RIGHT SIDE ON</b> indicates that the LCD Module is showing controller A information.</p> <p><b>LEFT SIDE ON</b> indicates that the LCD Module is showing controller B information.</p>
Controller Ready	Rdy	GREEN	<p><b>ON</b> indicates that the controller has successfully booted.</p> <p><b>OFF</b> indicates that the controller has NOT successfully booted</p>
Cache Dirty	Drty	AMBER	<p><b>ON</b> indicates that the cache memory is information. It also indicates that the cache is being held up by the BBU.</p>
Partner Fail	Ptrr_F	AMBER	<p><b>ON</b> indicates that the partner controller has failed. <i>Note that this only applies to dual redundant controller models.</i></p>
Drive Busy	D_Bsy	GREEN	<p><b>ON</b> indicates activity on the FC drive channels.</p> <p><b>OFF</b> indicates that there is no activity on the FC drive channels.</p>
Host Busy	H_Bsy	GREEN	<p><b>ON</b> indicates that there is activity on the FC host channels.</p> <p><b>OFF</b> indicates that there is no activity on the FC host channels.</p>

**Table 3-2: LED Front Panel Module LED Definitions**

### 3.2.3 Maintenance Module

The maintenance module come with two LEDs each. The first shows the *Link Status* and second shows the *Data Transfer Status*. Please see *Figure 3-3* below. The LED definitions are shown in *Table 3-3*.

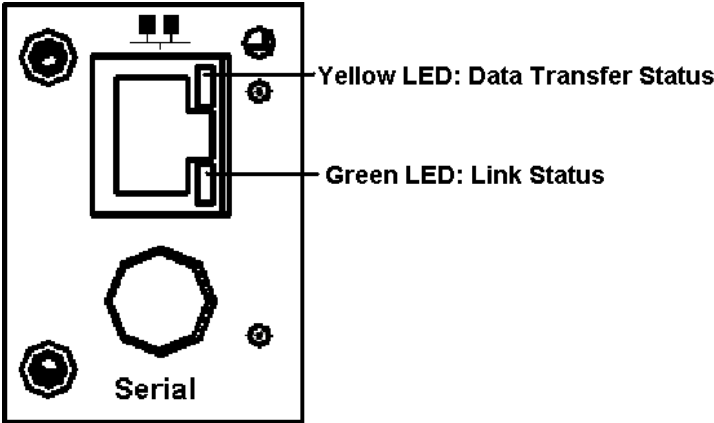


Figure 3-3: Maintenance Board LEDs

Name	Color	Status
Link Status	GREEN	<b>ON</b> indicates that the Ethernet link is functioning. <b>OFF</b> indicates that the Ethernet connection has not been established.
Data Transfer Status	YELLOW	<b>BLINKING</b> indicates that data is being transferred. <b>OFF</b> indicates that no data is being transferred.

Table 3-3: Maintenance Module LED Definitions

### 3.2.4 BBU Module

The BBU modules have a single yellow LED that show the status of the BBU (see *Figure 3-4*). The LED definition is given in *Table 3-4*.

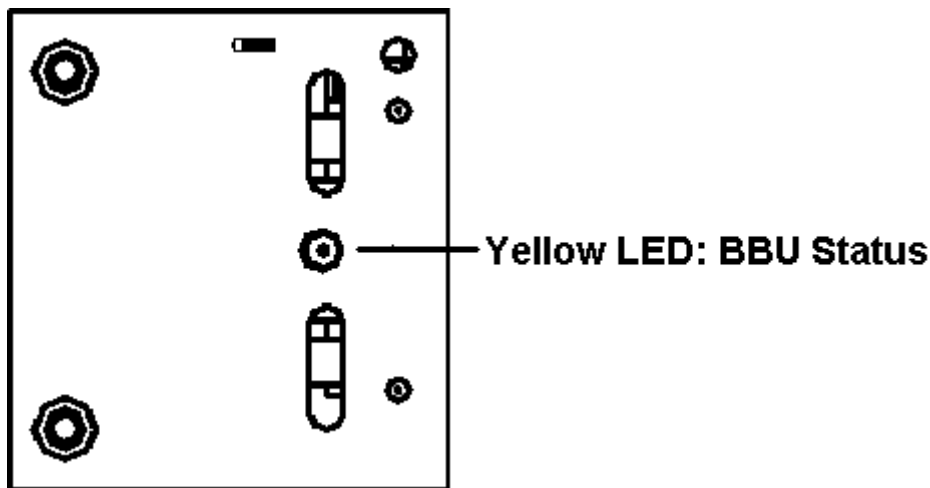


Figure 3-4: BBU Module LED

Name	Color	Status
BBU Status	YELLOW	<p><b>ON</b> indicates that the batteries are NOT installed or the batteries are bad.</p> <p><b>OFF</b> indicates that the BBU is capable of sustaining the memory in the event of a power loss.</p> <p><b>FLASHING</b> indicates that the BBU is charging</p>

Table 3-4: Maintenance Module LED Definitions

### 3.3. Audible Alarm

Different controller environmental and operational parameters (like temperature etc.) have been assigned a range of values between which they can fluctuate. If either the upper or lower thresholds are exceeded, an audible alarm will automatically be triggered. The alarm will also be triggered when an active component of the ER 2510FS fails. If the ER 2510FS manager is onsite and is alerted by the alarm, to determine what has triggered the alarm the user will have to read the error message on the LCD screen or on the PC terminal. After determining what has occurred the ER 2510FS manager must take appropriate actions to rectify the problem.

**WARNING:**

If an alarm is triggered it is necessary for the user to determine the problem. If the audible alarm is ignored or not taken seriously and the problem is not rectified, permanent damage to the system can result.

### 3.3.1 Default Threshold Values

*Table 3-5*, shows the default threshold values for the ER 2510FS controller head. If any of these values are surpassed the alarm will sound:

<i>Parameter</i>	<i>Upper Threshold</i>	<i>Lower Threshold</i>
+3.3V	+3.6V	+2.9V
+5V	+5.5V	+4.5V
+12V	+13.2V	+10.8V
<i>CPU Temperature</i>	90°C	0°C
<i>Board Temperature</i>	90°C	0°C

**Table 3-5:** Default Threshold Values

The thresholds in *Table 3-5* are the default threshold values. The user can change these values. To see how to change these values please refer to the *Generic Operation Manual* that came with your system.

### 3.3.2 Failed Devices

If any of the following devices fail the audible alarm will be triggered.

- ◆ RAID Controller Modules
- ◆ Dual FAN Cooling Modules
- ◆ PSU Modules
- ◆ BBU Modules

## 3.4. SES Monitoring

The ER2510FS RAID Controller Head supports SES. SES is a command set that is used to manage and sense the state of the power supplies, cooling devices, temperature sensors, individual; drives, and other non-SCSI elements installed in a fibre channel JBOD enclosure. If you have a SES-compliant enclosure the firmware on the controller boards will be able to decode and report this information.

**NOTE:**

*The SES monitoring support assists users in determining where a fault may or may not exist within an external enclosure. If there is a fault in the enclosure please contact the enclosure manufacturer to solve the problem.*

### 3.4.1 Using Terminal Emulation

**Step 1.** Open the PC Terminal Emulation screen. Enter the Main Menu and, using the arrow keys, scroll down the menu and select the “**View and Edit Peripheral Devices**” option. Once this has been selected a second menu will appear. From this menu select “**View Peripheral Status**”. The menu shown in *Figure 3-5* should appear:

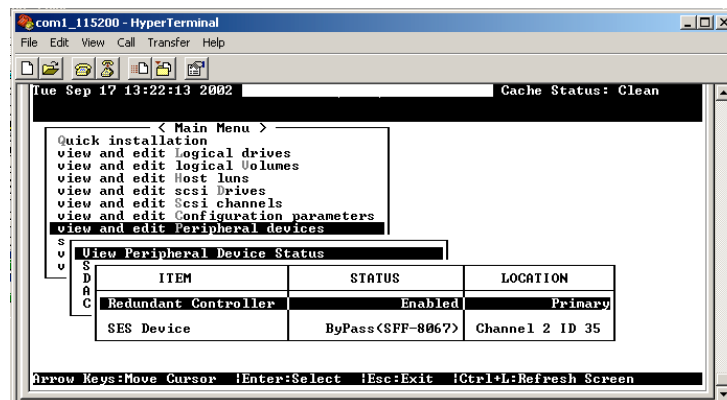


Figure 3-5: View Peripheral Status

**Step 2.** From the menu shown above, use the arrow key to scroll down the menu and select the “**SES Device**” option. When you have selected this option the screen shown in *Figure 3-6* will appear:



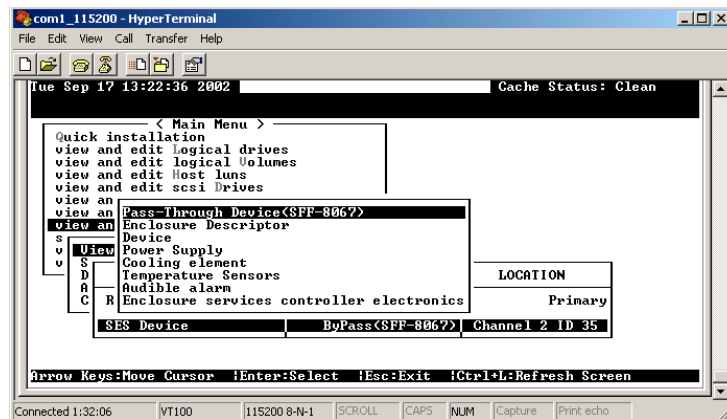


Figure 3-6: Select SES Device Option

**Step 3.** There are eight different items in the menu shown above. These are described below.

- **Pass Through Device:** - This selection will show the status of the channels that control the SES device. When this item is selected the menu in *Figure 3-7* will appear on the screen.

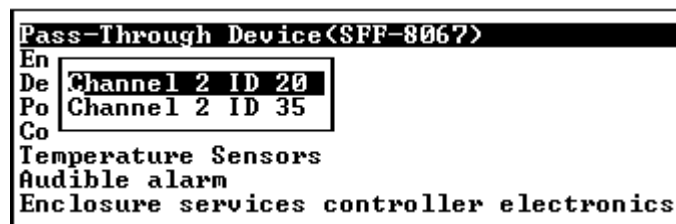


Figure 3-7: Pass through device

The status of the channel linked to the SES device can be determined by selecting either “Channel 2 ID 20” or “Channel 2 ID 35”.

---

**NOTE:**

*Please note that the ID numbers shown above will depend on the JBOD enclosure you are using. Different enclosures will assign different ID values to these channels.*

---

- **Enclosure Descriptor:** - Selecting this option will give the user a full description of the JBOD enclosure attached to the controller head. If selected the menu shown in *Figure 3-8* will appear.

```
Vendor Identification : ██████████
Product Identification:RS1600-FC2
Product Revision Level:2121
Enclosure Descriptor  :OPS349290004233
```

Figure 3-8: Enclosure Descriptor

- **Device:** - This option shows the user the status of the individual drives inside the JBOD enclosure. If selected the menu in *Figure 3-9* will appear.

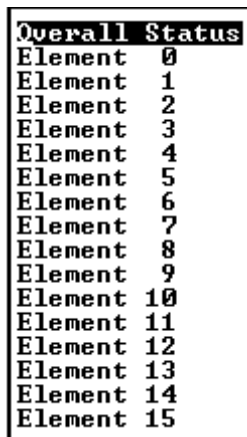


Figure 3-9: Device

Each “Element” in the above menu corresponds to a single Hard Disk. By selecting one of these elements it is possible to determine the status of the corresponding Hard Disk.

- **Power Supply:** - This option will show the user the status of the PSUs that are used inside the enclosure. If selected the menu in *Figure 3-10* will appear.

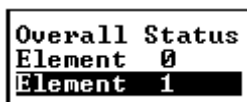


Figure 3-10: Power Supply

Each “Element” in the above menu corresponds to a single PSU. By selecting one of these elements it is possible to determine the status of the corresponding PSU.

- **Cooling Element:** - This option will show the user the status of the cooling devices that are used in the JBOD enclosure. If selected the menu in *Figure 3-11* will appear.



Figure 3-11: Cooling Element

Each “**Element**” in the above menu corresponds to a single cooling element. By selecting one of these elements it is possible to determine the status of the corresponding cooling element.

- **Temperature Sensors:** - This option will show the user the status of the temperature sensors that are used in the JBOD enclosure. If selected the menu in *Figure 3-12* will appear.



Figure 3-12: Temperature Sensors

In the above menu the single “**Element**” shows that the JBOD enclosure contains only one temperature sensor. If there were more temperature sensors in the enclosure more “**Element**” options would appear in the menu.

- **Audible Alarms:** - This option will show the user the status of the audible alarms that are used in the JBOD enclosure. If selected the menu in *Figure 3-13* will appear.

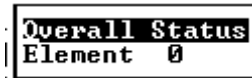


Figure 3-13: Audible Alarms

In the above menu the single “**Element**” shows that the JBOD enclosure contains only one audible alarm. If there were more audible alarms in the enclosure more “**Element**” options would appear in the menu.

### 3.4.2 Using the GUI for SES Monitoring

The RAIDWatch GUI can also be used for SES monitoring. To access the SES information using RAIDWatch please refer to the *RAIDWatch User Manual*.

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# Chapter 4: Connection and Operation

## 4.1. Overview

This chapter outlines some basic configuration rules that a user should use when they are configuring a storage system. It also introduces basic information about fibre channel cables and introduces fibre-to-fibre topologies. Sample topologies are outlined. The user can set their system up using these topologies or use them as a guide for developing their own unique topologies.

## 4.2. FC Considerations

### 4.2.1 FC Speed Detection

Speed auto-detection is specified by the Fibre Channel standard. If a 1Gb/s port is connected to a 2Gb/s port, it will negotiate down and run at 1Gb/s. If there are two 2Gb/s ports on either end of the link the link will be run at 2Gb.

---

**NOTE:**

1. *For the Type-1 IO modules, users have to manually select the fibre channel speed of the IO module using a jumper. Please refer to chapter 3 to see how this is done.*
  2. *If the fibre channel cable that is being used is too long your system may end up running at 1Gb/s even with two 2Gb/s ports.*
- 

### 4.2.2 Choosing the Fibre Cables

---

**WARNING:** *All Cables must be handled with care. They must not be bent; and to prevent interference within a rack system the routing path must be carefully planned.*

---

The Fibre Channel Standard allows for both copper and optical connections. Copper cables are cheaper but limited to lengths of less than 30m. Optical cables can be used over longer distances and have been shown to be more reliable. Due to the extremely high data transfer rates, optical cables are preferred for 2Gb/s fibre connectivity. Optical cables are also less susceptible to EMI.

---

**NOTE:**

*Fibre Channel cables are expensive components that need to be purchased separately. These cables are sensitive and should not be bent as they are susceptible to damage.*

---

### 4.2.3 Lasers

---

**WARNING:**

*Lasers can cause permanent eye damage, which may result in permanent blindness, and therefore must be treated with respect and used with caution. Never look at lasers without knowing whether they are on or off is **hazardous**.*

---

◆ **Wavelengths**

The lasers on fibre channel fiber optic cables emit either short wave (SW) beams (770nm – 860nm) or long wave (LW) (1270 nm - 1355 nm) beams. Cables that use either of these wavelengths can be used on the ER2510FS controller head.

◆ **Laser Types**

Two type of laser devices can be used in fibre cables: Optical Fibre Control (OFC) and non-OFC lasers. The OFC lasers are high-powered and can be used over long distances.

◆ **Safety features**

OFC lasers, due to their high power output, usually come with a safety mechanism that switches the laser off as soon as it is unplugged. Non-OFC lasers do not (due to their low power) come with these safety features but they can still inflict damage.

### 4.2.4 SFP Transceivers

Once you have purchased your fibre channel cables, it may be necessary to connect them to small form factor pluggable (SFP) transceivers. These transceivers should typically have at least 2Gb/s bi-directional data links, a laser transmitter (for fiber optic cables), LC connector and a metal enclosure to lower the EMI.

---

**NOTE:**

*LC connectors are small form factor, fiber-optic connectors based on a 1.25-mm ceramic ferrule and the familiar latching mechanism of the RJ-45 modular plug and jack.*

---

Other beneficial features for a typical SFP transceiver include a single power supply and low power dissipation. It is also preferable that these transceivers are hot-swappable. It is also important that any transceiver you use meets the Fibre Channel Performance and reliability specifications.

---

**NOTE**

*SFP Modules must be purchased separately. Please purchase the correct SFP modules from your ER2510FS Controller Head vendor/distributor.*

---

## 4.3. Topology and Configuration Pre-considerations

### 4.3.1 Basic Configuration Rules

When you are configuring your controller head, the following are some basic rules that should be followed.

---

**NOTE:**

Please adhere to these basic configuration rules. They are provided for your convenience to ensure that your storage system will run smoothly and effectively.

---

- ◆ When selecting the number of hard drives that should be connected through the drive channels, the transfer rates and the mechanical performance of the hard disks should be considered.
- ◆ When cabling, follow all the fibre channel specifications. Pay attention to signal quality and avoid electronic noise from adjacent interfaces.
- ◆ The drives in the same logical array should have the same capacity, but it is preferred that all the drives have the same capacity.
- ◆ A spare should have a minimum capacity that is equivalent to the largest drive that it is expected to replace. If the capacity of the spare is less than the capacity of the drive it is expected to replace then the controller will not proceed with the failed drive rebuild.

### 4.3.2 FC Topologies

The ER2510FS RAID Controller head uses up to two fibre controllers for the controller head. The Fibre Channel Standard has been designed to support three separate topologies. They are point-to-point, FC-AL and fabric switch topologies.

- ◆ **Point-to-Point:** Point-to-point topology is the simplest topology that can be used. It is a direct connection between two fibre channel devices.
- ◆ **FC-AL:** This is the most common topology currently in use. Fibre channel devices are all connected in a loop. Each device is assigned an arbitrated loop physical address (AL\_PA). The FC-AL is able to support 127 devices in a single loop.
- ◆ **Fabric:** The fabric topology can support up to  $2^{24}$  fibre channel devices. This topology allows many devices to communicate at the same time. To implement this topology a fibre switch is required.

### 4.3.3 Host Side Topologies

The Host Channels of the ER2510FS RAID Controller head supports all three topologies described above. The primary concern for configuring host-side topologies is that points

of failure are avoided. It is therefore recommended that the host side be connected to at least two HBAs. It is also preferable to connect the controller head to the host computer(s) through either a fibre channel hub or a fibre switch.

In the configuration examples given below, all the host channels are connected to HBAs. It is also possible to connect the host channels to fabric switches.

---

**NOTE:**

*To create dual redundant data paths on the host side, it is necessary for failover software to be installed on the host computer.*

---

#### **4.3.4 Drive Side Topologies**

The drive side channels support FC-AL topologies. It is recommended that you use an FC-AL topology with your hard-drives as this will allow you to use and manage more storage space. The drive channels can be connected directly to a JBOD or through a fibre hub to a JBOD. It is also recommended to connect two channels to each JBOD. This will ensure full data path redundancy. If one data path is disconnected, damaged or destroyed the second data path will inherit the workload.



### 4.3.5 Channel Default Settings

All the channels on the ER 2510FS can be set as either drive channels or host channels. The following tables, *Table 4-1* to *Table 4-4*, show the default settings for the different channels in the different models.

Model	Host Channels	Drive Channels
<b>ER2510FS-4S</b>	CH0 and CH1	CH2 and CH3
<b>ER2510FS-6S</b>	CH0 and CH1	CH2, CH3, CH4, and CH5

**Table 4-1:** Single Controller Models' Default Channel Settings

Model	Host Channels (for both Controllers)	Drive Channels (for both Controllers)
<b>ER2510FS-4D</b>	CH0 and CH1	CH2 and CH3
<b>ER2510FS-6D</b>	CH0 and CH1	CH2, CH3, CH4, and CH5

**Table 4-2:** Dual-Single Controller Models' Default Channel Settings

Model	Host Channels	Drive Channels + RCC
<b>ER2510FS-4RH</b>	CH0 and CH1	CH2 and CH3

**Table 4-3:** Four Channel Dual-Redundant Controller Model' Default Channel Settings

Model	Host Channels	Drive Channels	Dedicated RCC
<b>ER2510FS-6RH</b>	CH0 and CH1	CH2 and CH3	CH4 and CH5

**Table 4-4:** Six Channel Dual-Redundant Controller Models' Default Channel Settings

## 4.4. Single Controllers

The controller configurations described in this section are for the single controller models.

### 4.4.1 ER2510FS-4S

**Example:** Two host channels and two drive channels

Please note, in the example shown in *Figure 4-1* below the channels are configured in the following way.

Channels	Controller A	Controller B
<b>Host</b>	CH0 and CH1	N/A
<b>Drive</b>	CH2 and CH3	N/A

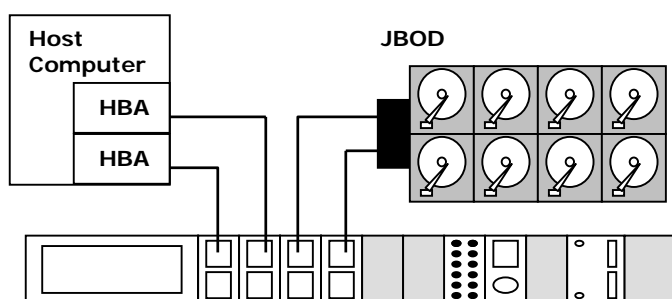


Figure 4-1: Possible ER2510FS-4S configuration

### 4.4.2 ER2510FS-6S

**Example 1:** Four host channels and two drive channels

Please note, in the example shown in *Figure 4-1* below the channels are configured in the following way.

Channels	Controller A	Controller B
<b>Host</b>	CH0, CH1, CH4 and CH5	N/A
<b>Drive</b>	CH2 and CH3	N/A

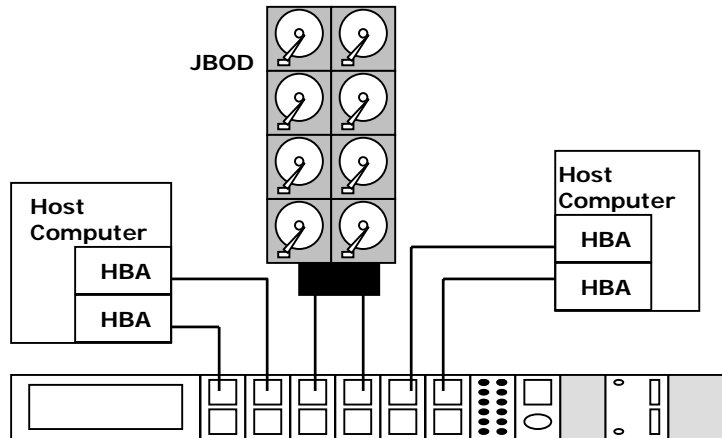


Figure 4-2: Possible ER2510FS-6S configuration, 4 host and 2 drive channels

**Example 2: Two Host Channels and four drive Channels**

Please note, in the example shown in *Figure 4-3* below the channels are configured in the following way.

Channels	Controller A	Controller B
Host	CH0 and CH1	N/A
Drive	CH2, CH3, CH4 and CH5	N/A

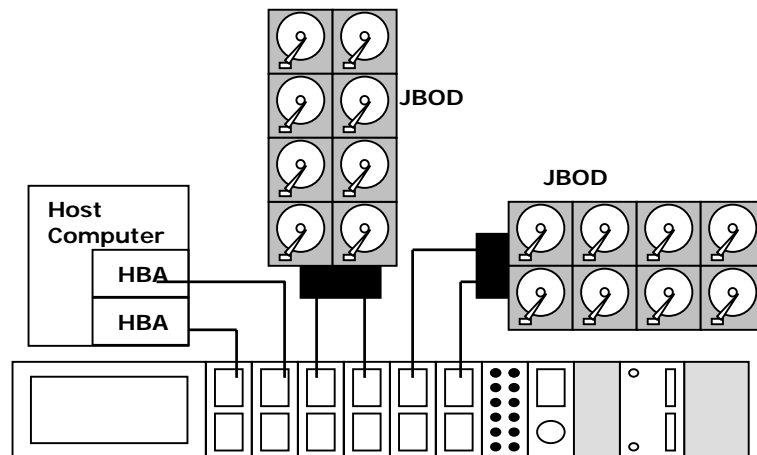


Figure 4-3: Possible ER2510FS-6S configuration, 2 host and 4 drive channels

## 4.5. Dual-Single Controllers

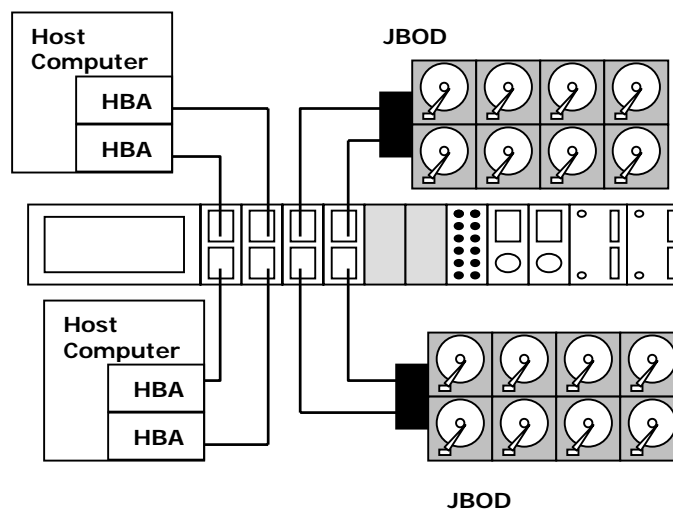
The controllers in the dual-single controller head models can have independent cache sizes (unlike the redundant controller models). The controllers are independent of each other and manage separate storage subsystems. Each controller is assigned a unique ID so that each FC port is identified by a unique port name that is recognized by the host. In this configuration the controllers do not communicate with each other and no cache synchronization takes place.

### 4.5.1 ER2510FS-4D

**Example:** Four Host Channels and four drive Channels

Please note, in the example shown in *Figure 4-4* below the channels are configured in the following way.

Channels	Controller A	Controller B
Host	CH0 and CH1	CH0 and CH1
Drive	CH2 and CH3	CH2 and CH3



**Figure 4-4:** Possible ER2510FS-4D configuration, 4 host channels and 4 drive channels

### 4.5.2 ER2510FS-6D

**Example 1: Four Host Channels and eight drive Channels**

Please note, in the example shown in *Figure 4-5* below the channels are configured in the following way.

Channels	Controller A	Controller B
Host	CH0 and CH1	CH0 and CH1
Drive	CH2, CH3, CH4 and CH5	CH2, CH3, CH4 and CH5

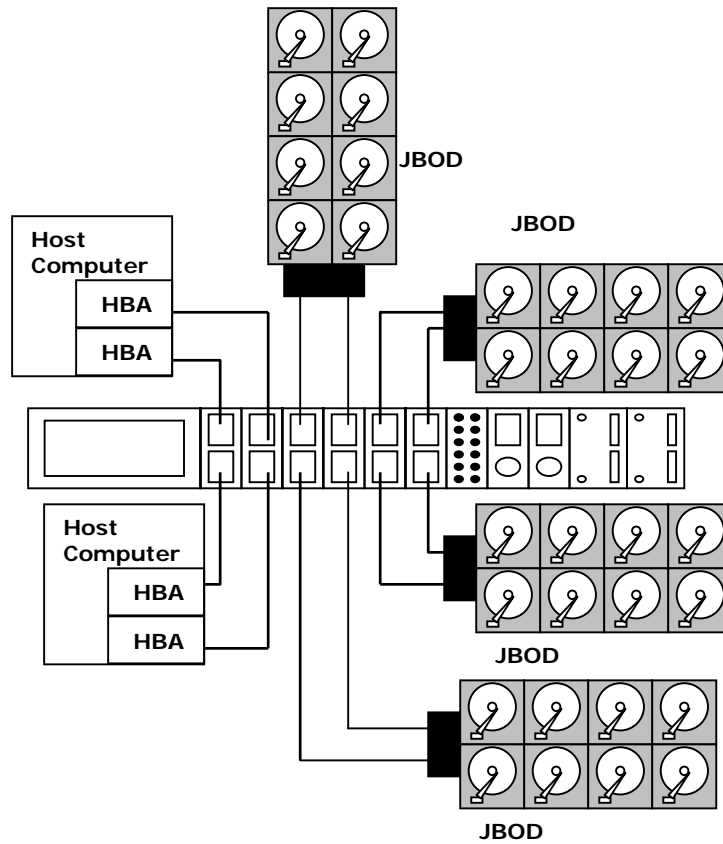


Figure 4-5: Possible ER2510FS-6D configuration, 4 host and 8 drive channels

**Example 2: Eight Host Channels and four drive Channels**

Please note, in the example shown in *Figure 4-6* below the channels are configured in the following way.

Channels	Controller A	Controller B
Host	CH0, CH1, CH4 and CH5	CH0, CH1, CH4 and CH5
Drive	CH2 and CH3	CH2 and CH3

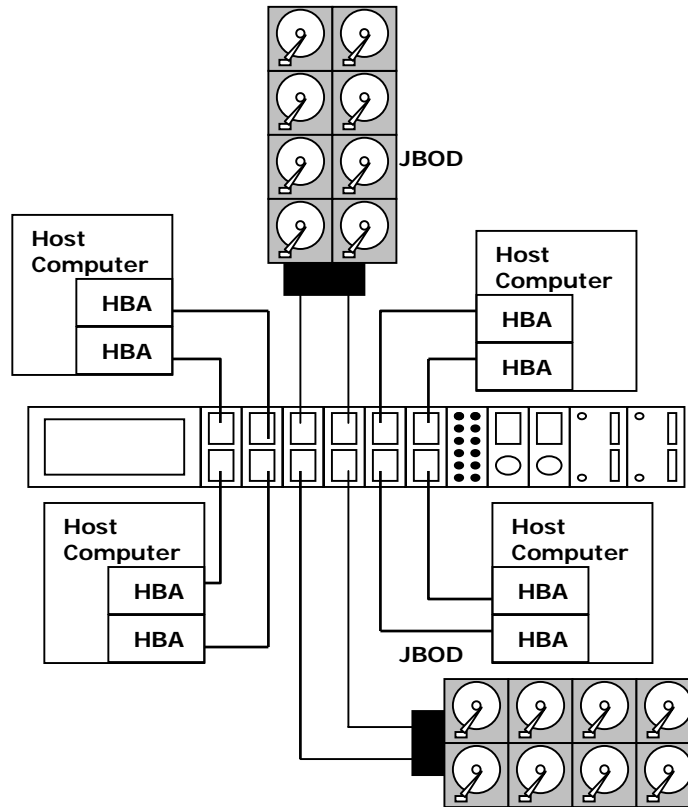


Figure 4-6: Possible ER2510FS-6D configuration, 8 host and 4 drive channels

**Example 3: Six Host Channels and six drive Channels**

Please note, in the example shown in *Figure 4-7* below the channels are configured in the following way.

Channels	Controller A	Controller B
Host	CH0, CH1	CH0, CH1, CH4 and CH5
Drive	CH2, CH3 , CH4 and CH5	CH2 and CH3

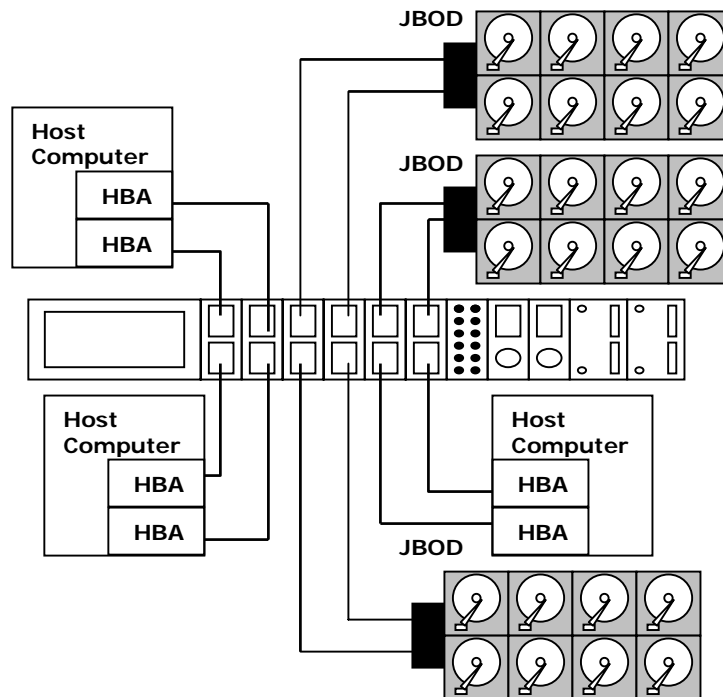


Figure 4-7: Possible ER2510FS-6D configuration, 6 host and 6 drive channels

## 4.6. Redundant Controllers

### 4.6.1 Redundant Controller Pre-requisites

Before two controllers can be configured in a redundant controller mode the following pre-requisites need to be met:

- ◆ Both controllers must have exactly the same cache size.
- ◆ Both controllers must be using an identical firmware version.

### 4.6.2 Redundant Controller Modes

Two different redundant controller modes are supported: the active-to-standby and the active-to-active mode.

- ◆ **Active-to-standby:** If this redundant controller mode is employed then one controller, the primary controller, does all the work while the other controller, the secondary controller, waits for the primary to fail. If, and when, the primary controller fails the secondary controller will take over the operation of the RAID subsystem.
- ◆ **Active-to-active:** This redundant controller mode allows the workload to be shared between the two controllers. This will increase the operating speed of the system and

allow the full potential of both controllers to be exploited. If one controller fails the second controller will take over the entire workload.

### **4.6.3 Internal Connections**

The two controllers are connected to each other internally through the Mid-Plane board. This enables the two controllers to synchronize their caches and distribute the workload between the controllers. The drive channels are also connected internally, via the mid-plane board, to both controllers. This enables the correct distribution of load traffic.

### **4.6.4 Unique Identifier**

The Unique Identifier is a user specified 16 bit, hexadecimal number that is used to assign a FC port number to the primary controller. Each controller is assigned a separate hexadecimal number. The firmware then determines which Unique Identifier to use. To see how to use the front panel LCD screen or the terminal emulation program to enter the unique identifier, please refer the *Generic Operation Manual*.

### **4.6.5 Redundant Controller Configurations**

- ◆ **Channel Mode:-** Every fibre channel can be configured as a drive or host channel manually. There is no limit to the number of drive or host channels that should be configured in the system. Therefore in the ER2510FS-6 RAID Controller Head, there maybe as many as five drive channels and one host channel or as many as five host channels and one drive channel. Channel 0 and 1 are, by default, host channels.
- ◆ **ID/LUN Mapping:-** I/O load distribution is determined by the Host ID/LUN mapping. Different logical groups of drives are mapped to the LUN numbers under a host ID. For a multi-host operation, a logical drive configuration can be mapped to different ID/LUN combinations. In this case the File locking mechanism is necessary. ID/LUN Mapping procedures are described fully in the *Generic Operations Manual*.



### 4.6.6 ER2510FS-4RH

**Example:** Two host channels and two drive + RCC channels

Please note, in the example shown in *Figure 4-8* below the channels are configured in the following way.

Channels	
Host	CH0, CH1
Drive + RCC	CH2, CH3

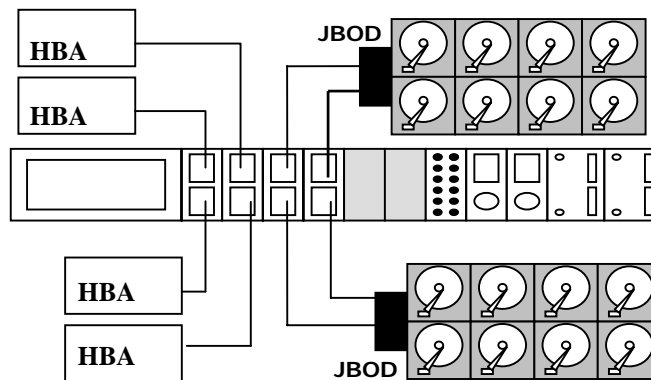


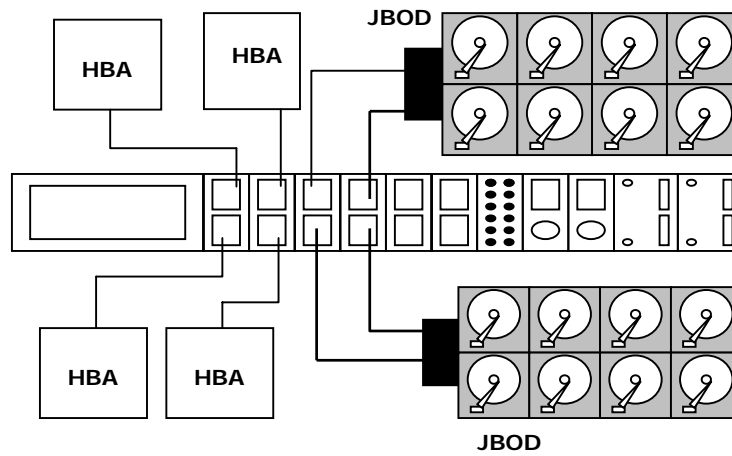
Figure 4-8: Possible ER2510FS-4RH configuration, 2 host and 2 drive channels

### 4.6.7 ER2510FS-6RH

**Example 1:** Two host channels, two drive channels and two dedicated RCC Channels.

Please note, in the example shown in *Figure 4-9* below the channels are configured in the following way.

Channels	
Host	CH0 and CH1
Drive	CH2 and CH3
Dedicated RCC	CH4 and CH5

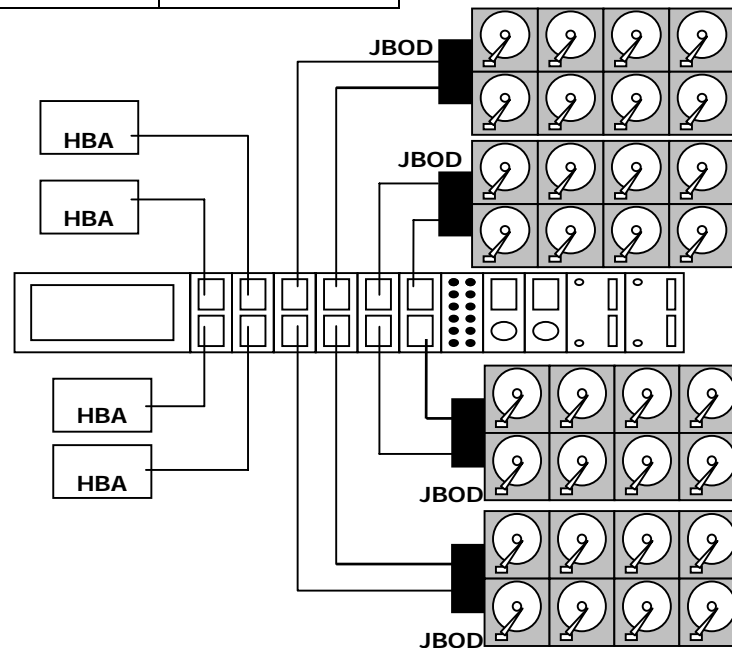


**Figure 4-9:** Possible ER2510FS-6RH configuration, 2 host, 2 drive and 2 dedicated RCC channels

**Example 2:** Two host channels, two drive channels and two drive+ RCC Channels.

Please note, in the example shown in **Figure 4-10** below the channels are configured in the following way.

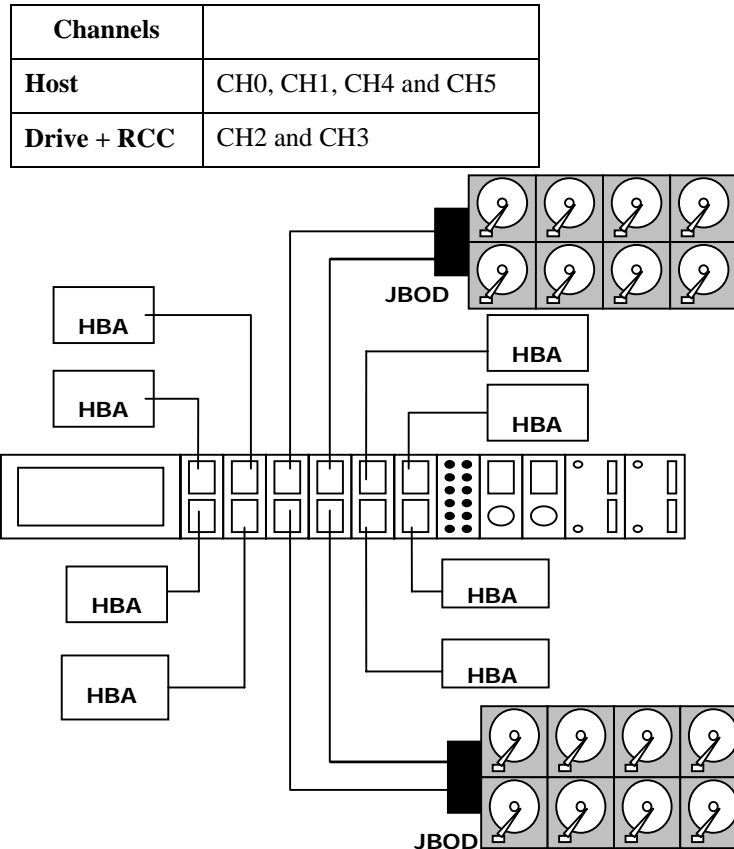
Channels	
Host	CH0 and CH1
Drive	CH2 and CH3
Drive + RCC	CH4 and CH5



**Figure 4-10:** Possible ER2510FS-6RH configuration, 2 host, 2 drive and 2 drive + RCC channels

**Example 3:** Four host channels and two drive channels.

Please note, in the example shown in *Figure 4-11* below the channels are configured in the following way.



**Figure 4-11:** Possible ER2510FS-6RH configuration, 4 host and 2 drive + RCC channels

## 4.7. Power On

Once all the components have been installed in the RAID controller head and both the host and drive channels the hosts and JBODs respectively, the ER 2510FS controller head be powered on.

### 4.7.1 Check List

**BEFORE** powering on the ER 2510FS, please check the following:

- Memory Modules** – Make sure that a DIMM memory module has been installed on all the controllers. If dual-redundant controllers are being used, make certain that the DIMM modules are the same size and speed.

- Controller Modules** – Make sure the controller modules have been properly installed and that the retention screw has been tightened. If a single controller model is being used, make sure the dummy controller canister is installed.
- Dual FAN Cooling Modules** - Make sure that the dual FAN cooling modules have been installed. If a single controller is being installed make sure the dummy cooling FAN module is installed behind the dummy controller canister.
- PSU Modules** – The PSU modules were pre-installed items. Make sure they are properly secured to the controller head.
- Front Panel Modules** – Make sure that all the front panel modules, including the IO Modules, LED module, Maintenance modules, and BBU modules, have been properly installed. In the case of the four channel modules, make sure that two dummy IO modules have been installed. In the case of the single controller module, make sure that one dummy maintenance module and one dummy BBU module have been installed.
- Cable Connections** – Make sure all the cable connections have been properly made. Make sure that host channels have been connected to host computers and the drive channels have been connected to the appropriate JBODs
- Power Cables** – Make sure the power cables have been connected to the PSU modules and plugged into the mains.
- Ambient Temperature** – Make sure all the ER 2510FS components have been acclimated to the surrounding temperature.

## **4.7.2 Power On Procedure**

When powering on the ER 2510FS controller head, please follow these steps.

1. **Power on FC connection devices**

These devices include the hubs, switches and any other such device that has been connected to the ER 2510FS. Please refer to the manual that came with you FC device to see the power on procedure.

2. **Power on JBODs**

The JBODs that have been connected to the ER 2510FS controller head must be powered up first. Please refer to the instruction manual that came with the JBOD to see it's own power on procedure.

3. **Power on the EonRAID controller head**

The EonRAID controller head should only be powered on after all the JBODs and FC connection devices have been powered on first. The power on procedure for the EonRAID controller head is described below.

#### 4. Host Computers

The host computers should be the last devices that are turned on. Please refer to the manual that came with your host computers to see its own power on procedure

### 4.7.3 EonRAID Power On-Procedure

To power on the controller head, turn on the two power switches, on the rear panel of the controller head (see *Figure 4- 1*). The power switches are located on the left side of each PSU module. Each switch controls a single PSU, therefore make sure that both switches are turned on.

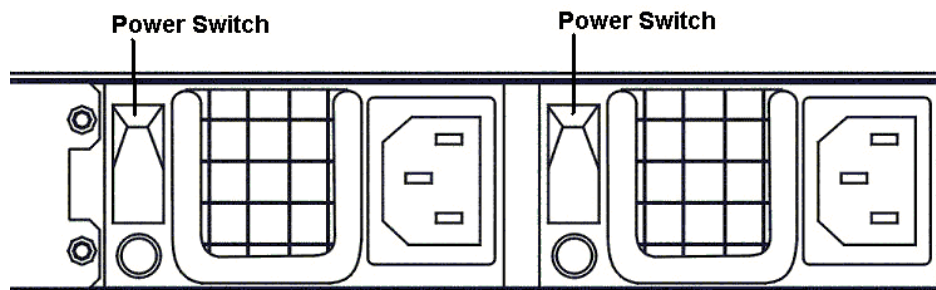


Figure 4- 1: EonRAID Controller Head Power Switches

---

**CAUTION:** Although the PSUs are redundant and a single PSU can provide sufficient power to the system, it is advisable to turn both the power switches on. If only one PSU is operating and fails, the whole system will crash.

---

### 4.7.4 Power On Status Check

Once the EonRAID controller head has been powered on, the status of the entire controller head should be checked to ensure that everything is running smoothly and that there are no complications or malfunctions.

1. **LED Module** – The following LEDs should be checked:
  - ◆ **LCD Module Owner** – If a dual-single or dual redundant model is being used, one of these LEDs should be on indicating which controller information is being shown on the LEDs.
  - ◆ **Controller Ready** – After bootup, if a single controller model is being used only one of these LEDs should be turned on. If a dual-single or dual redundant model is being used then both of these LED modules should be turned on.

- ◆ **Partner Fail** – If a dual redundant controller model is being used, both of these LEDs should be off. If one of these LEDs goes on it indicates that the partner controller has failed.
- 2. **Maintenance Module LED** – If the Ethernet port on the maintenance module has been connected, the Link Status LED should be turned ON.
- 3. **BBU Module** – The BBU Module LED should be turned OFF.
- 4. **Firmware and RAIDWatch** – The overall status of the system may be checked using the pre-installed firmware or the RAIDWatch GUI.
- 5. **Audible Alarm** - If any errors should occur during the initialization process, the onboard alarm should be sounded in a hastily repeated manner.

Drive tray LEDs should normally start flashing, indicating the RAID control units are attempting to access the hard drives.

System firmware supports configuration of a delayed sequence for starting drives. Please consult your Generic Operation Manual for more details.

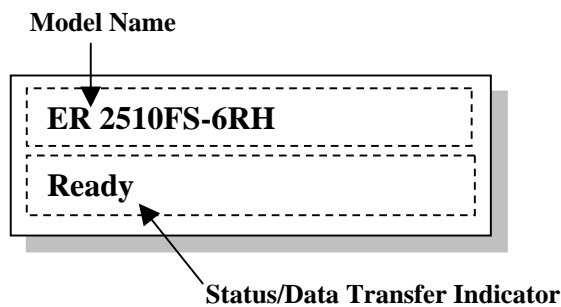
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**NOTE:***The controller head has been designed to run continuously. Even if a component failure occurs the fault can be corrected online.*

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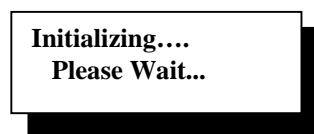
#### 4.7.5 LCD Screen

When Powering On the controller head the following messages should appear on the front panel LCD screen. Wait for the front panel LCD to show “**READY**” or “**No Host LUN**” before the host boots up. Refer to **Figure 4- 2** on how to read the screens.



**Figure 4- 2:** The LCD Start-Up Screen

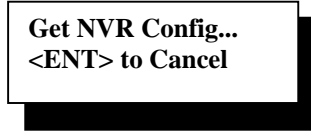
The LCD screen startup sequence is shown and described in the sequence below.



This screen appears when the PSUs are turned on.



This screen appears after the initialization process. It clearly shows the model name.



This screen will only appear if the **SECONDARY** controller has been inserted into the **Controller A** slot.



System is ready.

---

**NOTE**

*If you have purchased a redundant model you will need to set the unique identifier. For more information on setting the unique identifier please refer to **Section 4.6.4**.*

---

## 4.8. Power Off Procedure

If you wish to power down the EonRAID controller head, please follow these steps:

---

**NOTE:** *If you wish to power down the EonRAID controller head, please ensure that no time-consuming processes, like a “logical drive parity” check or a “background scrub,” are running.*

---

1. **Stop IO access to the system**

Use the software that is provided on the host computer to stop all IO accesses to the EonRAID controller head. Please refer to the user manual that came with your host computer.

2. ***Disconnect the host***

The host must be disconnected from the EonRAID controller head. To do this, disconnect the FC cables from both the host and the EonRAID controller head.

3. ***Flush the cache***

Use the “Shutdown Controller” function to flush all cached data. This prepares the EonRAID controller head to be powered down.

4. ***Turn off the power***

Turn off the power switches at the top of the rear panel of the EonRAID controller head. Once the controller head has been powered down, other devices that are connected to the controller head may be powered down.



# Chapter 5: Controller Head Maintenance

## 5.1. Overview

### 5.1.1 About Controller head Maintenance

Constant monitoring and maintenance of the ER 2510FS will minimize the chance of system downtime and preserve the working integrity of the system for a longer period of time. If any of the controller head plug-in modules fails, they must be replaced as soon as possible.

---

**WARNING:**

*Do not remove a failed component from the controller head until you have a replacement on hand. If you remove a failed component without replacing it the internal airflow will be disrupted and the system will overheat causing damage to the controller head.*

---

All the following components can be replaced in case of failure:

1. Controller Modules
2. PSU Modules
3. Dual FAN Cooling Modules
4. Front Panel Modules including IO modules, the LED module, Maintenance modules and the BBU modules.

### 5.1.2 General Notes on Component Replacement

- ◆ With the exception of the RAID controller module in the single and dual-single controller models, all the components on the ER 2510FS, including the PSU modules, dual FAN cooling modules, and front panel modules can be changed while the controller head is still in operation.
- ◆ Qualified engineers who are familiar with the ER 2510FS should be the only ones who make component replacements. If a user is not familiar with the ER 2510FS and not familiar with RAID system maintenance in general, it is strongly advised that they refer ER 2510FS maintenance to a suitably qualified maintenance engineer.
- ◆ Normalized airflow is directly dependent upon the presence of all controller head components. A controller head component, even if failed, should not be removed

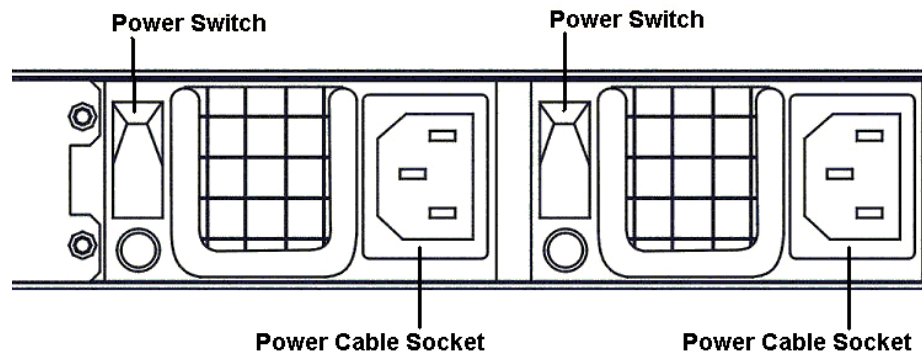
from the controller head until a replacement is readily at hand and can be quickly installed. Removing controller head components without a replacement can lead to permanent controller head damage.

- ◆ When replacing any hot-swappable component, caution should be taken to ensure that the components are handled in an appropriate manner. The manhandling of components can lead to irreparable damage.
- ◆ When removing a controller module from the controller head, ensure that the power has been turned off and that all precautionary measures, without exception, are adhered to. The controller board and the IO board on which it is mounted very sensitive components and can be easily damaged.

## 5.2. Replacing the PSU

The PSUs are preinstalled components and are located at the back of the ER2510FS RAID controller head on the left-hand side. If a PSU fails and needs to be replaced please follow these steps:

**Step 1. Turn off the PSU.** - The power switch is located on the left hand side of the PSU. Once the power switch has been turned off, remove the power cable that connects the controller head to the mains. The power cable socket is found on the right-hand side. See *Figure 5-1*.



**Figure 5-1: PSU switches and cable sockets**

**Step 2. Remove the crossbar** - Both PSUs are secured to an internal rack with a customized crossbar that is threaded through the rear handles of the PSUs. The crossbar is attached to the internal rack with two screws, one on either side. Remove these screws. Once the screws have been taken out, gently slide the crossbar out of the handles of the PSU. See *Figure 5-2*.

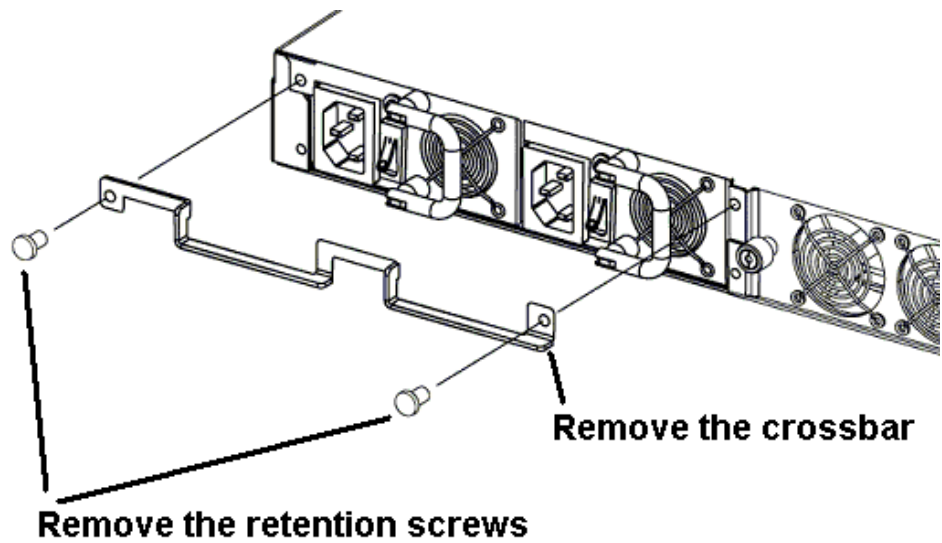


Figure 5-2: Remove the crossbar

**Step 3. Pull the PSU out** - Use the silver handle at the back of the PSU to gently pull the PSU out of the chassis. See *Figure 5-3*.

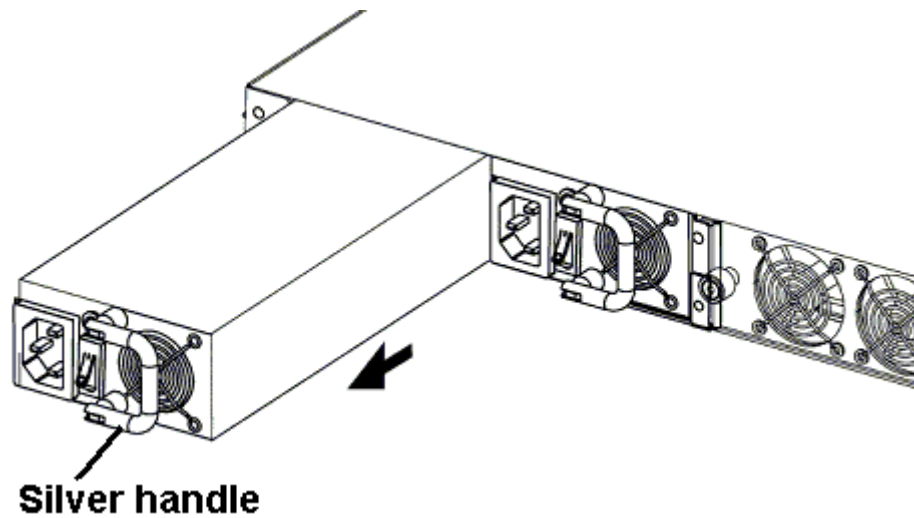
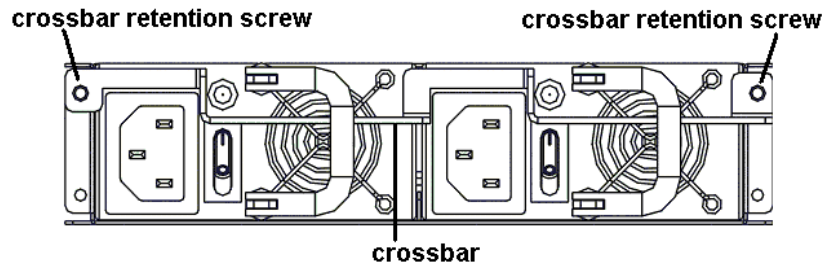


Figure 5-3: Gently pull the PSU out of the Controller Head

**Step 4. Install the new PSU** - Once the faulty PSU has been removed, insert the new PSU into the controller head. Push the PSU into the slot until it clicks into place. To firmly secure the PSUs into place, reinsert the crossbar through the handles and reattach the crossbar to the internal bracket using the screws that were previously removed. See *Figure 5-4*.

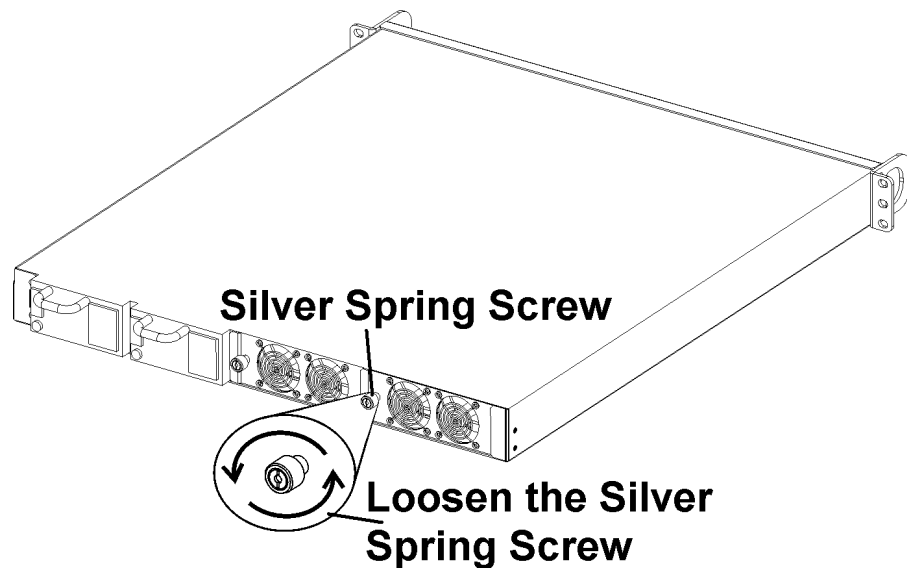


**Figure 5-4:** Insert the new PSU and re-attach the crossbar at the back of the PSUs.

### 5.3. Replacing the Dual FAN Cooling Module

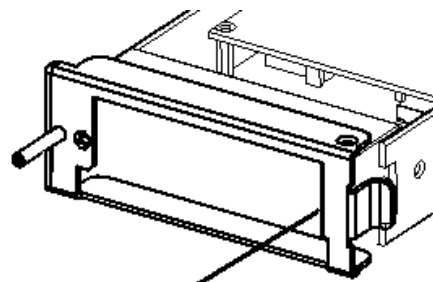
The dual FAN cooling modules are located on the back panel. If they fail they need to be replaced. To replace the cooling FAN module please follow these steps:

**Step 1. Loosen the silver spring screw** – This screw is found on the left-hand side of the cooling FAN module. Turn the screws in an anti-clockwise direction until it is completely loose. Once it is loose the cooling module can be easily slid out of the chassis.



**Figure 5-5:** Loosen the silver spring screw on the left hand side.

**Step 2. Insert the new dual FAN cooling module** - Make sure the small clip on the right-hand side is hooked behind the rear flap of the controller module. (see **Figure 5-6**) on the right-hand side is hooked behind the rear flap of the controller module (see **Figure 5-7**).



**Hook the clip at the back of the FAN behind the rear flap here**

Figure 5-6: Rear Side of the controller Module

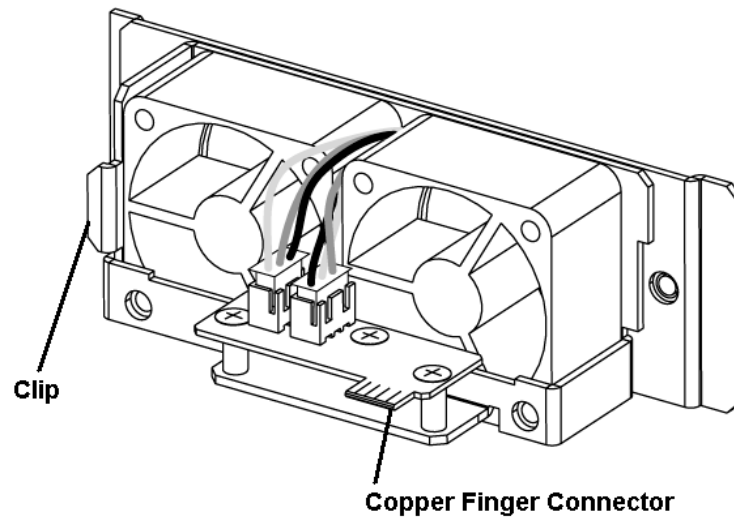


Figure 5-7: Rear view of the cooling FAN Module.

**Step 3. Push the dual FAN cooling module in** - Gently push the rest of the cooling FAN module into the chassis making sure the “Copper Finger Connector” at the back of the Cooling FAN module is firmly inserted into the connector on the controller adapter board.

**Step 4. Tighten the silver spring screw** - To secure the Cooling FAN Module, tighten the silver spring screw on the rear of the dual FAN cooling module. To tighten the spring screw, turn it in a clockwise direction.

## 5.4. Controller Module Maintenance

### 5.4.1 Controller Hot-Swapping

- ◆ **Single Controller** – When the controller module in the single controller ER 2510FS fails it must be replaced. When replacing the controller module it is best to power down the controller head. The power down and power up procedures have been completely described in *Chapter 4*.
- ◆ **Dual-Single models** – If a one of the controllers in the dual-single model fails, it must be replaced. During the controller downtime access to the JBODs controller by the controller will be blocked. When replacing a controller in a dual-single configuration it is not necessary to power down the controller head. Once a new controller is inserted into the controller bay, the firmware will, similar to the dual-redundant models, automatically start the initialization procedure.
- ◆ **Dual-Redundant models** – In the dual-redundant models, if a controller fails the partner controller will take over the entire workload. The failed controller can be hot-swapped. Once the new controller is installed, Firmware will automatically start the initialization procedure.

### 5.4.2 Notes on Controller Module Maintenance

- ◆ The controller modules contain the controller board, memory modules and a host IO board. If either the controller board or the host IO board (that is located beneath the controller board) fails, the entire controller module must be replaced. If only the DIMM module fails and no damage has been caused to either the controller board or the host IO board, it is sufficient to replace the DIMM module.
- ◆ DIMM modules are replaced when they are damaged or if a DIMM module with a larger capacity is required. If a DIMM module is being replaced with one that has a larger capacity, it is recommended that the DIMM module is replaced at a time when data access is least critical.
- ◆ If either the host IO board or the controller board have been damaged but the DIMM module is still operational, the DIMM module can be removed from the failed controller module and installed on the replacement module.
- ◆ When replacing the controller module, it should be remembered at all times that the controller board is one of the most sensitive components in the ER controller head. All previously stipulated safety precautions (see *Chapter 2*) must be strictly adhered to. Failure to adhere to these precautions can result in permanent damage to the controller board, resulting in timely delays for the end user. The same rule applies for the IO board that is mounted on the base of controller module chassis.

- ◆ The controller modules are located in front of the cooling FAN modules and are accessed through the rear panel. Please note that the controller modules are not visible on the rear panel.

### 5.4.3 Removing the controller Module

**Step 1. Remove the cooling FAN module** – The dual FAN cooling module blocks access to the controller module. Therefore, to remove the controller module, the dual FAN cooling module must be removed. To remove the dual FAN cooling module please refer to **Step 1** in **Section 5.3** above. See also **Step 1** in **Figure 5-8** below.

**Step 2. Remove the retention screw** – A retention screw is used to secure the rear flap of the controller module to controller module. This screw is located on the left-hand side and must be removed. See **Step 2** in **Figure 5-8** below.

**Step 3. Open the rear flap** – Once the retention screw has been removed from the rear flap of the controller module, the rear flap must be opened. Opening the rear flap will dislodge the controller module from the chassis. See **Step 3** in **Figure 5-8** below.

**Step 4. Remove the controller module** - Once dislodged, the controller module can be gently pulled out of the controller head. See **Step 4** in **Figure 5-8** below.

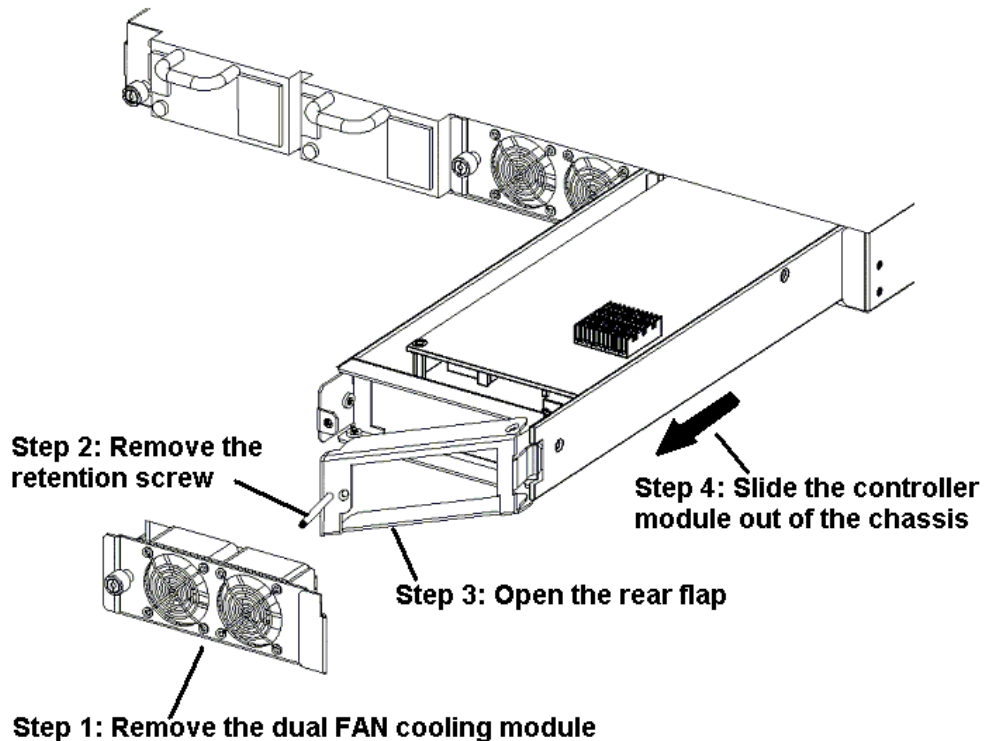


Figure 5-8: Remove the controller module

#### **5.4.4 Removing the DIMM module**

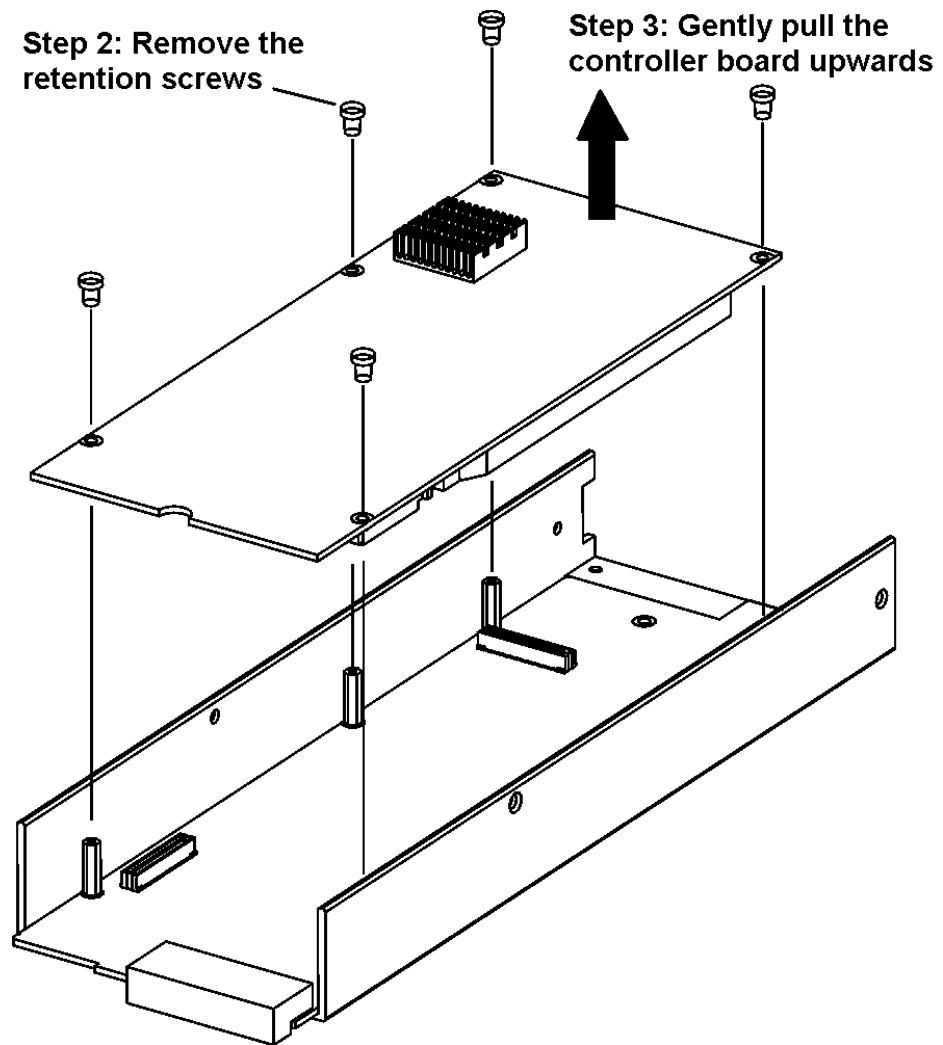
If the DIMM module is either undamaged and will be used on the new controller module or has failed and caused the controller module to failed, it must be removed from the controller module. To remove the DIMM module please follow these steps:

**Step 1. Remove the controller module** – The DIMM module is located in the controller module, to remove the DIMM module the controller module must therefore be removed. To remove the controller module please refer to **Section 5.4.3** above.

**Step 2. Remove the controller board retention screws** – The controller board is located inside the controller module and is mounted on the host IO board. The DIMM module is located between the controller board and the host IO board. Therefore to replace the DIMM module the controller board must be removed. To remove the controller board the five retention screws that secure it to the host IO board must be removed. See **Step 2** in **Figure 5-9** below.

**Step 3. Remove the controller board** – Once the retention screws have been removed, gently pull the controller board in an upward direction disconnecting it from the board-to-board connectors that connect it to the host IO board. See **Step 3** in **Figure 5-9** below.





**Figure 5-9:** Remove the controller board

**Step 4. Remove the DIMM module** – Once the controller module has been removed, gently turn it over and place it on an anti-static surface. Locate the DIMM slot and gently push the white levers on either side of the DIMM module in an outward direction. Opening these levers will dislodge the DIMM module from the slot. If the DIMM module is going to be re-used, place it on an anti-static surface and prepare to install it on the new controller module. If the DIMM module is being replaced, install the new DIMM module now.

#### 5.4.5 Replace/Install the DIMM module

- ◆ **Using a previously used DIMM module on a replacement controller module** - If a controller module is being replaced due to a failed controller board or host IO board, the DIMM module from the damaged controller module, if undamaged itself, can be used. To remove a DIMM module from the controller module please refer to *Section 5.4.4* above.

- ◆ ***DIMM module replacement*** – A DIMM module is replaced when it has either failed or a DIMM module with a larger capacity is required. In either case the DIMM module in the controller module must be removed. To remove a DIMMM module from the controller module please refer to ***Section 5.4.4*** above. Please note that for redundant controller models, if a DIMM module on one controller module is replaced with a DIMM module that has a larger capacity, the DIMM module on the partner controller must also be upgraded.
- ◆ ***Controller Module Replacement*** – If the controller module has failed and the DIMM module from the failed controller will not be used, a new DIMM module must be installed on the replacement controller module. Please note that for redundant controller models, the DIMM module on the new controller module must be equivalent in size and speed to the DIMM module on the already running controller module.
- ◆ ***DIMM Module Replacement/Installation*** – DIMM module installation procedures have been fully described in ***Chapter 2***. Please refer ***Section 2.8*** for complete DIMM module installation instructions.

#### **5.4.6 Controller Module Installation**

- ◆ ***Remove controller module*** - If a controller module has failed due to a failed controller board, failed host IO board, or failed DIMM module, or if a DIMM module is being upgraded, the controller module must be removed from the controller head (see ***Section 5.4.3***).
- ◆ ***Remove DIMM Module*** - If the DIMM module from the old controller module is being used on a new controller module or if the DIMM module is being upgraded, the DIMM module must also be removed (see ***Section 5.4.4***).
- ◆ ***Install DIMM Module*** – Install the DIMM module into the new controller module or, if the DIMM module is being replaced, install the new DIMM module into the controller module (see ***Section 5.4.5***).
- ◆ ***Install the Controller Module*** – Once the DIMM module has been installed on the new controller module or has been upgraded, the controller module must be reinstalled into the controller head. Controller module installation has been completely described in ***Chapter 2***. Please refer to ***Section 2.9*** for complete controller module installation instructions.

## 5.5. Replacing Front Panel Modules

### 5.5.1 The Hot-Swap Mechanism

The hot-swap mechanism shown in *Figure 5-10* is a tool that enables users to efficiently remove front panel modules from the EonRAID chassis. The hot-swap mechanism screws into a reserved location on the top right side of a front panel module and can be used to easily pull the respective module out of the chassis.

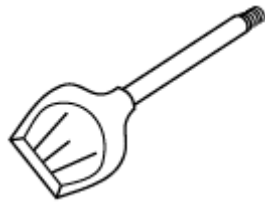


Figure 5-10: Hot-Swap Mechanism

### 5.5.2 Replacing a Failed Front Panel Module

To replace a failed front pane module, please follow these steps:

**Step 1. Locate the failed module** – Prior to replacing a front panel module the failed module must be located.

**Step 2. Disconnect cables** – If an IO module is being replaced, the FC cables (if any) that connected to the IO module must be removed. If a maintenance module is being replaced remove any cables (serial or Ethernet) that have been connected to it.

**Step 3. Remove the Retention Screws** – The front panel modules are secured to the chassis with two retention screws, one at the top and one at the bottom of the left side of the module. Both of these screws must be removed. See *Figure 5-11*.

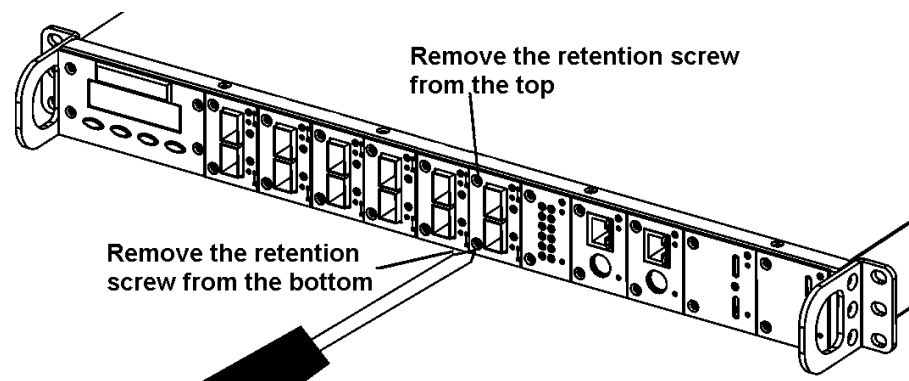
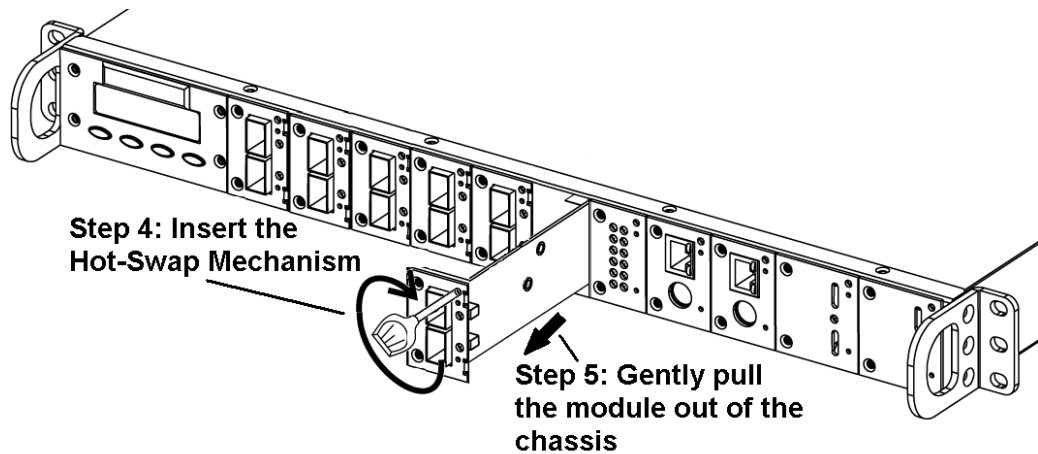


Figure 5-11: Remove front module retention screws

**Step 4. Insert the Hot-swap mechanism.** – Insert the hot-swap mechanism into the reserved screw hole at the top right corner of the front panel module. See *Step 4* in *Figure 5-12* below.

**Step 5. Pull out the Front Panel Module** – Once the hot-swap mechanism has been inserted into the faulty front panel module, gently pull the front panel module out of its slot. See *Step 5* in *Figure 5-12* below.



**Figure 5-12:** Insert the Hot-Swap Mechanism and gently pull the IO Module out of the Front Panel.

**Step 6. Install the replacement module** - Once the failed module has been removed, insert the new module and securely attach it to the front panel by re-inserting the screws. Front panel module installation has been completely described in *Chapter 2*. Please refer to *Section 2.12*.

## 5.6. LCD Panel Failure

LCD Panel failure is an extremely rare occurrence. If this Panel should fail then it is necessary to contact your supplier. Replacement procedures are difficult and we do not recommend that you try to replace it by yourself.

# Chapter 6: Upgrading the Controller Head

## 6.1. Overview

This chapter describes how to upgrade your ER2510FS RAID Controller Head. Upgrade kits for the following Controller Head upgrades are available and have been fully described in *Appendix D*.

<b>From:</b>	ER 2510FS- 4S	<b>To</b>	ER 2510FS- 4D
	ER 2510FS- 4S		ER 2510FS- 4RH
	ER2510FS-4D		ER2510FS-4RH
	ER2510FS-6S		ER2510FS-6D
	ER2510FS-6S		ER2510FS-6RH
	ER2510FS-6D		ER2510FS-6RH

## 6.2. Notes on Model Upgrades

- ◆ **POWER DOWN THE CONTROLLER HEAD** – When upgrading the controller head from one model to another, it is imperative the controller head is powered down. Complete Power down instructions are given in *Chapter 4*.
- ◆ **General Cross References** - When upgrading from one model to another, it may be necessary to remove and install new active components. The removal and installation procedures of these components have been described elsewhere in this manual. Please refer to the list in *Table 6-1* below to locate the relevant sections in the manual:

Component	Installation Reference	Removing Reference
<b>DIMM Module</b>	Section <b>2.8</b>	Section <b>5.5.4</b>
<b>Controller Module</b>	Section <b>2.9</b>	Section <b>5.5.3</b>
<b>Dual FAN Cooling Module</b>	Section <b>2.10</b>	Section <b>5.3</b>
<b>Front Panel Module</b>	Section <b>2.12</b>	Section <b>5.6</b>

**Table 6-1:** Installation/Removal Cross References

## 6.3. LCD Board Jumper Settings

Jumper settings on the LCD board, behind the LCD panel, determine the model name that appears on the LCD screen. The name that appears on the LCD panel will therefore not change automatically when the system is upgraded. The jumper settings need to be changed manually. The LCD board that contains the jumpers can only be accessed if the top cover of the ER 2510FS controller head is removed.

### 6.3.1 Removing the top cover

---

**WARNING:**

*The only time the top cover should ever be removed is when the jumper settings need to be changed. Do not, under any other circumstance, remove the top cover, especially during operation. This may cause severe damage to one or more critical component.*

---

**Step 1. Remove the retention screws** - The top cover is connected to the controller head with 30 retention screws, 24 of these are found at the top (see **Figure 6-1** below) and 6 (3 on either side) are found on the sides. (Please note that four of the retention screws, screws 21 to 24 in **Figure 6-1** below, are used to connect the front panel to the top cover and the chassis.)

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**NOTE:**

*After removing the retention screws, place them in a safe place and be careful not to lose them. You will need to use them again when you replace the top cover.*

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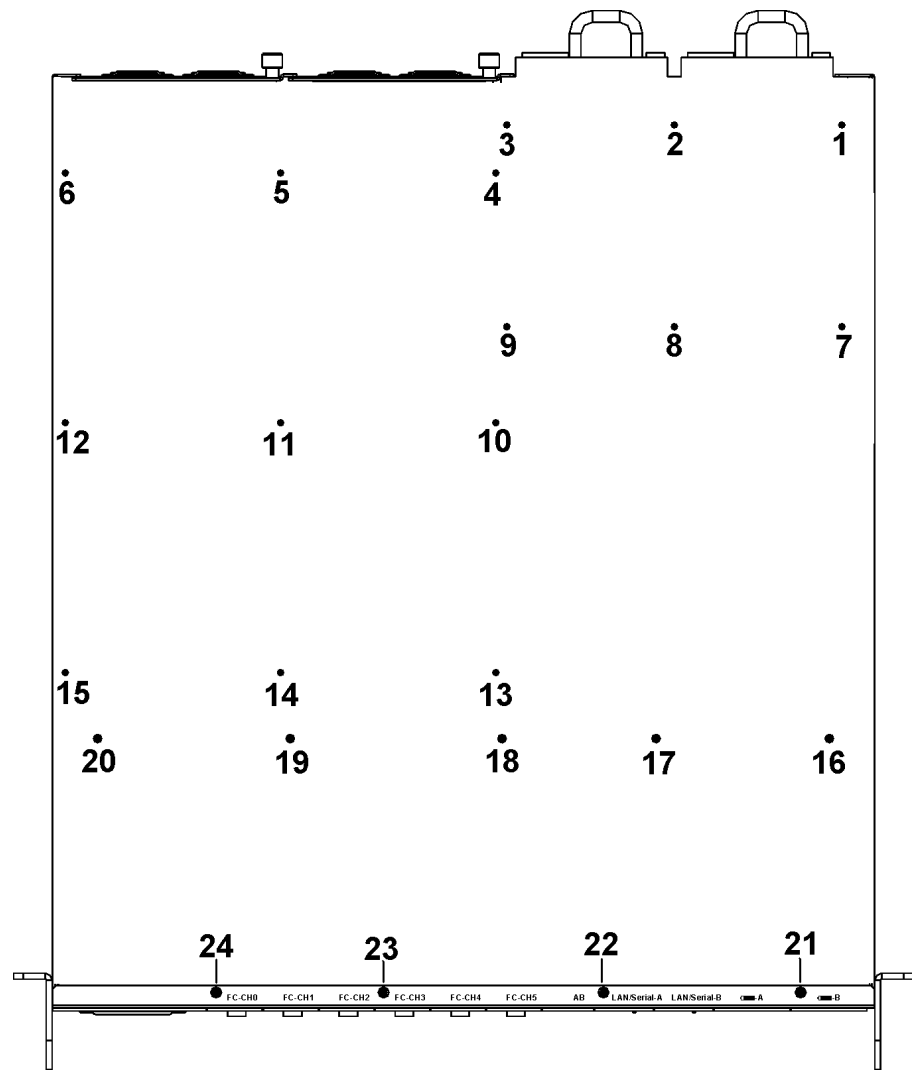


Figure 6-1: Retention Screw Locations

**Step 2. Remove the cover** - Once all the retention screws have been removed, gently slide the cover towards the back. If the cover does not move, check to see that all the retention screws were removed.

### 6.3.2 Changing the Jumper Settings

**Step 1. Locate the LCD Board** - The LCD board can be found at the rear of the LCD Panel. See *Figure 6-2*.

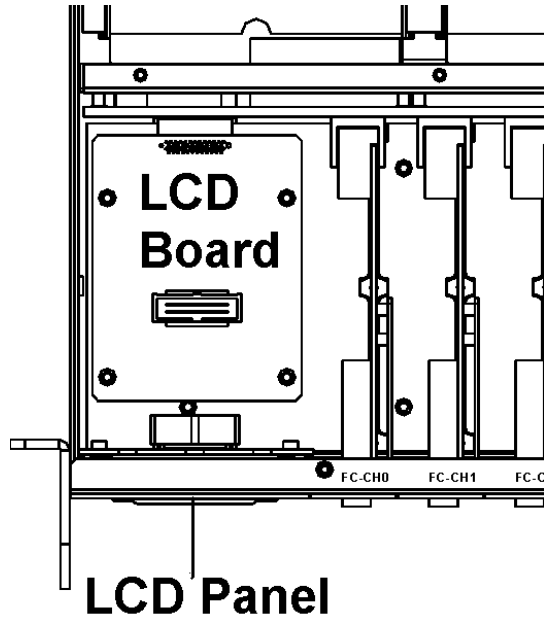


Figure 6-2: LCD Board

**Step 2. Locate JP4 and JP5** - The only jumpers that need to be changed are JP4 and JP5. Both of these jumpers are 2x4 pin pin-header jumpers. The location of these jumpers is shown in *Figure 6-3* below.

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**CAUTION:**

*Do not change Jumper 3 (JP3) setting.*

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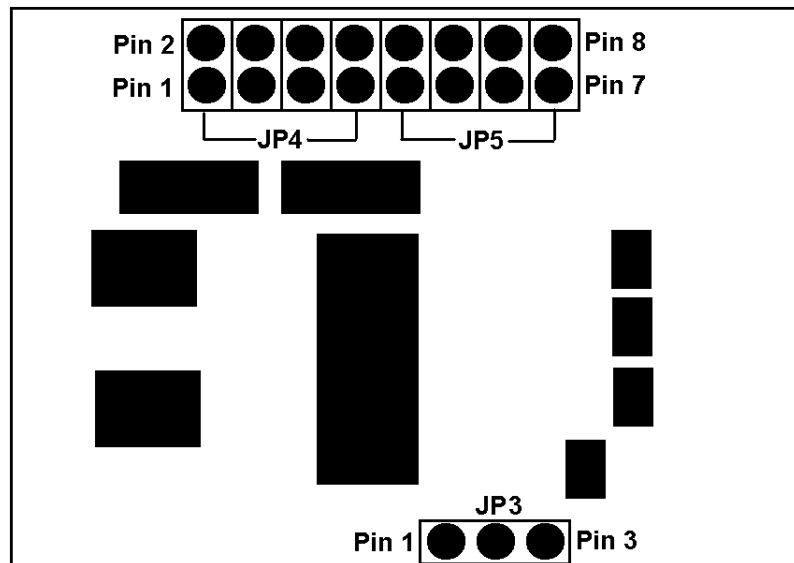


Figure 6-3: LCD board jumper locations

**Step 3. Change the Jumper settings** - The default settings for JP4 and JP5 will correspond to the model you are currently using and generate the current model name on the LCD screen. Refer to the list below to make the appropriate jumper settings.

- ◆ *ER2510FS-6RH* - All jumpers are open.
- ◆ *ER2510FS-4RH* - Pin (5-6) on JP5 are short, the rest are left open.
- ◆ *ER2510FS-6D* - Pin (1-2) on JP5 are short, the rest are left open.
- ◆ *ER2510FS-4D* - Pin (7-8) on JP4 are short, the rest are left open.
- ◆ *ER2510FS-6S* - Pin (5-6) on JP4 are short, the rest are left open.
- ◆ *ER2510FS-4S* - Pin (3-4) on JP4 are short, the rest are left open.

**Step 4. Replace the top cover** - Once the correct jumper settings have been made, the top cover must be replaced. Instructions for replacing the top cover are shown in *Section 6.3.3* below.

### 6.3.3 Replace the Top Cover

**Step 1. Slide the top cover back into place** - Gently place the top cover back on top of the controller head. Make sure that the top cover is correctly oriented with the slightly indented side facing the front.

**Step 2. Line up the retention screw holes** - Make sure that all the retention screws holes are correctly aligned and that it is possible to insert the appropriate retention screws.

**Step 3. Re-insert the retention screws** - Re-insert all 30 retention screws. 24 of these screws should be inserted into the top of the controller head and a further 6, 3 on either side, should be inserted into the sides. The locations of the retention screws on the top of the cover are shown in *Figure 6-1* above.

## 6.4. Front Panel Replacement

### 6.4.1 Front Panel variations

Front panel variations were introduced in Chapter 2. Briefly, the six available models use two front panel variations, **FP-I** and **FP-II**. **FP-I** is able to accommodate both type-1 and type-2 IO modules in slot 0 and slot 1 but, in slot 2 to slot 5, it is only able to support type-1 IO modules. The **FP-II** front panel is only able to use type-2 IO modules in all the slots. Therefore, when users wish to upgrade their controller head, it may be necessary to replace the front panel. Please refer to *Table 6-2* below.

From	To	Front Panel Change
ER 2510FS-4S	ER 2510FS-4D	<b>FP-I to FP-II</b>
ER 2510FS-4S	ER 2510FS-4RH	<b>NONE</b>
ER 2510FS-4D	ER 2510FS-4RH	<b>FP-II to FP-I</b>
ER 2510FS-6S	ER 2510FS-6D	<b>FP-I to FP-II</b>
ER 2510FS-6S	ER 2510FS-6RH	<b>NONE</b>
ER 2510FS-6D	ER 2510FS-6RH	<b>FP-II to FP-I</b>

**Table 6-2:** Panel Replacement

---

**NOTE:**

*The only time it is not necessary to change the front panel during an upgrade is when a single controller model is being upgraded to a dual-redundant controller model. In all other instances the front panel must be replaced.*

---

## 6.4.2 Replacing the Front Panel

- Step 1. Power down the controller head** - Make sure the controller head is completely turned off. The complete power down procedure is described fully in *Chapter 4*.
- Step 2. Disconnect all the cables that are connected to the front panel modules** - These cables may include FC cables connected to the IO ports, Ethernet cables connected to the LAN port or cables connected to the RS-232C serial port.
- Step 3. Remove the Chassis from the cabinet** - It is advisable to remove the chassis from the cabinet when changing the front panel. After the chassis has been removed, place the controller head onto a smooth working surface that will not damage or scratch the chassis.
- Step 4. Remove all the front panel modules** - Remove all the modules from the front panels. These modules include 4 or 6 IO modules, 2 maintenance modules and 2 BBU modules and any front panel dummy IO modules. Front Panel Module removal instructions are completely described in *Section 5.6, Chapter 5*.
- Step 5. Remove the Handles** - If the handles are located at the front of the Chassis, they must be removed. The handles are connected to the sides of the chassis with two screws. These screws (labeled **1** to **4** in *Figure 6-4*) must be removed. Once they are removed the handles will come off. (See *Step 5* in *Figure 6-4* below)
- Step 6. Remove the retention screws** - The front panel is attached to the chassis with 8 screws; four on the top surface and four on the bottom surface. Locate these eight screws (labeled **5** to **12** in *Figure 6-4*) and remove them. (See *Step 6* in *Figure 6-4* below)

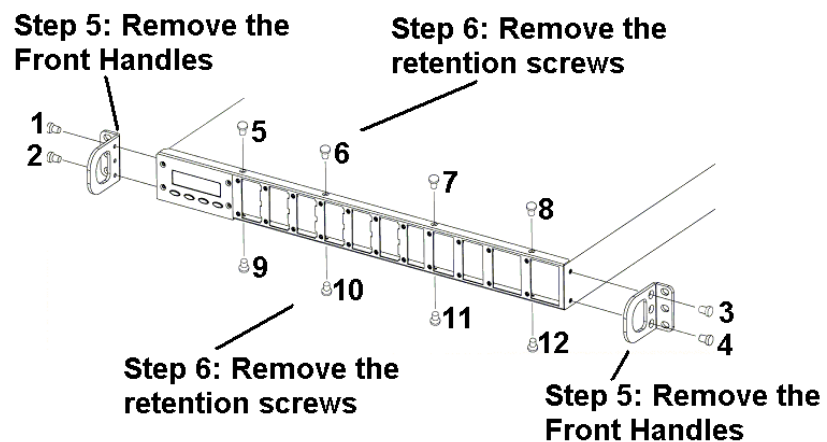


Figure 6-4: Remove the Front Panel Retention Screws

**Step 7. Disconnect the LCD ribbon cable** - Gently slide the front panel off the Chassis and disconnect the ribbon cable that connects the LCD panel to the LCD board.

**Step 8. Install the new front panel** - Re-attach the ribbon cable to the LCD panel on the new front panel. Slide the new front panel onto the chassis and re-insert all eight retention screws. Re-attach the handles and make sure the handles are firmly in place.

**Step 9. Install the front panel modules** - If you are replacing the front panel you will need to install the new IO modules that came with your upgrade kit.

## 6.5. Single Controller Model Upgrades

Single controller models can be upgraded to either dual-single or dual-redundant controller models.

### 6.5.1 Single to Dual-Single Upgrade

When upgrading from a single controller module to a dual-single or dual-redundant controller module, the steps shown below must be followed.

**Step 1. Replace the front panel** - Remove the already installed FP-I front panel and install the new FP-II front panel that came with the upgrade kit. Please refer to *Section 6.4*.

**Step 2. Replace the IO Modules** - Single controller models come with Type-1 IO modules whereas Dual-Single controller models all come with Type-2 IO modules. When from a single to a dual-single subsystem the Type-1 IO modules in the front panel of the single controller module must be replaced with the Type-2 IO modules that came with the upgrade kit.

**Step 3.** Complete the upgrade by following the general procedure outlined in *Section 6.5.2* below.

### 6.5.2 General Procedure

When upgrading from a single controller model to either a dual-single or dual-redundant controller module, the steps shown below must be followed.

**Step 1. Change the LCD board jumper settings** - To change these settings please refer to *Section 6.2* above.

**Step 2. Install DIMM Modules on the second controller Module** - DIMMs must be purchased separately. If you are upgrading to a dual-redundant model the DIMM that you purchase must be the same size and speed as the one already installed on the original controller.

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**NOTE:**

If you have purchased a model with 512MB pre-installed DIMM modules, it is not necessary to install DIMM modules. For more information please refer to **Section 1.1.3 in Chapter 1**.

---

**Step 3. Install the second controller module** - Remove the blank controller module that came with the single controller module and install the new controller module.

**Step 4. Install the cooling FAN module** - A second cooling FAN module must be installed at the rear of the controller module that has just been installed.

**Step 5. Install a second maintenance module** - The single controller module has a blank maintenance module installed in slot 8 of the front panel. The blank maintenance module must be replaced with the maintenance module that came with the upgrade kit.

**Step 6. Install a second BBU module** - The single controller module has a blank BBU module installed in slot 10 of the front panel. The blank BBU module must be replaced with the BBU module that came with the upgrade kit.

If you are upgrading to a dual-redundant model the upgrade procedure is complete. The controller head may be powered back up. If you are upgrading to a dual-single controller module please make sure you have also completed the instructions outlined in the previous section, **Section 6.5.1**.

## 6.6. Dual-Single Controller Model Upgrade

Dual-Single controller models, i.e. the ER 2510FS-4D and ER 2510FS-6D, can be upgraded to Dual-Redundant controller models, i.e. ER 2510FS-4RH or ER 2510FS-6RH.

### 6.6.1 Dual-Single to Dual-Redundant Upgrade

To upgrade from a Dual-Single to Dual-Redundant controller module please follow these steps:

**Step 1. Change the front panel** - Remove the already installed FP-II front panel and install the new FP-I front panel that came with the upgrade kit. Please refer to **Section 6.4**.

**Step 2. Install the new IO modules** - The IO modules that were removed from the enclosure prior to the replacement of the front panel were all Type-2 IO modules. Replace the Type-2 IO modules with the Type-1 IO modules that came with the upgrade kit.

**Step 3. *Install the Dummy IO Modules*** - In the case of the 4-channel controller head, do not forget to install the dummy IO modules.

**Step 4. *Install the Maintenance and BBU modules*** - These four items, the two maintenance modules and the two BBU modules, must also be re-installed into the controller head.

If all these steps have been successfully completed, the upgrade is complete and you can power up the controller head.

# Appendix A: System Features

## A.1. Overview

The ER2510FS RAID Controller Head comes with many different features. Some of these features enhance the performance of the system, other features add configuration flexibility and other features simplify the installation, maintenance and upgrade procedures of the system. This section highlights some of the features of the ER2510FS RAID Controller Head.

## A.2. Flexible Configuration Options

### A.2.1 Six Models

The ER2510FS RAID Controller Head comes in six different models. This provides users with extreme configuration flexibility and enables them to customize their systems to meet their unique and specific needs. Differences between the models include different controller configuration modes, the number of available fibre channels and the IO module type. *Table A-1* lists the four different models and briefly summarizes their differences.

MODELS	CONTROLLER MODE (Controller Model)	FC Channels
ER2510FS-4S	Single controller 1 x IFT5251F-4	4
ER2510FS-6S	Single controller 1 x IFT5251F-6	6
ER2510FS-4D	Dual-Single controllers 2 x IFT5251F-4	8
ER2510FS-6D	Dual-Single controllers 2 x IFT5251F-6	12
ER2510FS-4RH	Dual-Redundant controllers 2x IFT5251F-4	4
ER2510FS-6RH	Dual-Redundant controllers 2x IFT5251F-6	6

Table A-1: ER2510FS Model Variations

### A.2.2 Front Panel Variations

To facilitate the use of two different IO Modules on the front panel two different front panels have been developed.

### **A.2.3 FC Configuration**

All the ER2510FS RAID Controller Heads come with a minimum of four and a maximum of twelve 2Gb/s fibre channels. All the channels can be configured as either host or drive channels. The host channels support point-to-point, fibre switch and fibre channel arbitrated loop (FC-AL) connectivity, and are therefore able to connect to the Host Bus Adapter (HBA) through either a Hub or a Fabric Switch. The drive channels all support both point-to-point and FC-AL connectivity.

## **A.3. Redundant Features**

### **A.3.1 Dual-Active Redundant Controllers**

The ER 2510FS controllers can be configured in a dual-active redundant mode. If one controller fails the other controller will automatically take over the workload of the failed controller and manage the entire storage system. Both the cache writes and configuration data are fully synchronized. Failover and failback operations are completely transparent to the host and IOs are moved between the controllers without any user intervention.

### **A.3.2 Redundant Data Paths**

Dual data paths can be connected to the JBOD enclosure/HBA from the ER2510FS RAID Controller Head. If one data path should fail the data can be transmitted through the alternative data path. Full host side redundancy can be achieved if two host channels are connected to two separate HBAs and then to the Host computer.

## **A.4. Fault Tolerance**

### **A.4.1 Hot-swappable active components**

All the active components; including the controller modules, power supply units (PSU), the IO modules, the battery back up units (BBU), the maintenance modules and the LED modules; are hot-swappable. If any of these components fail, they can be replaced without turning off the system or disrupting the smooth operation of the system.

### **A.4.2 Global and Local Spares**

Both Global and Local (dedicated) spares are supported. The controller(s) will automatically disconnect from a failed drive and start to rebuild data on the spare drive. The spare drive will then replace the failed drive.

### **A.4.3 Hot-Swapping of Drives**

A failed drive in the JBOD storage enclosure can be exchanged without turning off the system or interrupting the smooth operation of the system. Once the failed drive is replaced the data will be rebuilt in the background. Hot-swapping is supported through



the automatic disconnection from a failed drive and the detection of a reserve drive. All these failure recovery procedures are completely transparent to the host.

#### **A.4.4 S.M.A.R.T. Support**

S.M.A.R.T (Self Monitoring Analysis and Reporting Technology) is supported with configurable reaction schemes. Users may select different reaction schemes for immediate prevention against S.M.A.R.T. detected errors. Available options include: detect only, clone and replace, and perpetual clone. A faulty drive can be cloned to an active spare upon the discovery of errors.

#### **A.4.5 Other Fault Tolerant Features**

Other comprehensive failure management features on the ER2510FS RAID Controller Head include:

- ◆ Automatic Bad Block Assignment
- ◆ Background rebuilding
- ◆ Verify-after-Write is supported on normal writes, rebuild writes and/or RAID initialization writes.
- ◆ Regeneration of parity of logical drives in the background.

### **A.5. SAN Features**

#### **A.5.1 Logical Unit Numbers**

Up to 128 Logical Unit Numbers (LUNs) are supported. Each LUN can be mapped to a logical unit (drive or volume). The LUN provides the logical unit with a unique signifier which enables the controllers to identify it.

#### **A.5.2 LUN Masking**

Both the IFT5251F-4 and IFT5251F-6 RAID Controllers support LUN Masking. This enables a specific LUN to be uniquely assigned to a specific host. The host will then only be able to access the LUNs which are assigned to it, all the other LUNs will be “hidden”.

### **A.6. Mechanical Features**

#### **A.6.1 Modular Design**

The modular design of the ER2510FS simplifies the installation process and makes these systems easy to upgrade and maintain. All the active components are modular and are therefore easy to replace.

## **A.6.2 Hot-swap mechanisms**

Special hot-swap mechanisms have been designed to facilitate the easy removal and replacement of the hot-swappable active components.

## **A.6.3 Cableless Design**

All the active components are cableless. This simplifies the installation of the system. Users do not have to be concerned with connecting any cables.

## **A.6.4 Slide rails and support handles**

Both support slide rails and support handles can be used to mount the system into a standard Cabinet. The slide rails and handles ensure simplified installation and solid support.

## **A.6.5 Dummy Canisters and Brackets**

The ER2510FS comes in four different models. Some of these models come with only four IO modules and one controller module. To ensure the smooth running of these systems, dummy canisters and brackets have been designed. Once installed, these dummy canisters and brackets will ensure that the air impedance within the chassis is properly regulated and the system cooled sufficiently.

# Appendix B: Hardware Specifications

## B.1. Overview

Unless specified, the Hardware Specifications listed in this appendix apply to all the ER2510FS models.

## B.2. Technical Specifications

Specification	Feature
<b>Environmental</b> <i>Humidity</i> <i>Temperature</i> <i>Altitude</i>	10 ~ 95% 5 - 44°C Up to 40 000 ft
<b>Power Requirements</b> <i>Input Voltage</i>  <i>Frequency</i> <i>Power Consumption</i>	+ 100V ~ + 240V AC (auto-switching) 47 – 63Hz 100V ~ 120V, 6A 200V ~ 240V, 3A
<b>Dimensions</b> <i>Height</i> <i>Width</i> <i>Length</i> <i>Weight</i>	1U (4.8 mm) 427 mm 480 mm 20Kg (with package)
EMI/EMC	FCC Class-A / CE / UL
Safety Requirements	UL60950
<b>Shock</b> (Non-Operating) <i>Half Sine</i> <i>Square</i>	71G, 2ms (6 shocks) 40G, 166 in/s (6 shocks)
<b>Vibration</b> (Non-Operating, 3 hrs in each plane) <i>Sine</i> <i>Random</i>	5~500Hz, 0.6G (zero to peak) 5~500Hz, 2.0Grms (zero to peak)

## B.3. Controller Specifications

### B.3.1 Configuration

Specification	Feature
RAID Levels	0, 1(0 + 1), 3, 5, 10, 30, 50, JBOD, and Non-RAID disk spanning
Host O/S Compatibility	Host O/S Independent
Fibre Channels	Up to 12 (Dual Single Model)
Host Interface	1Gb or 2Gb FC-AL or Fabric Switch
Host Channels	All channels can be configured as host or drive.
Drive Interface	1Gb or 2Gb FC-AL
Drive Channels	All channels can be configured as host or drive channel
Cache Mode	Write-through or write-back
Cache Memory	Up to 1GB SDRAM with/without ECC, Register
Number of LUNs	Upto 32 per SCSI ID
Multiple Target ID's/host Channel	Yes
Aliases for target IDs	Yes
Firmware on Flash Memory	Yes
Drive Hot-swapping	Yes
Controller Hot-swapping	Yes (redundant controller models only)

### B.3.2 Architecture

Specification	Feature
Dimensions (W x L)	3.85 inches x 9.35 inches
CPU	400MHz PowerPC 750CXe
Fibre Controllers	Qlogic ISP2312
DIMM Slot	One 168 pin DIMM module
PC-133 Support	Yes
ASIC	Infortrend 64-bit chipset
Flash ROM	32Mbit (4MB)
NVRAM	32Kb with RTC
Hardware XOR	Yes
I/O Channel Bandwidth	1 – 2Gb/s
Real-Time Clock	For Event Messages with time record

### B.3.3 Environmental Specifications

Specification	Feature
Input Voltage	+5V DC +12V DC
Power Consumption <b>IFT5251F-4</b> <i>Full Loading</i> <i>Idle</i> Power-up	6A 4A 4.5A
<b>IFT5251F-6</b> <i>Full Loading</i> <i>Idle</i> <i>Power-up</i>	6.6A 4.3A 4.8A
MTBF (under 40°C)	> 300 000 hours ( for IFT5251F-4) > 280 000 hours ( for IFT5251F-6)
Operating temperature	5 – 44°C
Relative Humidity	10 ~ 95% non-condensing
Altitude	0 – 40 000ft

### B.4. RAID Management

Specification	Feature
Performance Monitoring	Yes
Remote Control and monitoring	Yes
Event Broadcast/Alert	Yes (via Java-based RAIDWatch manager and Event Monitor)
Event Notification	Yes (Via RAIDWatch's sub-module, NPC)
Hardware Connection	In-band over Fibre, Ethernet, or RS-232C
Configuration on Disk	Configuration Data stored on disks for logical drive assemblies to exist after controller replacement.
Failure Indicator	Via Alarm, LCD Panel, RAIDWatch Manager, or terminal emulation.

## B.5. Fault Tolerance Management

<b>Specification</b>	<b>Feature</b>
Drive S.M.A.R.T Support	Yes (with user-configurable detect only, clone and replace and perpetual clone functions).
Battery Back-up option	Yes
S.E.S. support	Yes
ISEMS (Infortrend Simple Enclosure Management Service) via I <sup>2</sup> C interface	Yes
Automatic Drive Failure Detection	Yes
Automatic rebuild on spare drives	Yes
Regenerate Logical drive parity	Yes
Bad block re-assignment	Yes
Automatic rebuild upon failed drive replacement	Yes
Manual Clone of suspected failed drive	Yes
Concurrent Rebuild on Multiple drive in a RAID (0 + 1) logical drive	Yes
Salvage the 2 <sup>nd</sup> temporary failed drive in a RAID 1, 3 or 5 logical drive	Yes
Salvage the 1 <sup>st</sup> temporary failed drive in a RAID 0 logical drive	Yes

## B.6. Cooling Fan Specifications

**NOTE:**

*The specifications given below are for an individual fan contained within the cooling FAN module and not for the entire cooling FAN module.*

Specification	Feature
Rated Voltage	12V DC
Operating Voltage Range	5 – 13.8V DC
Starting Voltage	5V DC
Rated Speed	8200RPM ± 1000RPM
Air Delivery	10.8CFM
Static Pressure	0.27 Inch-H <sub>2</sub> O
Rated Current	0.13A
Rated Power	1.6W
Noise Level	27.5 dB (A)
Direction of Rotation	Counterclockwise if viewed from the front blade
Operating Temperature	-10° to +70°C
Weight	30g

## B.7. Power Supply Specifications

### B.7.1 Input Characteristics

Input Characteristics	
Specification	Feature
Voltage	100 – 240 VAC Full Range
Frequency	47 – 63 Hz
Input Current	3.0 A (RMS) for 230 VAC 6.0 A (RMS) for 115 VAC
Inrush Current	50.0 A Max. for 115 VAC 80.0 A Max. for 230 VAC Per Module

### B.7.2 Other PSU Specifications

Other PSU Specifications	
Temperature Range	0°C ~ 40°C (operating) -20°C ~ 60°C (non-operating)
Hold Up Time	16 ms Minimum at Full Load & Normal Input Voltage
Efficiency	65% (minimum)
Power Good Signal	ON delay 100 ms ~ 500ms OFF delay 1ms
Isolation	Built-in In Power Module
Power Factor correction	Reduces line harmonic current in accordance with the EN61000-3-2 and JETI MITI standards.
Cooling	One Fan rated at 10 CFM minimum Chassis Cooling
On/Off Control	Remote
Dimensions	290 (D) x 188.2 (W) x 41 (H) mm

### B.7.3 PSU Protective Features

PSU Protective Features	
Over Current Protection	<b>For:</b> +5, +3.3 and +12 VDC <b>Conditions:</b> - 100/240VAC <b>Limit:</b> - output current is over to 110% - 140%
Over Voltage Protection	+5V 5.6 ~ 6.5V +3.3V 3.8 ~ 4.3V +12V 13.6 ~ 15.6V
Short Circuit Protection	Shut down
Safety	UL 1950 CSA 22.2 No/950 TUV IEC 950
Warning Alarms	Audio Alarms LED Power Fault Signal



# Appendix C: Packaging

## C.1. Overview

The items that come with your controller head arrive in a single packaging container that contains two separate boxes (an upper box and a lower box).

- ◆ **Accessory box:** – The accessory box is the upper box that will contain all the components that need to be installed, the 22 x screws for attaching these components, the cables necessary for connecting these components and a power cord. The contents of this box will depend on the model you have ordered please refer to the table below.
- ◆ **Enclosure box:** – The enclosure box is the lower box that will contain the RAID Controller Head Chassis with all the pre-installed components. These components include the PSU's, the Mid-Plane, the Front Panel, the LCD board and the LCD module. The pre-installed components will vary according to the model you have ordered.

Please go through the following checklist to make sure your package contains all the necessary items for the model you have purchased.

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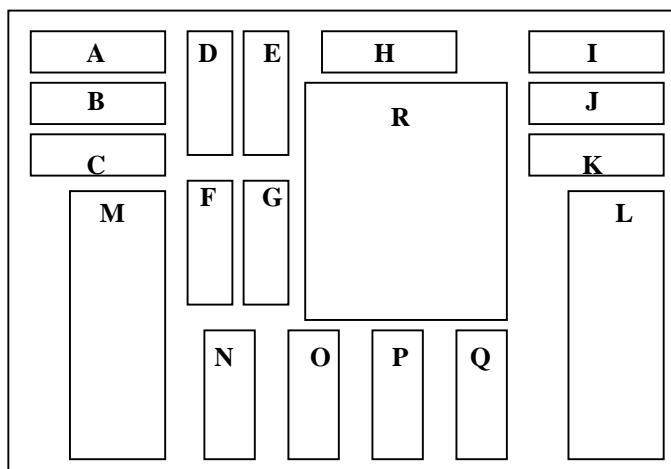
### WARNING

*Please make sure that when your system arrives you have all the following components in the two boxes.*

---

## C.2. Upper Box

*Figure C.1* shows a schematic diagram of the location of the items in the upper box. Please refer to the table below to see what each item is.



*Figure C-1: Layout of items in the upper box.*

	Item		Item
<b>A</b>	FC-CH0	<b>B</b>	FC-CH1
<b>C</b>	FC-CH2	<b>D</b>	FC-CH3
<b>E</b>	FC-CH4	<b>F</b>	FC-CH5
<b>G</b>	LED Module	<b>H</b>	LAN-Serial – A
<b>I</b>	LAN-Serial – B	<b>J</b>	Battery A
<b>K</b>	Battery B	<b>L</b>	Controller Module A
<b>M</b>	Controller Module B	<b>N</b>	Power Cord
<b>O</b>	RS-232 Cable	<b>P</b>	RS-232 Cable
<b>Q</b>	Power Cord	<b>R</b>	Manual & accessories

*Table C-1: Description of items shown in figure C-1.*

## C.3. Container Contents for Each Model

### C.3.1 ER2510FS-4S

*Accessory box :*

- ◆ 1 Controller module (with fan module attached)
- ◆ 1 Dummy controller canister (with dummy fan module attached)
- ◆ 4 Type-1 IO modules
- ◆ 2 Dummy IO module covers
- ◆ 1 LED module
- ◆ 1 Maintenance module
- ◆ 1 Dummy maintenance module canister
- ◆ 1 BBU module
- ◆ 1 Dummy BBU module canister
- ◆ 2 Power cords
- ◆ 1 Serial port cable
- ◆ 1 Null modem
- ◆ 2 Hot swap mechanisms
- ◆ 22 screws
- ◆ 1 CD with hardware and generic manuals

*Enclosure box :*

- ◆ 1 Controller head chassis
- ◆ 2 PSUs (pre-installed)

### C.3.2 ER2510FS-6S

*Accessory box :*

- ◆ 1 Controller module (with fan module attached)
- ◆ 1 Dummy controller canister (with dummy fan module attached)
- ◆ 6 Type-1 IO modules
- ◆ 1 LED module
- ◆ 1 Maintenance module
- ◆ 1 Dummy maintenance module canister
- ◆ 1 BBU module
- ◆ 1 Dummy BBU module canister
- ◆ 2 Power cords
- ◆ 1 Serial port cable
- ◆ 1 Null modem
- ◆ 2 Hot swap mechanisms
- ◆ 22 Screws
- ◆ 1 CD with hardware and generic manuals

*Enclosure box :*

- ◆ 1 Controller head chassis
- ◆ 2 PSUs (pre-installed)

### C.3.3 ER2510FS-4D

*Accessory box :*

- ◆ 2 Controller modules (with fan modules attached)
- ◆ 4 Type-2 IO modules
- ◆ 2 Dummy IO module covers
- ◆ 1 LED module
- ◆ 2 Maintenance modules
- ◆ 2 BBU Modules
- ◆ 2 Power cords
- ◆ 2 Serial port cables
- ◆ 2 Null modems
- ◆ 2 Hot swap mechanisms
- ◆ 22 Screws
- ◆ 1 CD with hardware and generic manuals

*Enclosure box :*

- ◆ 1 Controller head chassis
- ◆ 2 PSUs (pre-installed)

### **C.3.4 ER2510FS-6D**

*Accessory box :*

- ◆ 2 Controller modules (with fan modules attached)
- ◆ 6 Type-2 IO modules
- ◆ 1 LED module
- ◆ 2 Maintenance modules
- ◆ 2 BBU modules
- ◆ 2 Power cords
- ◆ 2 Serial port cables
- ◆ 2 Null modems
- ◆ 2 Hot swap mechanisms
- ◆ 22 screws
- ◆ 1 CD with hardware and generic manuals

*Enclosure box :*

- ◆ 1 Controller head chassis
- ◆ 2 PSUs (pre-installed)

### **C.3.5 ER2510FS-4RH**

*Accessory box :*

- ◆ 2 Controller modules (with fan modules attached)
- ◆ 4 Type-1 IO modules
- ◆ 2 Dummy IO module covers
- ◆ 1 LED module
- ◆ 2 Maintenance modules
- ◆ 2 BBU modules
- ◆ 2 Power cords
- ◆ 1 Y-cable (two PS/2 to one DB-9 male)
- ◆ 1 Null modem
- ◆ 2 Hot swap mechanisms
- ◆ 22 Screws

- ◆ 1 CD with hardware and generic manuals

*Enclosure box :*

- ◆ 1 Controller head chassis
- ◆ 2 PSUs (pre-installed)

### **C.3.6 ER2510FS-6RH**

*Accessory box :*

- ◆ 2 Controller modules (with fan modules attached)
- ◆ 6 Type-1 IO modules
- ◆ 1 LED module
- ◆ 2 Maintenance modules
- ◆ 2 BBU modules
- ◆ 2 Power cords
- ◆ 1 Y-cable (two PS/2 to one DB-9 male)
- ◆ 1 Null Modem
- ◆ 2 Hot swap mechanisms
- ◆ 22 screws
- ◆ 1 CD with hardware and generic manuals

*Enclosure box :*

- ◆ 1 Controller head chassis
- ◆ 2 PSUs (pre-installed)

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# Appendix D: Upgrade Kits

## D.1. Overview

The ER2510FS series comes in six different models (see Chapter 1). If you wish to upgrade your system you can purchase an upgrade kit that will enable you to upgrade to a model that will suit your new needs. Instructions on how to upgrade your current model are given in Chapter 7. Please refer to these instructions to see how to upgrade your system.

## D.2. Upgrade Kits

There are six different upgrade kits. Please refer to the *Table D-1* below to see which upgrade kit you require.

Upgrade Kit	From	To
IFT-9560UP4S4D	ER2510FS-4S	ER2510FS-4D
IFT-9560UP4S4RH	ER2510FS-4S	ER2510FS-4RH
IFT-9560UP4D4RH	ER2510FS-4D	ER2510FS-4RH
IFT-9560UP6S6D	ER2510FS-6S	ER2510FS-6D
IFT-9560UP6S6RH	ER2510FS-6S	ER2510FS-6RH
IFT-9560UP6D6RH	ER2510FS-6D	ER2510FS-6RH

**Table D-1: Available Upgrade Kits**

## D.3. Upgrade Kit Contents

### D.3.1 IFT-9560UP4S4D

Used to upgrade from an ER2510FS-4S to an ER2510FS-4D

- One FP-II Front Panel
- One spare controller canister (for 4 channel model)
- One cooling FAN module
- One Maintenance module
- One BBU module
- One Series Port Cable (PS/2 to DB9)
- One Null Modem

### D.3.2 IFT-9560UP4S4RH

Used to upgrade from an ER2510FS-4S to an ER2510FS-4RH

- One spare controller canister (for the 4 channel model)
- One cooling FAN module
- One Maintenance module
- One BBU module
- One Series Port Y-Cable (two PS/2 to DB-9)

### D.3.3 IFT-9560UP4D4RH

Used to upgrade from an ER2510FS-4D to an ER2510FS-4RH

- One **FP-I** Front Panel
- Four Type 1 Channel IO Boards (for CH0, CH1, CH2, and CH3).
- One Series Port Y-Cable (two PS/2 to DB-9)



#### **D.3.4 IFT-9560UP6S6D**

Used to upgrade from an ER2510FS-6S to an ER2510FS-6D

- One **FP-II** Front Panel
- One spare controller canister (for 6 channel model)
- One cooling FAN module
- One Maintenance module
- One BBU module
- One Series Port Cable (PS/2 to DB-9)
- One Null Modem

#### **D.3.5 IFT-9560UP6S6RH**

Used to upgrade from an ER2510FS-6S to an ER2510FS-6RH

- One spare controller canister (for the 6 channel model)
- One cooling FAN module
- One Maintenance module
- One BBU module
- One Series Port Y-Cable (two PS/2 to DB-9)

#### **D.3.6 IFT-9560UP6D6RH**

Used to upgrade from an ER2510FS-6D to an ER2510FS-6RH

- One **FP-I** Front Panel
- Six Type 1 Channel IO Boards (for CH0, CH1, CH2, CH3, CH4, and CH5).
- One Series Port Y-Cable (two PS/2 to DB-9)

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# Appendix E: Spare Parts and Accessories

## E.1. Overview

All the active components in the ER2510FS Controller Head can be replaced. If any of these components fail then they can, if configured in a fully redundant mode, be hot-swapped. There are also a number of different spare parts for the ER2510FS Controller Head that can be ordered separately. This Appendix lists the model names for the different components and spare parts. If you need to order individual parts please use these model names.

## E.2. Spare Parts

The active components and their model names are listed in **Table E-1** below.

<b>Model Name</b>	<b>Description</b>
IFT-9560-IOLCD	ER2510FS LCD Board
IFT-9560-IO1	ER2510FS Type-1 Channel IO Module
IFT-9560-IO2	ER2510FS Type-2 Channel IO Module
IFT-9560-IOLED	ER2510FS LED Module
IFT-9560-IOMT	ER2510FS Maintenance Modules
IFT-9560-IOBT	ER2510FS BBU Module
IFT-9560-CTMod-4	ER2510FS Spare Controller Module for 4 channel model. Contains one 4 channel controller (IFT-5251F-4), one 4 channel controller adapter board (IFT-9560-CAB4)
IFT-9560-CTMod-6	ER2510FS Spare Controller Module for 6 channel model. Contains one 6 channel controller (IFT-5251F-6), one 6 channel controller adapter board (IFT-9560-CAB6)
IFT-9560-LCDMod	ER2510FS LCD Module
IFT-9560-PSU	ER2510FS PSU
IFT-9560-FanMod	ER2510FS FAN Module. Contains two individual fan units (IFT-9560-Fan).

**Table E-1: Spare Parts**

### E.3. Accessories

The accessories and their model names are listed in *Table E-2* below.

Model Name	Description
IFT-9560Scab	Serial Port Cable (PS/2 to DB-9 male), for Single/Dual-Single controller use.
IFT-9560Ycab	Serial Port Y-Cable (two PS/2 to DB-9 male), for Redundant controller use.
IFT-9253L18	18" Slide Rail
IFT-9011	Null Modem

**Table E-2: Accessories**

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# Appendix F: Pin Outs

## F.1. SFP Connector Pin Outs

The pin outs on an SFP connector are shown in *Figure F-1* and their definitions are given in *Table F-1*.

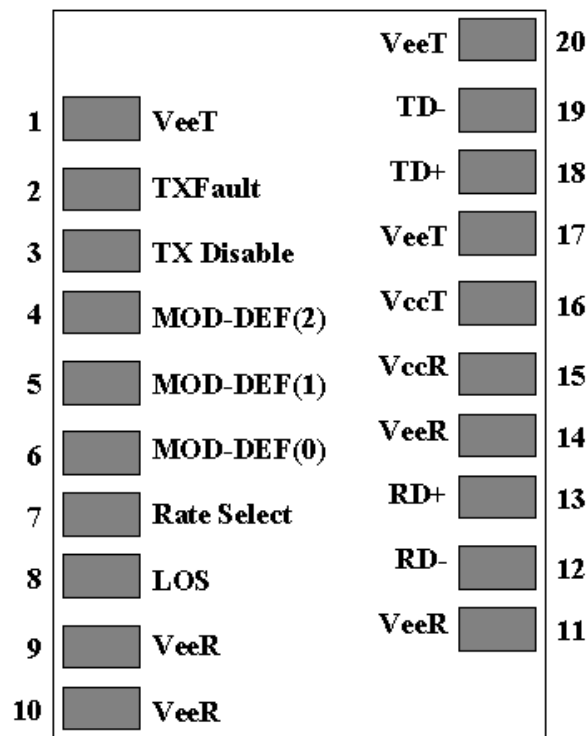


Figure F-1: SFP Socket Pin Outs

<b>Pin</b>	<b>Pin Name</b>	<b>Pin Description</b>
1	V <sub>EET</sub>	Transmitter Ground (Common with Receiver Ground)
2	T <sub>FAULT</sub>	Transmitter Fault. Not supported
3	T <sub>DIS</sub>	Transmitter Disable. Laser output disabled on high or open.
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID.
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID.
6	MOD_DEF(0)	Module Definition 0. Grounded within the module.
7	Rate Select	No connection required
8	LOS	Loss of signal indication. Logic 0 indicates normal operation.
9	V <sub>EER</sub>	Receiver Ground (Common with Transmitter Ground)
10	V <sub>EER</sub>	Receiver Ground (Common with Transmitter Ground)
11	V <sub>EER</sub>	Receiver Ground (Common with Transmitter Ground)
12	RD-	Receiver inverted DATA out. AC coupled
13	RD+	Receiver Non-inverted DATA out. AC coupled
14	V <sub>EER</sub>	Receiver Ground (Common with Transmitter Ground)
15	V <sub>CCR</sub>	Receiver Power Supply
16	V <sub>CCT</sub>	Transmitter Power Supply
17	V <sub>EET</sub>	Transmitter Ground (Common with Receiver Ground)
18	TD+	Transmitter Non-Inverted DATA in. 100 ohm termination between TD+ and TD-, AC Coupled thereafter.
19	TD-	Transmitter inverted DATA in. See TD+
20	V <sub>EET</sub>	Transmitter Ground (Common with Receiver Ground)

**Table F-1: SFP connector Pin Out Definitions**



## F.2. PS2 Pinouts -D-Sub (DB9) Pinouts (1 to 1)

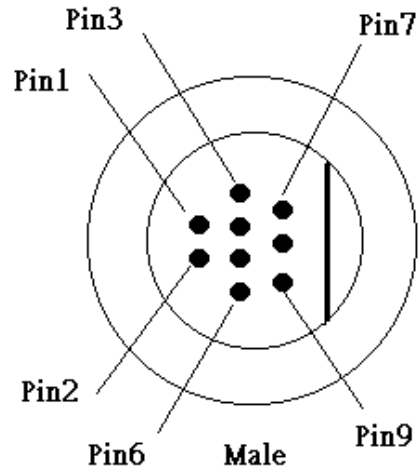


Figure F-2: PS/2 Pin Outs

Pin	Pin Name
1	DCD1
2	COM_RX
3	COM_TX
4	DTRI
5	DSRI
6	RTSI
7	CTSI
8	RII
9	GND

Table F-2: PS/2 Pin Outs

### F.3. LAN pin out

<b>Pin</b>	<b>Pin Name</b>	<b>Pin</b>	<b>Pin Name</b>
<b>1</b>	<b>LAN_TXP</b>	<b>7</b>	<b>LAN_RXP</b>
<b>2</b>	<b>LAN_TXN</b>	<b>8</b>	<b>LAN_RXN</b>
<b>3</b>	<b>CT</b>	<b>9</b>	<b>Pull High for Pin 10</b>
<b>4</b>	<b>N1</b>	<b>10</b>	<b>LAN_LEDG (Link OK)</b>
<b>5</b>	<b>N1</b>	<b>11</b>	<b>Pull-High for Pin12</b>
<b>6</b>	<b>CT</b>	<b>12</b>	<b>LAN_LEDY (Data transfer)</b>

**Table F-3: LAN Pin Outs**

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# Index

---

## --A--

active-to-active, 4-11  
active-to-standby, 4-11  
audible alarm, 1-22, 3-1, 3-7, 3-11  
battery, 1-16

## --B--

BBU module, 1-16, 3-6  
bypass circuit, 1-11

## --C--

cabinet, 2-2, 2-19  
cable connections, 4-16  
cable requirements, 2-2  
cache flush, 4-20  
cache, 4-8, 4-11  
channel mode, 4-12  
component check, 2-1  
controller head, 1-1, 1-3, 1-21, 2-1, 3-8  
controller module installation, 2-11  
controller module location identification,  
2-7  
controller module, 1-18, 2-11, 5-1, 5-7  
controllers, 1-7, 1-15, 1-16, 1-18  
copper cables, 4-1  
Copper Finger Connector, 2-15, 5-5  
crossbar, 5-2

## --D--

DIMM module, 2-11  
dual data paths, A-2  
dual FAN cooling module, 1-19, 1-21, 2-11,  
2-14, 5-1, 5-4  
dual redundant, 1-2, 1-10, 1-15, 1-16  
dual-active, A-2  
dual-single, 1-2, 1-10, 1-15, 4-8  
dummy canister, 2-11, 2-16

## --E--

ECC, 2-8  
electronic noise, 4-3  
electrostatic discharge, 2-1  
environmental parameters, 3-6  
EonRAID Power On-procedure, 4-17  
ESD, 2-1  
Ethernet link, 1-22  
Ethernet port, 1-6  
external bypass function, 1-11

## --F--

fabric switch, 4-3  
fabric, 4-3  
failback, A-2  
failover software, 4-4  
failover, A-2  
FAN module, 1-19  
FC cables, 2-1  
FC speed selection jumper, 2-15  
FC-AL, 1-18, 4-3, 4-4, A-2  
features, A-1  
fibre channels, A-2  
fibre switch, 1-18, A-2  
fibre-to-fibre topologies, 4-1  
fibre-to-fibre, 1-18  
firmware, 1-22, 3-1  
front panel module, 2-6  
front panel variations, 6-6  
front panel, 1-1, 1-3, 1-5, 1-6, 1-7, 2-16

## --G--

Generic Operation Manual, 3-7  
GUI, 1-15, 1-22, 2-2

## --H--

handles, 2-19, 2-20  
HBA, 2-2, 2-44, A-2

hot-swap mechanism, 5-11, A-4  
hot-swappable components, 1-22  
hot-swappable, A-2

## **--/--**

ID/LUN mapping, 4-12  
installation procedure, 2-4  
IO access, 4-19  
IO module, 1-6, 1-7, 1-11, 2-15, 3-2

## **--L--**

label, 2-6  
laser, 4-2  
LC connector, 4-2  
LCD board jumper settings, 6-2  
LCD board, 6-2  
LCD panel failure, 5-12  
LCD panel, 1-6, 1-10, 1-21, 4-18  
LED module, 1-6, 1-14  
LED, 1-21, 3-1, 3-2, 3-3, 3-5  
LUN Masking, A-3  
LUN, A-3

## **--M--**

maintenance module, 1-6, 1-15, 1-16, 3-5  
maintenance, 5-1  
mechanism, 1-5  
memory installation, 2-8  
memory module, 2-1  
modular design, 2-1  
modular, A-4  
module identification, 2-7  
monitoring, 5-1

## **--N--**

non-OFC, 4-2  
normalized airflow, 1-23, 5-1  
Notification Process Center, 3-1

## **--O--**

OFC, 4-2  
operational integrity, 3-1  
operational parameters, 3-6  
optical cables, 4-1

## **--P--**

packaging, 2-6  
path redundancy, 1-2  
point-to-point, 1-18, 4-3, A-2  
power cable, 4-16  
power down, 4-19  
Power On procedure, 4-16  
Power On status check, 4-17  
Power On, 4-15  
power supply unit, 1-1  
power switch, 4-17  
PS/2, 1-15  
PSU Module, 1-20, 1-21, 5-1, 5-2, 5-3

## **--R--**

Rack Installation, 2-1  
RAIDWatch, 1-22, 2-2, 3-1,  
rear panel, 1-3, 1-5, 1-6  
redundant controller, 4-8, 4-11  
RJ-45, 1-15  
RS-232C serial port, 1-6, 1-15

## **--S--**

S.M.A.R.T, A-3  
self-monitoring features, 3-1  
SES, 1-21, 3-2, 3-8, 3-9  
SFP, 1-7, 1-8, 4-2  
signal quality, 4-3  
single-controller, 1-2, 1-10, 4-6  
slide rail, 2-19, 2-20  
spares, A-2  
speed detection, 4-1  
startup, 4-18  
static free, 2-1

## **--T--**

temperature threshold, 3-1  
terminal emulation program, 1-6, 1-22  
top cover, 6-2  
Type-1 IO module, 1-7, 1-11  
Type-2 IO module, 1-7, 1-12

**--U--**

unique identifier, 4-12

unpack, 2-4

unpacking, 2-1

upgrade, 6-1

**--Y--**

Y-cable, 1-16

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