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Infortrend®

# EonStor® S16F-R1430
# S16F-G1430

**4G FC to SAS/SATA RAID Subsystem**

# Installation and Hardware Reference Manual

**Rev. 1.2 (Apr., 2007)**



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# Warnings and Certifications




## Restricted Access Location:

This equipment is intended to be installed in a RESTRICTED ACCESS LOCATION only.



## Electric Shock Warning!

To Prevent Electric Shock:

Access to this equipment is granted only to trained operators and service personnel who have been instructed of and fully understand the possible hazardous conditions and the consequences of accessing non-field-serviceable units.

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

## FCC Class A Radio Frequency Interference Statement

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

**NOTE:**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.



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**WARNING**:

A shielded power cord is required in order to meet FCC emission limits and also to prevent interference to nearby radio and television reception.

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.

CE

This device is in conformity with the EMC.

CB

**(Certified Worldwide)**

This device meets the requirements of the CB standard for electrical equipment with regard to establishing a satisfactory level of safety for persons using the device and for the area surrounding the apparatus. This standard covers only safety aspects of the above apparatus; it does not cover other matters, such as style or performance.

## China RoHS

In Compliance with AeA China RoHS Regulations (SJ/T 11364-2006)

### 有毒有害物质或元素的名称及含量

| 部件名称 | 有毒有害物质或元素 | | | | | |
|---|---|---|---|---|---|---|
| | 铅(Pb) | 汞(Hg) | 镉(Cd) | 六价铬(Cr6+) | 多溴联苯(PBB) | 多溴二苯醚(PBDE) |
| PCBA | X | O | O | O | O | O |
| 机壳机架 | X | O | O | O | O | O |

O:表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T 11363-2006规定的限量要求以下。
X:表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T 11363-2006规定的限量要求。

说明 :
于PCBA部分:
1. 主动(半导体)组件: 高熔点焊料合金中含有铅
2. 被动组件:电子陶瓷组件含有铅
3. 组件脚(脚距小于0.65mm之主、被动组件及连接器)含有铅
4. LCD模块所使用的光学玻璃含有铅

于机壳机架部分:
机壳机架中的钢合金、铝合金及铜合金含有铅

* 上述项目皆碍于技术上不够成熟、经济上及可靠度上不可行而含有过量有毒物质

CCC

For Power Supplies' compatibility to China Compulsory Certification.

D33225

ITE BSMI Class A, CNS 13438 (for Taiwan)

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。



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This device is in conformity with UL standards for safety.

Infortrend is committed to being properly prepared and taking all the necessary steps that will result in our compliance with the new European directive, RoHS (2002/95/EC), on or before the specific dates set forth in those applicable laws and regulations. Infortrend is applying its own internal efforts and expertise and is working closely with customers and suppliers to achieve compliance while maintaining an uninterrupted supply of quality products. Infortrend is currently investigating, evaluating, and qualifying our materials and components to ensure that products sold on or after 1 July 2006, in such territory, are in compliance with the above regulations.



Disposal of Old Electrical & Electronic Equipment (Applicable in the European Union and other European countries with separate collection systems)

This symbol on the product or on its packaging indicates that this product shall not be treated as household waste. Instead it shall be handed over to the applicable collection point for the recycling of electrical and electronic equipment. By proper waste handling of this product you ensure that it has no negative consequences for the environment and human health, which could otherwise be caused if this product is thrown into the garbage bin. The recycling of materials will help to conserve natural resources.

For more details information about recycling of this product, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

# Table of Contents

**CONTACT INFORMATION** ..... **II**
**COPYRIGHT 2007** ..... **III**
This Edition First Published 2007 ..... iii
Disclaimer ..... iii
Trademarks ..... iii
**WARNINGS AND CERTIFICATIONS** ..... **IV**
**TABLE OF CONTENTS** ..... **VI**
Precautions and Instructions ..... ix
ESD Precautions ..... x
**ABOUT THIS MANUAL** ..... **X**
**REVISION HISTORY** ..... **X**
**WHO SHOULD READ THIS MANUAL?** ..... **XI**
Related Documentation ..... xi
**CONVENTIONS** ..... **XI**
Naming ..... xi
Lists ..... xi
Software and Firmware Updates ..... xii

## CHAPTER 1 INTRODUCTION

**1.1 PRODUCT OVERVIEW** ..... **1-1**
1.1.1 Product Introduction ..... 1-1
1.1.2 Model Variations ..... 1-2
**1.2 CHASSIS OVERVIEW** ..... **1-2**
1.2.1 Front Panel Overview ..... 1-3
1.2.2 Rear Panel Overview ..... 1-3
1.2.3 Integrated Backplane ..... 1-5
1.2.4 Physical Dimensions ..... 1-5



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**1.3 MAJOR SUBSYSTEM COMPONENTS ..... 1-5**
1.3.1 LCD Keypad Panel ..... 1-5
1.3.2 Drive Tray ..... 1-6
1.3.3 MUX Kit ..... 1-7
1.3.4 The RAID Controller Module ..... 1-8
1.3.4.1 JBOD Support ..... 1-9
1.3.4.2 Controller Module Interfaces ..... 1-9
1.3.4.3 DIMM Module ..... 1-12
1.3.5 BBU ..... 1-12
1.3.6 PSUs ..... 1-13
1.3.7 Cooling Modules ..... 1-14
**1.4 SUBSYSTEM MONITORING ..... 1-15**
1.4.1 $I^2C$ bus ..... 1-15
1.4.2 LED Indicators ..... 1-16
1.4.3 Firmware (FW) and RAIDWatch GUI ..... 1-16
1.4.4 Audible Alarms ..... 1-16
**1.5 HOT-SWAPPABLE COMPONENTS ..... 1-17**
1.5.1 Hot-swap Capabilities ..... 1-17
1.5.2 Components ..... 1-17

## CHAPTER 2 HARDWARE INSTALLATION

**2.1 INTRODUCTION ..... 2-1**
**2.2 INSTALLATION PREREQUISITES ..... 2-1**
**2.3 SAFETY PRECAUTIONS ..... 2-2**
2.3.1 Precautions and Instructions ..... 2-2
2.3.2 Static-free Installation ..... 2-4
2.3.3 Preparation ..... 2-5
**2.4 GENERAL INSTALLATION PROCEDURE ..... 2-5**
2.4.1 Installation Procedure Flowchart ..... 2-6
**2.5 UNPACKING THE SUBSYSTEM ..... 2-7**
2.5.1 Preinstalled Components ..... 2-7
2.5.2 Components to be Installed ..... 2-7
**2.6 HARD DRIVE INSTALLATION ..... 2-8**
2.6.1 Hard Drive Installation Prerequisites ..... 2-8
2.6.2 Drive Installation without MUX Kit ..... 2-9
2.6.3 Drive Installation with MUX Kit ..... 2-9
**2.7 DRIVE TRAY INSTALLATION ..... 2-10**
**2.8 OPTIONAL MUX KIT INSTALLATION ..... 2-12**
**2.9 BBU INSTALLATION ..... 2-13**
2.9.1 BBU Warnings and Precautions ..... 2-13
2.9.2 Installation Procedure ..... 2-14
**2.10 RACKMOUNTING ..... 2-16**

## CHAPTER 3 SUBSYSTEM CONNECTION

**3.1 FC HOST CONNECTION PREREQUISITES ..... 3-1**
3.1.1 Choosing the Fibre Cables ..... 3-1
3.1.2 FC Lasers ..... 3-2
3.1.3 SFP Transceivers ..... 3-3
3.1.4 FC Port Dust Plugs ..... 3-3
**3.2 TOPOLOGY AND CONFIGURATION CONSIDERATIONS ..... 3-3**
3.2.1 Basic Configuration Rules ..... 3-3
3.2.2 Fibre Channel Topologies ..... 3-4
3.2.3 Host-side Topologies ..... 3-4
3.2.4 Drive-side Connection ..... 3-5
3.2.5 Internal Connections ..... 3-5
3.2.6 Unique Identifier ..... 3-5
3.2.7 ID/LUN Mapping ..... 3-5
**3.3 DIP SWITCH ..... 3-6**
DIP Switch Mode Setting ..... 3-7
**3.4 SAMPLE TOPOLOGIES ..... 3-8**
3.4.1 Multiple RAID, Fault-tolerant Connection ..... 3-8
3.4.2 Single Controller Connection ..... 3-10
3.4.3 Dual-Controller, Fault-Tolerant Connection ..... 3-11
3.4.4 Drive-side Expansion ..... 3-12

## CHAPTER 4 SYSTEM OPERATION AND MONITORING



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**4.1 POWER ON ..... 4-1**
4.1.1 Check List ..... 4-1
4.1.2 Power On Procedure ..... 4-2
4.1.3 Power On Status Check ..... 4-3
4.1.4 LCD Screen ..... 4-4
**4.2 POWER OFF PROCEDURE ..... 4-5**
**4.3 SYSTEM MONITORING OVERVIEW ..... 4-6**
**4.4 STATUS-INDICATING LEDS ..... 4-8**
4.4.1 Brief Overview of the LEDs ..... 4-8
4.4.2 LCD Keypad Panel ..... 4-8
4.4.3 Drive Tray LEDs ..... 4-10
4.4.4 Controller Module LEDs ..... 4-11
4.4.4.1 Controller Status LEDs ..... 4-11
4.4.4.2 Fibre Port LEDs ..... 4-12
4.4.4.3 Restore Default LED ..... 4-12
4.4.4.4 LAN Port LEDs ..... 4-12
4.4.5 BBU LED ..... 4-13
4.4.6 PSU LEDs ..... 4-13
4.4.7 Cooling Module LEDs ..... 4-14
**4.5 AUDIBLE ALARM ..... 4-15**
**4.6 I²C MONITORING ..... 4-16**

## CHAPTER 5 SYSTEM MAINTENANCE

**5.1 OVERVIEW ..... 5-1**
5.1.1 About Subsystem Maintenance ..... 5-1
5.1.2 General Notes on Component Replacement ..... 5-2
**5.2 REPLACING CONTROLLER MODULE COMPONENTS ..... 5-3**
5.2.1 Considerations ..... 5-3
5.2.2 Removing the Controller Module ..... 5-4
5.2.3 Replacing the Controller Module ..... 5-5
**5.3 DIMM MODULE REPLACEMENT ..... 5-7**
5.3.1 DIMM Module Considerations ..... 5-7
5.3.2 DIMM Module Upgrade/Replacement Procedure ..... 5-8
**5.4 REPLACING A FAULTY BBU ..... 5-9**
**5.5 REPLACING A FAULTY PSU ..... 5-12**
5.5.1 PSU Overview ..... 5-12
5.5.2 Replacing the PSU ..... 5-13
**5.6 COOLING MODULE MAINTENANCE ..... 5-16**
5.6.1 Notes on Cooling Module Maintenance ..... 5-16
5.6.2 Replacing a Cooling Module ..... 5-17
**5.7 REPLACING A FAILED HARD DRIVE ..... 5-19**
5.7.1 Hard Drive Maintenance Overview ..... 5-19
5.7.2 Replacing a Hard Drive ..... 5-20
**5.8 REPLACING A MUX KIT ..... 5-22**

## APPENDIX A SPECIFICATIONS

**A.1 TECHNICAL SPECIFICATIONS ..... A-1**
Environmental Specifications ..... A-1
Power Requirements ..... A-1
Certifications ..... A-2
Warning Alarms ..... A-2
**A.2 FUNCTIONAL SPECIFICATIONS ..... A-2**
Configuration Specifications ..... A-2
Architectural Specifications ..... A-3
**A.3 DRIVE TRAY SPECIFICATIONS ..... A-3**
**A.4 POWER SUPPLY SPECIFICATIONS ..... A-3**
**A.5 COOLING MODULE SPECIFICATIONS ..... A-4**
**A.6 RAID MANAGEMENT ..... A-4**
**A.7 FAULT TOLERANCE MANAGEMENT ..... A-5**

## APPENDIX B SPARE PARTS AND ACCESSORIES

**B.1 SPARE PARTS ..... B-1**
**B.2 ACCESSORIES ..... B-2**



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# APPENDIX C PINOUTS

C.1 SFP CONNECTOR PINOUTS ..... C-1
C.2 COM1 CABLE: DB9 AND AUDIO JACK PINOUTS ..... C-3
C.3 COM1 CABLE: DB9 AUDIO JACK Y-CABLE PINOUTS ..... C-4
C.4 COM2 UPS CABLE: DB9 AND AUDIO JACK PINOUTS ..... C-5
C.5 IFT-9011 NULL MODEM ..... C-6
C.6 LAN PORT PINOUTS ..... C-7
C.7 POWER CONNECTORS ..... C-7
C.8 CONNECTOR TYPE AND OTHER INFORMATION ..... C-7
C.8.1 Connector Type and Supported Connections ..... C-7

## Precautions and Instructions

- If it is necessary to transport the subsystem, repackage all disk drives with its drive trays in the foam blocks in the original shipping package.
- Provide a soft, clean surface to place your subsystem on before working on it. Servicing on a rough surface may damage the exterior of the chassis.
- Leaving any of these drive bays empty will seriously affect the efficiency of the airflow within the enclosure, and will consequently lead to the system overheating, which can cause irreparable damage.
- Prior to powering on the subsystem, ensure that the correct power range is being used.
- All modules must be properly installed before powering on the subsystem. If a cooling module is missing, the power supply unit (PSU) will overheat rapidly.
- If a module fails, leave it in place until you have a replacement unit and you are ready to replace it.
- Handle subsystem modules using their retention screws, eject levers, and the metal frames/face plates. Avoid touching PCB boards and connector pins.
- **Airflow Consideration:** The subsystem requires an airflow clearance, especially at the front and rear.
- Be sure that the rack cabinet into which the subsystem chassis will be installed provides sufficient ventilation channels and airflow circulation around the subsystem.
- To comply with safety, emission, or thermal requirements, none of the covers or replaceable modules should be removed. Make sure that all enclosure modules and covers are securely in place during operation.



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- Dual redundant controller models come with two controller modules that must be installed into the subsystem. Single controller modules come with a single controller module and a dummy cage is placed over the lower controller bay at the rear of the subsystem. Since single controller modules cannot be upgraded, this metal sheet should NEVER be removed.

### ESD Precautions

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

# About This Manual

This manual:

- Introduces the EonStor RAID Subsystem series.
- Describes all the active components in the system.
- Provides recommendations and details about the hardware installation process of the subsystem.
- Briefly describes how to monitor the subsystem.
- Describes how to maintain the subsystem.

This manual does not:

- Describe components that are not user-serviceable.
- Describe the configuration options of firmware, using terminal emulation programs, or the RAIDWatch GUI that came with your subsystem.
- Give a detailed description of the RAID controllers embedded within the subsystem.

# Revision History

| | |
|---|---|
| Rev. 1.0: | Initial release |
| Rev. 1.1: | Reflected changes in 4G and 2G Fibre host channel compatibility. |
| Rev. 1.2 | Updated Infortrend US and European office addresses |



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# 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

- Fibre-to-SAS/SATA Series RAID Subsystem Operation Manual
- RAIDWatch User's Manual

These two (2) documents are located in the CD included with your subsystem package

# Conventions

## Naming

From this point on and throughout the rest of this manual, the EonStor series is referred to as simply the "subsystem" or the "system" and EonStor is frequently abbreviated as "ES."

## 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 you should follow in order.

Important information that users should be aware of is indicated with the following icons:



**NOTE:**

These messages inform the reader of essential but non-critical information. These messages should be read carefully as any directions or instructions contained therein can help you avoid making mistakes.



**CAUTION!**

Cautionary messages should also be heeded to help you reduce the chance of losing data or damaging the system.



**IMPORTANT!**



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The Important messages pertain to using the EonStor subsystem introduced in this manual.



**WARNING!**

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously.

## Software and Firmware Updates

Please contact your system vendor or visit Infortrend's FTP site (ftp.infortrend.com.tw), VIP room, or esupport websites for the latest software or firmware updates.

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



**NOTE:**

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.



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# Chapter 1

# Introduction

## 1.1 Product Overview

### 1.1.1 Product Introduction

This chapter briefly introduces the EonStor (ES) S16F Fibre-to-SAS (Serial Attached SCSI) subsystem. With compatible interface connectors, the drive bays also support SATA-II (Serial ATA) disk drives. The 16-bay model comes with up to four (4) 4Gb/s host channels and sixteen (16) hot-swappable SAS/SATA disk drives in a 3U chassis. The subsystem is powered by Infortrend's proprietary ASIC400 RAID engine, which features expanded bandwidth and RAID6 configurations. The RAID controller comes with a pre-installed memory buffer of up to 2GB in size for transient handling of I/Os. Each 4Gb/s channel is capable of delivering data at the speed of 400MB/s. An onboard hub (bypass) can be used to connect the corresponding FC channels on partner controllers together to facilitate fault-tolerant connections. A common backplane provides fault-tolerant data paths across dual-ported SAS disk drives (over two separate SAS domains).



**Figure 1-1: EonStor S16F Subsystem**

The subsystem is ideal for high performance and high availability storage applications, and is highly scalable via a 4x multi-lane SAS expansion port. Terabytes of expansion capacity can be added via the SAS 4-PHY SFF-8470 expansion links to expansion enclosures.

Data cached in memory is protected by a Li-Ion battery backup unit (BBU) that comes with an embedded EEPROM for storing BBU service data. If the one-year life expectancy of a BBU is reached, system administrators will be notified by event messages. The BBU is independently accessible and hot-replaceable.

Two (2) cooling modules protect the subsystem from overheating, and two (2) hot-swappable power supply unit (PSU) modules ensure constant power



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to the subsystem. The modular design of the subsystem ensures the ease of subsystem maintenance.

**NOTE:**

On receiving and unpacking your subsystem, please check the package contents against a printed copy of Unpacking List included in kit. If any modules are missing or appear damaged, please contact your subsystem vendor immediately.

### 1.1.2 Model Variations

Two (2) S16F models are available.

| Model | Controllers | Configuration | FC Channels | 4G FC Ports | SAS Exp. |
|---|---|---|---|---|---|
| S16F-R1430 | IFT-83SF14RE16M5 x 2 | Redundant | 4 (2 per controller) | 8 | 2 |
| S16F-G1430 | IFT-83SF14GE16M5 x 1 | Single | 2 | 4 | 1 |

- **S16F-R1430:** The dual-redundant controller model comes with dual-active RAID controllers which support all high-availability features including mirrored cache, controller failover/failback capability, and intelligent load-balancing between partner controllers. If one controller fails, the surviving controller automatically takes over in a way that is transparent to host.

- **S16F-G1430:** The single controller model comes with one (1) controller module. This model cannot be upgraded into a dual-redundant subsystem by adding a second controller. The docking bay for the second controller module is covered by a dummy cage that should never be removed, in order not to interrupt the subsystem's cooling airflow.

## 1.2 Chassis Overview

The S16F RAID storage subsystem is housed in a 3U metal chassis made of compact steel. The chassis can be divided into the front and the rear sections, which are respectively accessed through the front and rear panels. Separately-purchased rackmount rails are available from Infortrend for installation into 19" standard racks or cabinets. Please acquaint yourself with the locations of individual components before proceeding with hardware installation.

**NOTE:**

Components accessed through the front panel are referred to as "Front Panel Components" and components accessed through the rear panel are referred to as "Rear Panel Components."



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### 1.2.1 Front Panel Overview

The front section of the subsystem features a 4x4 layout for sixteen (16) 3.5-inch drives. One of the two forearm handles comes with an LCD keypad panel. The LCD panel provides easy access to the subsystem's monitoring and configuration utilities.

The front view of the S16F subsystems is shown in ***Figure 1-2***. Descriptions of each front panel component are given below:

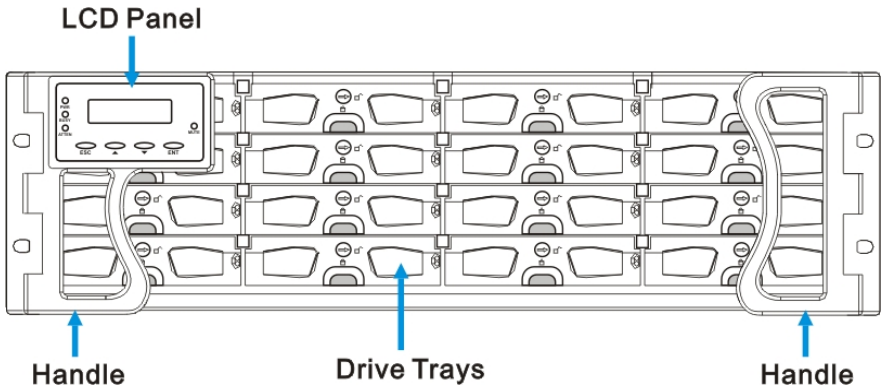



**Figure 1-2: S16F with an LCD Keypad Panel**

- **Drive bays with drive tray canisters*:*** The front section of the chassis houses sixteen (16) drive bays.
- **LCD keypad panel and handles*:*** The forearm handles on the sides of the subsystem provide an easier means for installing or retrieving the chassis into and out of a rack or cabinet. The left-side handle comes with a 2 rows x 16 characters-wide LCD keypad panel that can be used to access a firmware-embedded configuration and monitoring utility. (Please refer to ***Section 1.3.1***)

### 1.2.2 Rear Panel Overview

The rear views of both the dual-controller and single-controller subsystems are shown below. The rear panel provides access to all components located in the rear section of the chassis.

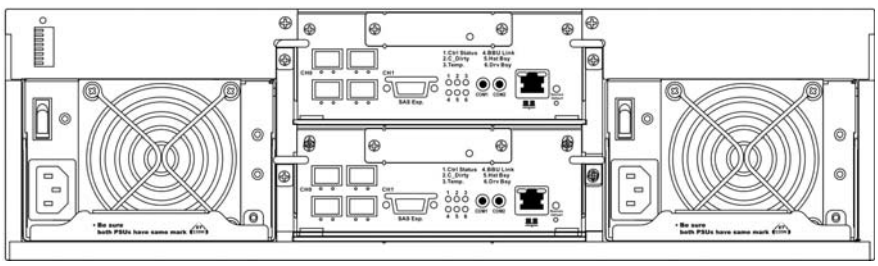


**Figure 1-3: S16F-R1430 Subsystem Rear View**



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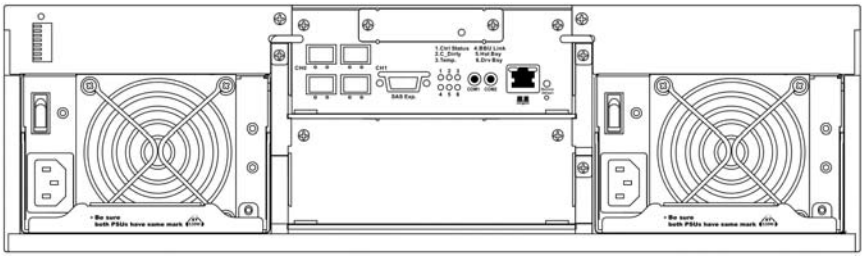


**Figure 1-4: S16F-G1430 Subsystem Rear View**

- **RAID controller modules:** Each controller module contains a main circuit board and a pre-installed DDR RAM DIMM module. (See ***Section 1.3.3***.)

### About the dual-redundant RAID controllers in S16F-R1430:

For the S16F subsystem featuring redundant RAID controllers, the upper controller module is identified as **Controller A,** while the lower controller module is identified as **Controller B.** By factory default, management tools such as the LCD keypad panel, hyper terminal and RAIDWatch® manager recognize **Controller A** as the primary controller and **Controller B** as the secondary controller.

If **Controller A** fails for any reason (hardware error, software error, removal from system, etc.), then **Controller B** will take over and become the primary/managing controller.

If the failed **Controller A** restarts and successfully returns to service, it will temporarily become the secondary controller.

Once the subsystem is rebooted, all system configurations revert to the default stage so that **Controller A** becomes the primary controller and **Controller B** the secondary controller.

- **BBUs:** Two (2) BBUs come as standard equipment for the dual-controller S16F-R1430. For the S16F-G1430, the BBU is an optional item. Each BBU sustains cache memory for days during a power outage to prevent data loss. These BBUs are hot-swappable. (See ***Section 1.3.5.***)

- **PSUs:** The hot-swappable, load-sharing PSUs convert 110V or 240V input to 3.3V, 5V, or 12V for subsystem components. Subsystem power-on/off is controlled by a power switch on each PSU. (See ***Section 1.3.6.***) These modules contain the subsystem's cooling modules. The redundant cooling modules ventilate the chassis with an airflow traveling from the front to the rear. (See ***Section 1.3.7.***)



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### 1.2.3 Integrated Backplane

An integrated backplane board separates the front and rear sections of the chassis. This circuit board provides logic level signals and low voltage power paths. Thermal sensors and $I^2C$ devices are implemented to detect system temperature and PSU/cooling module presence signals. This board contains no user-serviceable components.

The backplane board is designed for dual-ported SAS drives. Every disk drive is connected through two separate SAS domains and each SAS domain is individually managed by a RAID controller in a dual-controller configuration.

### 1.2.4 Physical Dimensions

The S16F subsystem comes in an enhanced 3U chassis with the following dimensions:

- With handles: 488.6mm (W) x 131mm (H) x 504.3mm (L) (19 x 5.2 x 21 inches)
- Without handles: 445mm x 130mm x 488.2mm (17.5 x 5.1 x 19.2 inches)

## 1.3 Major Subsystem Components

Both S16F models house many active components and most of them can be accessed through either the front or rear panel. The modular enclosure design facilitates the ease of installation and maintenance procedures. Hot-swap mechanisms are incorporated to eliminate power surges and signal glitches that might occur while removing or installing these modules. Each component is further described below:

### 1.3.1 LCD Keypad Panel

PN: IFT-9273CHandLLCD

The LCD keypad panel consists of a 2-rows x 16-characters LCD screen with push buttons and LED status-indicators. The LCD keypad panel provides full access to RAID configuration utility and monitoring functions. After powering up the subsystem, the initial screen will display the subsystem's model name. A different name can be assigned to the subsystem for ease of identification in a topology consisting numerous arrays.



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### 1.3.2 Drive Tray

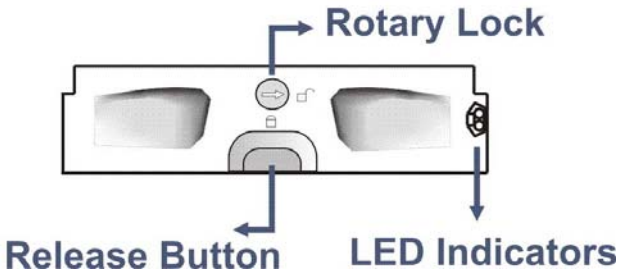



**Figure 1-5: Drive Tray Front View**

PN: IFT-9273CDTray

The S16F subsystem comes with sixteen (16) drive trays (see ***Figure 1-5***) designed to accommodate separately purchased standard 1-inch pitch, 3.5-inch SAS/SATA disk drives. Two (2) LEDs on the drive tray's front bezel indicate drive status. A rotary bezel lock on each drive tray prevents unintentional ejection, and a convenient release button releases the drive tray from chassis.

**WARNING!**

Be careful not to warp, twist, or contort the drive tray in any way (e.g., by dropping it or resting heavy objects on it). The drive tray has been customized to fit into the drive bays in the subsystem. If the drive bay superstructure is deformed or altered, the drive trays may not properly fit into the drive bay.

The subsystems are housed in an enclosure that is 4 bays wide and 4 bays high. When viewing from the front, drive bay IDs are numbered from Slot 1 to Slot 16 (see ***Figure 1-6***), from left to right, and then from top to bottom.

**TIPS:**

- Tray numbering sequence is important if one disk drive fails and needs to be replaced. Replacing a wrong drive can fatally fail a RAID3/5 array. Failing three drives destroys a RAID6 array.

| | | | |
|---|---|---|---|
| Slot-1 | Slot-2 | Slot-3 | Slot-4 |
| Slot-5 | Slot-6 | Slot-7 | Slot-8 |
| Slot-9 | Slot-10 | Slot-11 | Slot-12 |
| Slot-13 | Slot-14 | Slot-15 | Slot-16 |

**Figure 1-6: S16F Drive Bay Numbering Sequence**



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### 1.3.3 MUX Kit

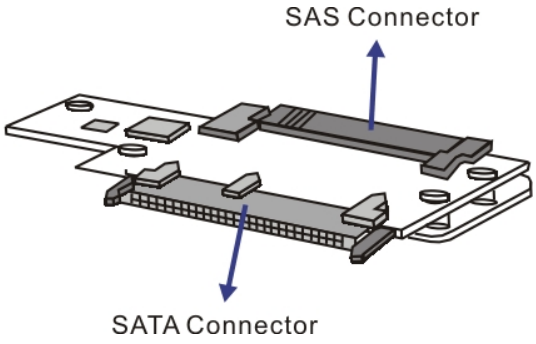



**Figure 1-7: MUX Kit**

P/N: IFT-9273S1N2S1S (MUX kit)

IFT-9273S1DT2S1S (Drive tray with a pre-installed MUX kit)

The MUX kit enables partner RAID controllers to access individual SATA-II hard drives in a dual-controller configuration. Because of the relatively high price of the emerging SAS drives, SATA-II disk drives may be a more popular choice for the moment. As the result, a MUX kit is attached to every drive tray as the default configuration of the dual-controller model.

There is no need for the MUX kit in a single-controller S16F subsystem. The MUX kits are equipped with active-active port selectors to facilitate SATA drive installation and access from dual-active RAID controllers. When installed into the enclosure, the SAS connectors on the other end of the MUX kits will mate with the corresponding connectors on the backplane board.

**NOTE:**

- The S16F-G1430 single-controller subsystem accommodates both SAS and SATA-II hard drives without the need for the MUX kits.
- If the dual-ported SAS hard drives are preferred, there is no need for a MUX kit on each drive tray. The MUX kits should then be manually removed from each drive tray.

**CAUTION!**

The MUX kits are small, delicate components that must be handled with care.



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### 1.3.4 The RAID Controller Module

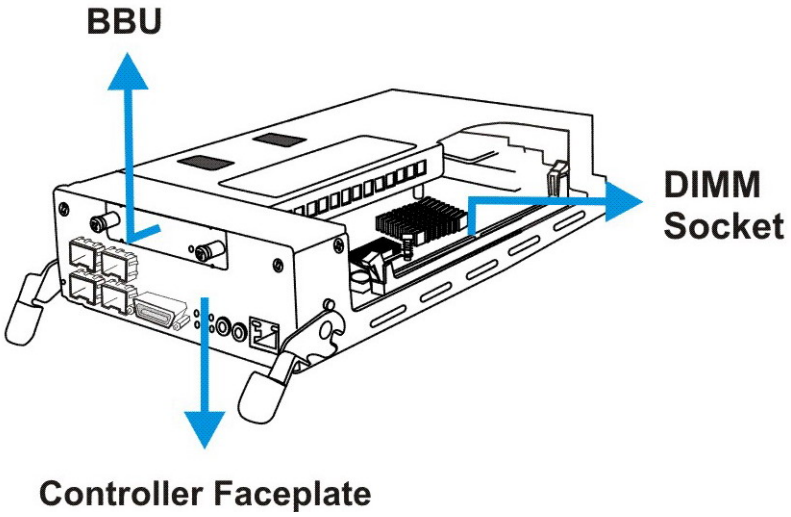



**Figure 1-8: RAID Controller Module**

PN: IFT-83SF14RE16 (for S16F-R1430)

IFT-83SF14GE16 (for S16F-G1430)

The RAID controller module that came with your subsystem contains a controller board, a BBU adapter board, an interface faceplate, and a pre-installed DIMM module. The BBU adapter board is mounted on top of the main circuit board and is non user-serviceable. The DDR RAM DIMM socket is strategically placed on an easily accessible location. (See ***Figure 1-8***) A BBU slot on the top center of the controller module receives a BBU module.

The controller module contains no user-serviceable components. Except when installing/upgrading the cache memory inside, the controller module should never be removed from the chassis.

**WARNING!**

- Although the RAID controller can be removed, the only time you should touch the controller itself is to install/upgrade the memory modules. The RAID controller is built of sensitive components and unnecessary tampering can damage the controller.

- ***D***

- **Docking Connectors:** The FCI docking connectors at the rear of the controller boards connect the controller module to the backplane board.

- **Ejection levers:** The two (2) ejection levers on the sides of the controller canister ensure positive connection and provide a graceful means to retrieve the canister from chassis.



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### 1.3.4.1 JBOD Support

- **JBOD Enclosure Service:**

  Each RAID controller comes with a SAS 4x, wide expansion port that connects to SAS JBOD(s). A managing RAID subsystem is aware of the operating statuses of JBOD components including:

  1. JBOD expander controller
  2. PSU
  3. Cooling module
  4. Enclosure thermal
  5. Disk drives

  A managing RAID subsystem acquires JBOD component statuses via a proprietary enclosure service using in-band SAS port connectivity. No additional management connection is required.

- **JBOD Identifier:**

  The managing RAID subsystem will sound the alarm and deliver notification messages if the following occur:

  1. JBOD ID conflict. If more than one JBOD is connected to the managing RAID subsystem, each JBOD needs a unique ID set by the rotary switch on the chassis ear.

  2. Firmware automatically disconnects a second JBOD if the second JBOD is connected online and comes with an ID identical to that of the first JBOD.

### 1.3.4.2 Controller Module Interfaces

The controller interfaces are accessed through the controller's rear-facing faceplate shown in ***Figure 1-9***.

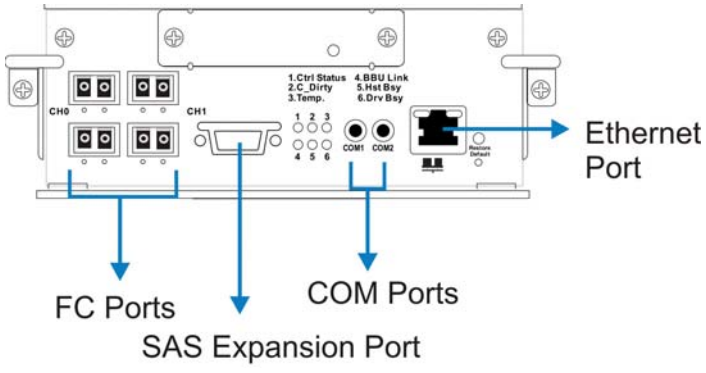



**Figure 1-9: RAID Controller Faceplate**

- **4G FC host ports:** Each controller module has four (4) FC ports with the onboard hub functionality, two (2) for each Fibre Channel. Each



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host port comes with two (2) LEDs to indicate link and speed statuses. Two (2) 4G FC host channels, CH0 and CH1, connect the subsystem to the host computers equipped with 4G FC connectivity. The Fibre Channel host ports receive 4.25/2.125GBd SFP, LC duplex type transceivers and then connect to LC-type optical fiber cables.

- **SAS SFF-8470 Expansion Port:** This SAS expansion port allows you to expand the raw capacity of your RAID subsystem with 3 (to dual-controller RAID) or 4 (to single-controller RAID) add-on JBODs. For more information, please refer to the documentation that came with the S16S-J1000 series expansion enclosures or ***Section 3.3*** of this manual.

- **COM ports:** Each controller module comes with two (2) serial ports. The **COM1** port is used for accessing the controller-embedded configuration utility through a RS-232C serial connection and over a VT-100 terminal emulation program running on a management computer. Either an audio-jack-to-DB9 cable for the S16F-G1430 or a dual-audio-jacks-to-DB9 Y-cable for the S16F-R1430 is included with the shipping package.

  The second COM port, marked as **COM2,** is for connecting to an uninterruptible power supply (UPS). An optional audio-jack-to-DB9 cable (PN: IFT-9270CUPSCab or IFT-9270CUPSYCab) is available for purchase.

- **Ethernet port:** All controller modules on the S16F come with a 10/100BaseT Ethernet port that can be used for local/remote management. When operated in the dual-active mode, system configuration is handled through one of the controllers. In the event when one controller fails, the Ethernet port on the surviving controller inherits the configured IP and continues the monitoring or configuration session. Shielded cables are recommended to protect against emissions. Connect the other end of the Ethernet cable to a LAN port of your local network.

- **LED indicators:** Each controller's interface faceplate comes with numerous LED indicators. Please refer to ***Chapter 4*** for information on the LED definitions.

- **Restore Default Button/LED:** Pressing the "restore default button" while powering on the subsystem will restore firmware defaults.

**CAUTION!**

The Restore NVRAM Default push button is a function that carries some risks. Firmware restoration will not destroy the existing logical drive configurations; however, if the existing logical drives cannot be adequately associated with host ID/LUNs after firmware default restoration, data loss or inconsistencies may occur.



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The "Restore Default" button is a non-latch type push button accessed through a round opening underneath the Restore Default LED.

**Listed below are the necessary procedures that should be completed before using this button:**

1. Before pressing this button to restore firmware defaults, it is highly advised to make a list of the existing ID/LUN mapping information. You will need the list for restoring ID/LUN mapping after restoring defaults. Default restoration will erase the ID/LUN mapping associations (e.g., which logical drive is associated with which host ID/LUN), and it is necessary to restore the host ID/LUN mapping after firmware default restoration in order to access data on the previously configured arrays.

2. Some of the latest firmware updates may be incompatible with the firmware currently running on your subsystem. These updates may require restoring firmware defaults before firmware upgrade can actually take place. Before using the button, it is highly advised to practice the following:

   - Stop host I/Os,
   - Backup your data,
   - Make a list of host ID/LUN mapping information for future references.
   - It is also recommended to keep a record of all configuration parameters such as the performance preferences, specific stripe sizes, etc., using the "**Save NVRAM**" firmware function.

3. Another condition that requires restoring defaults is when an administrator forgets the password configured to control the access to a RAID subsystem. Before pushing this button, also practice the steps listed above. You can access array information even without a password.

**How to use the button?**

After the subsystem is powered down, you can use a straighten paper-clip to press the button. Press and hold the button while powering on the subsystem, and wait for the associated LED and system Ready LED to light up. The "**Restore Def.**" LED indicates successful restoration of firmware defaults.

With redundant RAID controllers, the procedure can be tricky:


Step 1. Remove one controller from the subsystem, power down, and then power on with the "Restore Def." button depressed to restore the firmware defaults on the remaining controller.



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Step 2. Power down, and remove the controller you previously restored its defaults.

Step 3. Install the controller you have not configured, and repeat the restoration process.

Step 4. When completed with restoring defaults on both controllers, power down, install both controllers, and power on.

#### 1.3.4.3 DIMM Module

Each controller module comes with a DDR RAM DIMM module.

The 184-pin **DDR RAM DIMM socket** comes with a pre-installed 512MB capacity or above DDR RAM DIMM and is able to support a module with up to 2GB capacity.

The DIMM module is accessed through an opening on the side of the controller canister. If the need should arise for replacing the DIMM module, please refer to ***Chapter 5*** for details on upgrading/replacing DIMM modules.

### 1.3.5 BBU

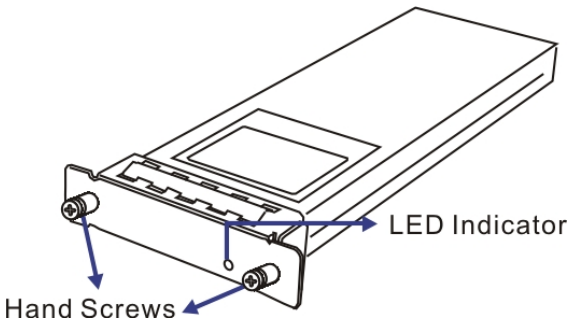



**Figure 1-10: BBU**

PN: IFT-9273CBTE (optional for single-controller subsystems)

The Li-Ion BBU module, a shown above, can sustain cached data for days during a power failure. The use of a BBU is highly recommended in order to ensure data integrity. If power outage occurs, the BBU supplies power to sustain the unfinished writes cached in memory. The BBU module is hot-swappable.



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**New Feature:**

The battery cell packs come with an EEPROM to record the date of installation; and when the approximate one-year life expectancy is reached (by checking against the real-time-clock), system administrators will be notified for replacing the BBU.

In accordance with international transportation regulations, the BBU is only charged to between 35% and 45% of its total capacity when shipped. After powering on the subsystem (see ***Section 4.1***) the BBU will automatically start charging its battery cells. It usually requires approximately seven (7) hours for the battery to be fully charged.

If the battery is not fully charged after twelve (12) hours, a problem might have occurred with the BBU and you should contact your subsystem vendor for a replacement. Re-installing the BBU may sometimes correct the fault if BBU charger has overheated and forced the charging process to halt many times during the charging process. If the overheating conditions occurred during the process, charge time must extend the expected twelve hours.

While charging the battery, the LED on the BBU will flash slowly. You can check battery charge using the RAIDWatch management software or firmware configuration utility.

**WARNING!**

The BBU is hot-swappable itself; however, when the controller module is removed from the subsystem, the BBU is also removed. Do not remove the controller module unless it becomes absolutely necessary.

### 1.3.6 PSUs

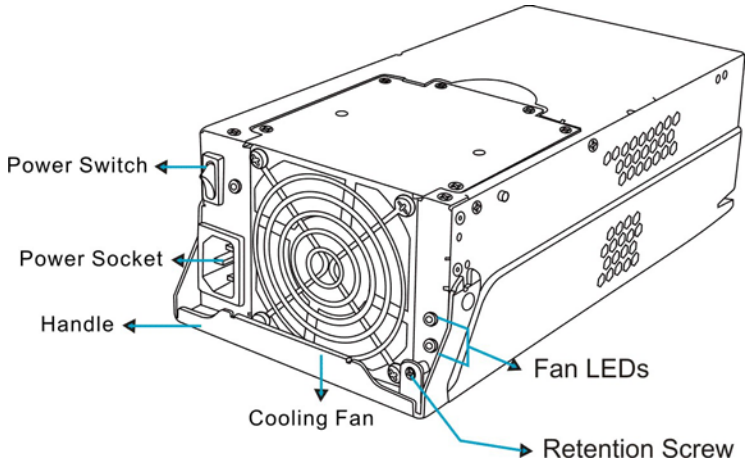



**Figure 1-11: PSU Components**

PN: IFT-9273ECPSU

The subsystem is equipped with two (2) redundant, hot-swappable, 530W PSUs, which are located at the rear of the enclosure. The PSU is



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permanently mounted into a 2U bracket especially designed to house both the PSU and a cooling module. If a PSU is removed from the chassis, the cooling module within is also removed.

As shown in ***Figure 1-11***, each PSU comes with a single power socket for power cord plug-in and a power switch to turn the subsystem on and off. A single LED indicates the PSU status. For the LED definitions, please refer to ***Section 4.4.9***. If a PSU fails the LED lights steadily red. An ejection handle on the PSU enables you to remove or to secure the PSU in place. This should only occur if the PSU fails and needs to be replaced.

In addition to the ejection lever, a retention screw fastened through a hole on the ejection handle helps prevent accidental disconnection.

For the PSU specifications, please refer to ***Appendix A.4***.

### 1.3.7 Cooling Modules

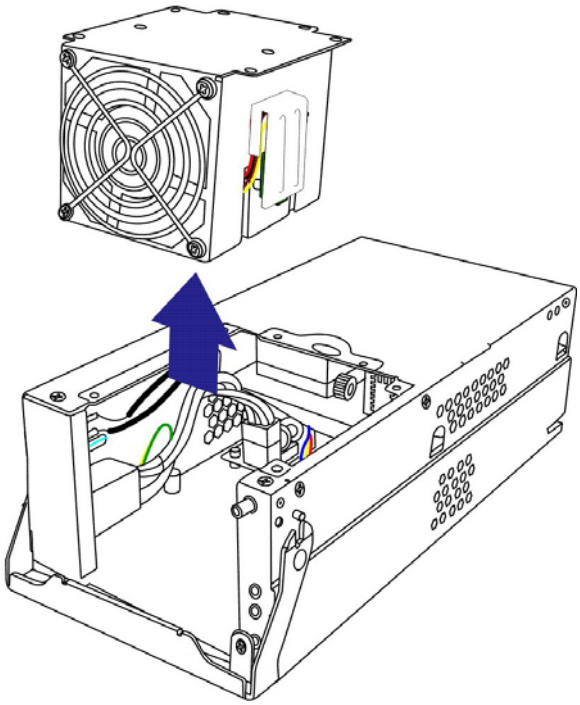


**Figure 1-12: Cooling Module**

PN: IFT-9273ECFanMod

The subsystem is equipped with two (2), dual-fan, redundant cooling modules. They are installed in the rear section of the PSU modules. Two (2) LEDs on the PSU faceplate indicate the cooling fan status.



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**Intelligent Dual Speed Operation**

The cooling fans in the cooling module operate with two rotation speeds. Under normal conditions, the cooling fans run at the low speed, which is sufficient for maintaining airflow across components. Under the following conditions, cooling fans raise their rotation speed to increase airflow:

1. Component Failure: if one cooling fan, a PSU, or a temperature sensor fails, the remaining cooling fans automatically raise its rotation speed.

2. Elevated Temperature: if the temperature reading breaches the upper threshold set for any of the interior temperature sensors, the cooling fans automatically raise its rotation speed.

3. During the subsystem initialization stage, the cooling fans operate at the high speed and return to lower speed once the initialization process is completed and that the subsystem has not discovered any erroneous conditions.

## 1.4 Subsystem Monitoring

The S16F subsystem comes with a number of different monitoring approaches that provide you with continual updates on the status of the subsystem and individual components. The following monitoring features are provided with the subsystem.

### 1.4.1 $I^2C$ bus

The following S16F subsystem elements are interfaced to the RAID controller over a non-user-serviceable $I^2C$ serial bus:

- PSUs
- Cooling modules
- Temperature sensors (for the RAID controller board and backplane board)
- Module presence detection circuits

### 1.4.2 LED Indicators

The following active components come with LEDs to indicate the status of individual components. Please refer to ***Chapter 4*** for more information on System Monitoring.

- LCD keypad panel (3 LEDs)



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- Drive trays (2 LEDs on each tray)
- RAID controllers, each module has
  - 10 Ethernet port Link and Speed LEDs
  - 6 controller status LEDs
  - 1 Restore Default LED
- BBUs (1 LED on each module)
- Cooling modules (2 LEDs on PSU canister)
- PSUs (1 LED on PSU canister)

### 1.4.3 Firmware (FW) and RAIDWatch GUI

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

***RAIDWatch:*** RAIDWatch is a premier, browser-based or Java-based graphical 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 Ethernet port.

### 1.4.4 Audible Alarms

The S16F subsystems come with audible alarms that are triggered when certain active components fail or when certain controller or subsystem thresholds are exceeded. Whenever you hear an audible alarm from an S16F subsystem, it is imperative that you determine the cause and rectify the problem immediately.

Event notification messages indicate the completion or status of array configuration tasks and are always accompanied by two (2) or three (3) successive and prolonged beeps.

**CAUTION!**

Failing to respond when an audible alarm is heard can lead to permanent damage of the S16F subsystem. When an audible alarm is heard, rectify the problem as soon as possible.



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# 1.5 Hot-swappable Components

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

## 1.5.1 Hot-swap Capabilities

The S16F subsystem comes with a number of hot-swappable components that can be exchanged while the subsystem is still online without affecting the operational integrity of the subsystem. These components should only be removed from the subsystem when they are being replaced. At no other time should these components be removed from the subsystem.

## 1.5.2 Components

The following components are hot-swappable:

- Controller module (S16F-R1430)
- BBU(s)
- PSUs
- Hard drives



**NOTE:**

Instructions on how to replace these hot-swappable components for maintenance purposes are given in ***Chapter 5***.



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# Chapter 2

# Hardware Installation

## 2.1 Introduction

This chapter gives detailed instructions on how to install hard disk drives and drive trays into the subsystem. Installation into a rack or cabinet should occur before hard drive installation. Please confirm that you received all of the components listed on a printed copy of ***Unpacking List*** included in the shipping package before proceeding with the installation process.



**CAUTION!**

Carefully follow the installation instructions described in this manual to prevent any difficulties and damages to your system.

## 2.2 Installation Prerequisites

1. **Static-free installation environment:** The S16F subsystems must be installed in a static-free environment to minimize the possibility of electrostatic discharge (ESD) damage. (See ***Section 0***)

2. **Component check:** Before installing the S16F subsystem, check to see that you have received all the required components. (See ***Section 2.5***) If any items appear damaged or are missing, contact your vendor for a replacement.

3. **Hard drives:** Up to sixteen (16) SAS or SATA hard drives should be separately purchased and available prior to installing the subsystem. (See ***Section 2.6***)

4. **Cabling:** All the fiber optical cables that connect the subsystem to the hosts should be purchased separately. We recommend using certified fiber optical cables from Infortrend to avoid compatibility problems. Please see ***Chapter 3*** for sample topologies and configuration options.



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Please contact your vendor or Infortrend for the list of compatible cables.

5. **SFP transceivers:** SFP transceivers must also be separately purchased. (See ***Chapter 3***)

6. **Memory modules:** If you wish to replace the pre-installed DDR RAM DIMM module, the separately purchased module(s) must be installed. (See ***Chapter 5***)

7. **BBU:** If you wish to install a BBU, the BBU must be purchased separately and installed prior to powering on the subsystem. (See ***Section 2.9***)

8. **Rack installation:** The enclosure chassis can be installed into a rack cabinet using separately purchased mounting rails, rear-attached brackets, or Infortrend's ***IFT-9273Cslider28*** and ***IFT-9273Cslider36*** rackmount brackets. (See ***Section 2.10***)

# 2.3 Safety Precautions

## 2.3.1 Precautions and Instructions

1. Please read these instructions carefully.

2. Please disconnect two (2) power cords from AC outlets before servicing or cleaning. Don't use liquid or sprayed detergent for cleaning. Use a slightly moistened paper sheet or clothe for cleaning.

3. Rack-mounting the enclosure – The subsystem is intended to be rack-mounted, the following concerns should be heeded when installing the enclosure into a rack cabinet.

    a. The rack cabinet and the associated equipment at the installation site should be able to maintain an ambient temperature (around the chassis) lower than 40°C and 35°C if battery backup is applied.

    b. The openings on the enclosure are for air convection through the interior of the chassis. DO NOT COVER THE OPENINGS.

    c. The rack cabinet into which this enclosure is installed must support overcurrent protection and must not be overloaded by the modules installed. Other requirements, such as ventilation airflow, rack stabilizing features, electrical earth, and electrical distribution, must comply with the technical specifications listed in the documentation or safety labels that came with this product.



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d. Consideration should be given to the connection of the subsystem to the supply circuit and the effect that overloading of circuits might have on over current conditions.

4. The power source outlet sockets should be adequately adjacent and easily accessible.

5. Place the enclosure on a soft, clean surface before working on it. Placing the enclosure on a rough surface during servicing may damage the chassis finish.

6. Do not remove any module or component from its anti-static bag before installation to prevent static electricity from damaging the electric components.

7. Because hard drives are prone to damages by shock and vibration during operation, all equipment should be installed in an equipment rack prior to powering up.

8. Hard Drives must not be stacked one on top of another without their protective drive trays. Even when fixed in the drive trays, contact with the exposed PCB or rear-end interfaces may result in ESD damage which will yield various immediate or latent failures.

9. Stacking drives one upon another can result in erasing the IC programmable contents.

10. When replacing components, insert them as gently as possible while assuring full engagement. Vibration and shock can easily damage hard drives during operation. Handle hard drives with extreme care.

11. Place the power cords and all cables away from foot traffic. Do not place anything over the power cords. After all equipment is installed into rack, carefully route the power cords and data cables so that power cords are not resting against data cables.

12. If the enclosure is not used for a long time, disconnect it from the mains to avoid transient over-voltage.

13. Never open the enclosure chassis. For safety reasons, only qualified service personnel can open the equipment.

14. If any of the following situations occurs, contact service personnel:

    a. The power cord or plug is damaged.

    b. The equipment has been exposed to moisture.

    c. The enclosure has not work well or you cannot get it work according to this manual.



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d. The enclosure has been dropped against a hard surface.

e. The enclosure shows obvious signs of breakage.

15. Thermal notice: All drive trays (even if they do not contain a hard drive) must be installed into the enclosure. Leaving a drive bay or module slot open will seriously affect the airflow efficiency, and consequently lead to overheating. Keep a faulty module in place until you have a replacement unit and are ready to replace it.

16. An enclosure without disk drives can weigh up to 19 kilograms. (42 lbs.) Two or more people will be required to install or relocate the subsystem. Drives should be removed from the enclosure if the need arises for relocating the enclosure.

17. Airflow considerations: The subsystem requires an airflow clearance especially at the front and rear. For proper ventilation, a minimum of 2.5cm (1 inch) is required between the front of the enclosure and rack cover; a minimum of 5cm (2 inches) is required between the enclosure and the rear wall of the cabinet.

18. Handle the system modules by the retention screws, ejection levers, or the module's metal frame/faceplate only. Avoid touching the PCB boards or connector pins.

19. Always secure every enclosure module with its retaining screws and make sure it is held in place by its retention mechanisms.

20. When working with the subsystem, it is important to use tools with care. Do not place power tools or other items on top of the enclosure to avoid damaging the outward appearance.

21. If it is necessary to transport the subsystem, remove and repackage all disk drives separately.

### 2.3.2 Static-free Installation

Static electricity can damage the system's electronic components. To prevent ESD damage to any of the components, follow these precautions before touching or handling them:

- Discharge the static electricity accumulated in your body by wearing an anti-static wristband. Use of other methods, such as an ionizer, is also recommended.
- Avoid carpets, plastic, vinyl, and Styrofoam in your work area.
- Handle all components by holding their edges or metal frames. Avoid touching the exposed circuitry on PCB boards and connector pins.



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### 2.3.3 Preparation

- Make sure you are aware of the related positions of each plug-in module and interface connector.

- Default configurations: The R (redundant controller) model provides a total of eight (8) 4Gb/s Fibre Channel host ports and a 4x (4-PHY), wide-link, SAS port. The S (single controller) model provides four (4) Fibre Channel host ports and a 4x (4-PHY), wide-link, SAS port. They are marked as "**CH0**" or "**CH1**" and "**SAS Exp**." Use these ports to connect application servers and expansion JBOD(s).

  Infortrend's JBODs come with external SAS cables for making the inter-enclosure connections.

- Cables for connecting Fibre and SAS devices must be handled with care and must not be bent. To prevent emission interference within a rack system and accidental cable disconnection, the routing path must be carefully planned.

## 2.4 General Installation Procedure

Following all the instructions provided below can minimize subsystem installation time. Detailed, illustrated instructions for each component are given in the following sections.



**CAUTION!**

To ensure that your system is correctly installed, please follow the steps outlined below. If you follow these steps, installation will be fast and efficient. If you do not follow these steps, you may accidentally install the hardware incorrectly.

1. **Unpack:** Unpack the subsystem and confirm that all components on the list were included. (See ***Section 2.5***)

2. **Rack/Cabinet installation:** If the subsystem is going to be installed in a rack or cabinet, it should be installed prior to installing the hard drives. Installing the subsystem into a rack or cabinet requires at least two (2) people. (See ***Section 2.10***)

3. **Install hard drives:** Separately purchased SAS or SATA hard drives must be individually attached to the drive trays. (See ***Section 2.6***)

4. **Install drive trays:** After the hard drives have been installed into the drive trays, the drive trays must be installed into the enclosure itself. (See ***Section 2.7***)



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5. **Cable connection:** Use the supplied power cords to connect the subsystem to main power. It is recommended to connect power cords to separate and independent power sources, e.g., UPS, for higher redundancy. Make sure your subsystem is electrically grounded.

6. Use separately purchased Fibre Channel optical cables and transceivers to connect host ports to FC switches or host computers. (See ***Chapter 3***)

**CAUTION!**

Cables for connecting Fibre Channel devices must be handled with care. They must not be bent and the routing path must be carefully planned to prevent emission interference within a rack system.

7. **Power up:** Once the components have been properly installed and all cables are properly connected, you can power up the subsystem and configure the RAID array. (See ***Section 4.1***)

### 2.4.1 Installation Procedure Flowchart

***Figure 2-1*** shows a flowchart of the installation procedure. As you complete each step, check off the "***Done***" box on the right. Please use this flowchart in conjunction with the instructions that follow.

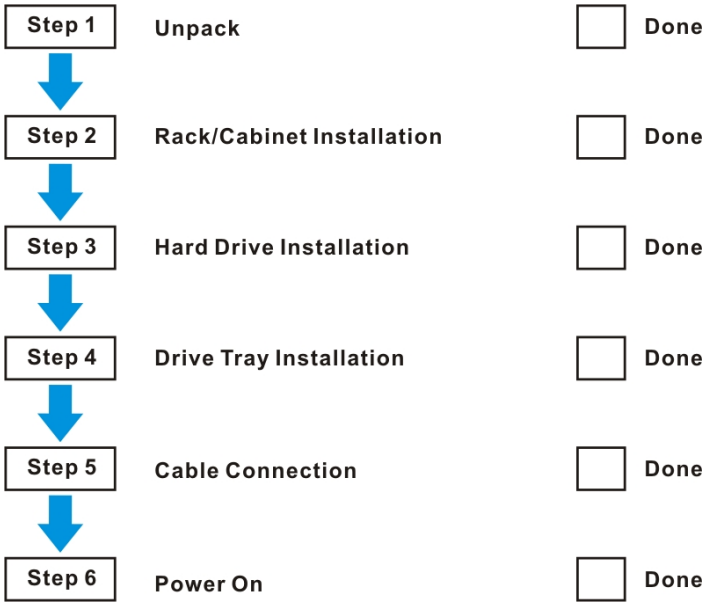



**Figure 2-1: Installation Procedure Flowchart**



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# 2.5 Unpacking the Subsystem

Compare the ***Unpacking List*** against the actual package contents to confirm that all required materials have arrived. Carefully check the items contained in each box before proceeding with installation.

**WARNING!**

Do not rely on the non-definitive, summarized unpacking list shown below--it is for reference only. A detailed packing list can be found in your product shipping package or product CD.

Each packed box is separated into the upper and lower levels.

**Upper level box contents:**

- Sixteen (16) drive canisters

**Lower level contents:** Three (3) boxes are placed in the lower level. One (1) box contains the enclosure with all the pre-installed components. The other two (2) boxes contain power cords and accessory items.

Accessory items include an RS-232C serial port cable, a null modem, a printed copy of ***Quick Installation Guide***, screws, and a CD containing the ***RAIDWatch*** Manager software and its user manual, ***Installation and Hardware Reference Manual*** (this document), ***EonPath*** software and the ***Fibre-to-SAS Operation Manual*** (Firmware).

## 2.5.1 Preinstalled Components

Following are the pre-installed components:

- 1 - LCD keypad panel
- 1 - LED panel (Custom-made models)
- 2 - Forearm handles
- 2 - Chassis ears with finger grips (Custom-made models)
- 1 - Backplane board
- 2 (S16F-R1430) / 1 (S16F-G1430) - Controller module(s)
- 2 (S16F-R1430) / 1 (S16F-G1430) - DDR RAM DIMM module(s)
- 2 - BBUs (Dual-controller model, S16F-R1430)
- 2 - PSUs (with cooling modules)

## 2.5.2 Components to be Installed

You must install the following components:

- Hard drives (separately purchased SAS/SATA drives)
- Drive trays



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# 2.6 Hard Drive Installation

## 2.6.1 Hard Drive Installation Prerequisites

Hard drives must be purchased separately. When purchasing the hard drives, the following factors should be considered:

**Capacity (MB/GB):** Use drives with the same capacity. RAID arrays use a "least-common-denominator" approach meaning that the maximum usable capacity in each member drive is the maximum capacity of the smallest drive. Choose big drives with the same storage capacity.



**TIPS:**

Even disk drives by the same manufacturer, of the same model, and claiming the same rated capacity may actually carry different block numbers meaning that their capacity may not be exactly the same.

When configuring disk drives into a RAID array, you may use a slightly smaller capacity as the "**Maximum Disk Capacity**" in each individual disk drive. The configuration option can be found in the interface-specific firmware manual that came with your enclosure.

**Profile:** The drive trays are designed for 3.5-inch wide x 1-inch high hard drives.

**Drive type:** The subsystem is designed for SAS or SATA-II interface hard drives. Please ensure that you purchase the correct hard drives.

**MUX kit:** A dual-controller S16F-R1430 subsystem comes with SAS-to-SATA MUX kits on its drive trays. The MUX kits provide access routes form the dual-active RAID controllers. If the dual-ported SAS drives are preferred, there is no need for the MUX kits.

The single-controller models using SATA hard drives does not require MUX kits either.



**CAUTION!**

The hard drives and drive trays should only be installed into the subsystem after the subsystem has been mounted into a rack cabinet. If the hard drives are installed first, the subsystem will be too heavy to handle and the possible impact during installation may damage your drives.



**WARNING!**

1. Handle hard drives with extreme care. Hard drives are very delicate. Dropping a drive onto a hard surface (even over a short distance) and hitting or touching the circuits on the drives with your tools may damage the drives.



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2. Observe all ESD prevention methods when installing hard drives.

3. Only use screws supplied with the drive canisters. Longer screws may damage the hard drive.

### 2.6.2 Drive Installation without MUX Kit

**Step 1.** **Place the hard drive into the drive tray** (as shown in ***Figure 2-3***), making sure that the connector at the back of the drive is facing the open side of the drive tray, the circuit side facing downward, and the label side facing upward.

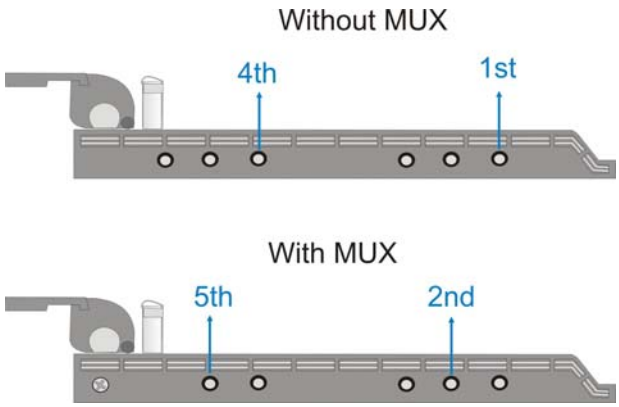



**Figure 2-2: Screw Holes for Different Installations**

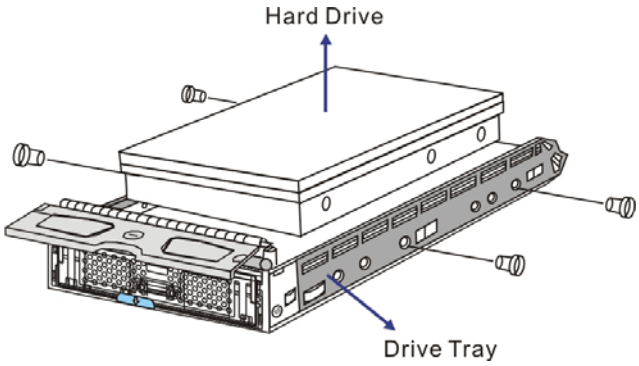



**Figure 2-3: Installing a Hard Drive without MUX Kit**

**Step 2.** **Adjust the drive's location** until the mounting holes in the drive canister are aligned with those on the hard drive. Secure the drive with four (4) of the supplied 6/32 flat-head screws. (See ***Figure 2-3***)



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### 2.6.3 Drive Installation with MUX Kit

**Step 1.** **Place the hard drive into the drive tray**, making sure that the connector at the back of the drive is facing the open side of the drive tray, the circuit side facing downward, and the label side facing upward.

**Step 2.** Connect the drive to the MUX kit by sliding it towards the rear of the drive tray until a solid connection between the drive connector and the MUX kit connector has been made. (See ***Figure 2-4***)

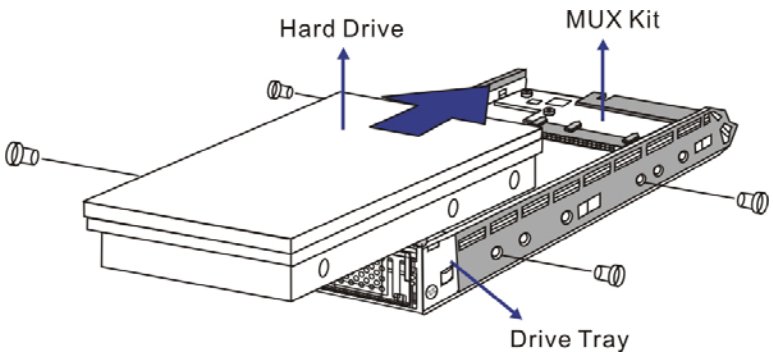



**Figure 2-4: Installing a Hard Drive with a MUX Kit**

**Step 3.** Insert four (4) supplied 6/32 flat-head retention screws to secure the hard drive.

**Step 4.** Once the hard drives are installed into drive trays, install all drive trays into the subsystem.

## 2.7 Drive Tray Installation

Once the hard drives have been secured to the drive trays, the drive trays are ready to be installed into the S16F subsystem.

**WARNING!**

All drive trays must be installed into the enclosure even if they do not contain a hard drive. If the trays are not installed into the enclosure, the ventilation required for cooling will not be normalized and the subsystem will overheat.

**Step 1.** **Make sure the rotary bezel lock is in the unlocked position**, i.e., the groove on its face is in a horizontal orientation as



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shown in ***Figure 2-5.*** If the groove is in a vertical position**,** then the rotary lock prevents the front flap on the drive tray from opening.

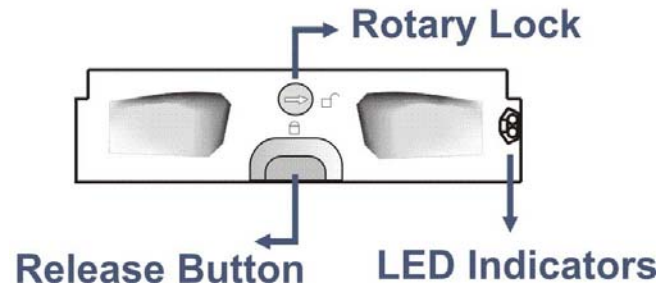



**Figure 2-5: Front View of an Individual Drive Tray**

**Step 2.** **Open the front flap** (see ***Figure 2-6***) by pushing the release button on the drive tray. The front flap will spring open.

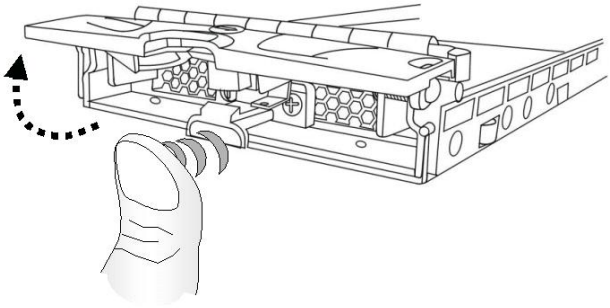


**Figure 2-6: Opening the Front Flap**

**Step 3.** **Align the drive tray with the slot** into which you wish to insert it. Make sure that it is properly aligned with the drive bay, and then gently slide it in. This should be done smoothly and gently. (See ***Figure 2-7***)

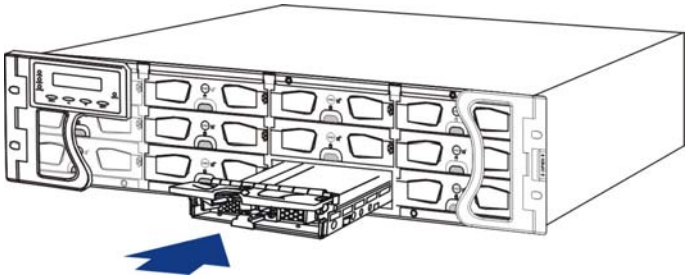


**Figure 2-7: Installing a Drive Tray**

**Step 4.** **Close the front flap.** Make sure the front flap is closed properly to ensure that the back-end connector is properly mated with the corresponding connector on the backplane board. If the front flap is not closed properly, the connection between the hard drive and the subsystem will not be secure.



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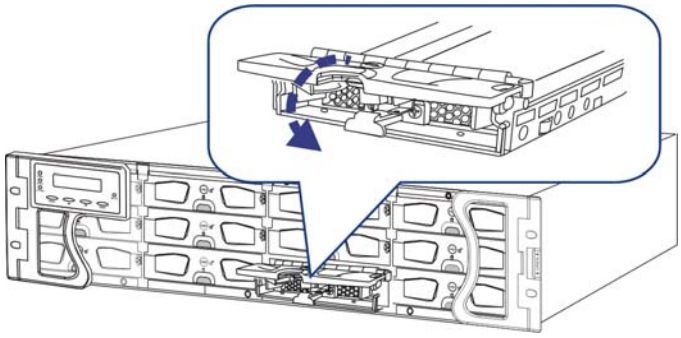


**Figure 2-8: Closing the Front Flap**

**Step 5.** **Lock the front flap into place** by turning the rotary bezel lock using a small-size flathead screwdriver. Turn the bezel lock until the groove on its face is pointing down (vertical orientation). (See ***Figure 2-9***)

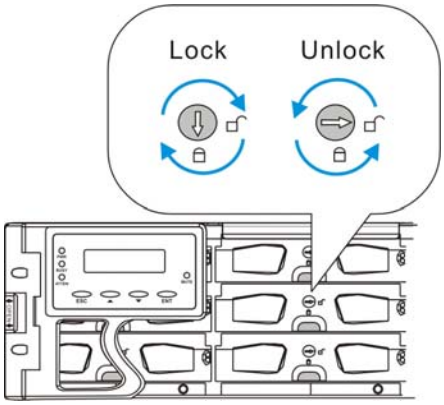



**Figure 2-9: Drive Tray Rotary Lock Rotation**

Once drive trays are inserted and the subsystem is powered on, the subsystem will recognize them and automatically bring them online during the power-on procedure.

## 2.8 Optional MUX Kit Installation

Situations may require that you install a MUX kit back to the drive trays because of configuration change. Please follow the instructions below to install a MUX kit to a drive tray.



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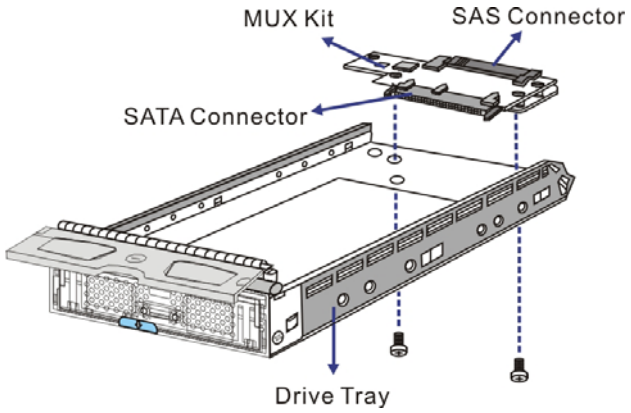



**Figure 2-10: Installing a MUX Kit**

**Step 1.** Orient the MUX kit with mounting positions near the open end of the drive tray. The SATA connector should face the front side and the SAS connector should face the rear side. Align the mounting holes on the drive tray with those on the MUX kit.

The SAS and SATA interfaces look similar. A SAS connector has pins on both sides.

**Step 2.** Secure the MUX kit by driving the included two (2) retention screws from the bottom of the drive tray. (See ***Figure 2-10***)

# 2.9 BBU Installation

The BBU can sustain cache memory in the event of a power failure or in the extremely unlikely event of failing both PSUs. The use of a BBU is highly recommended in order to avoid data inconsistency. The BBU is an optional item for the S16F-G1430 and can be ordered separately from your subsystem vendor (PN: IFT-9273CBTE). You may skip this section if you are using an S16F-R1430 redundant-controller subsystem because two (2) BBUs come as standard equipment.

Read the BBU handling precautions in ***Section 2.9.1*** before replacing it.

Please follow the steps in ***Section 2.9.2*** to install a BBU into your system.

## 2.9.1 BBU Warnings and Precautions

- Install or replace the BBU with BBUs supplied by your ES subsystem vendors only. Use of battery cells provided from another source will void your warranty.



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- Always dispose of used batteries in an ecologically responsible manner at authorized battery disposal sites only.

- Do not use nor leave the BBU near a heat source. Heat can melt the insulation and damage other safety features of the battery cells, possibly causing an acid leak and may result in a fire or explosion.

- Do not immerse the BBU in water nor allow it to get wet. Its protective features can be damaged and abnormal chemical reactions may occur, possibly causing functional defects, acid leaks, and other hazardous results.

- Do not disassemble or modify the BBU. If disassembled, the BBU could leak acid, overheat, emit smoke, burst and/or ignite.

- Do not pierce the BBU with a sharp object, strike it with a hammer, step on it, or throw it. These actions could damage or deform it and internal short-circuiting can occur, possibly causing functional defects, acid leaks, and other hazardous results.

- If a BBU leaks, gives off a bad odor, generates heat, becomes discolored or deformed, or in any way appears abnormal during use, recharging or storage, immediately remove it from the subsystem and stop using it. If this is discovered when you first use the BBU, return it to Infortrend or your system vendor.

### 2.9.2 Installation Procedure

To install a BBU into the controller module, please follow these steps:



**Step 1.** **Remove the BBU slot dummy plate from the chassis** by loosening the two (2) retention screws on the sides using a Phillips screwdriver, and then pulling the dummy plate away. (See ***Figure 2-11***)



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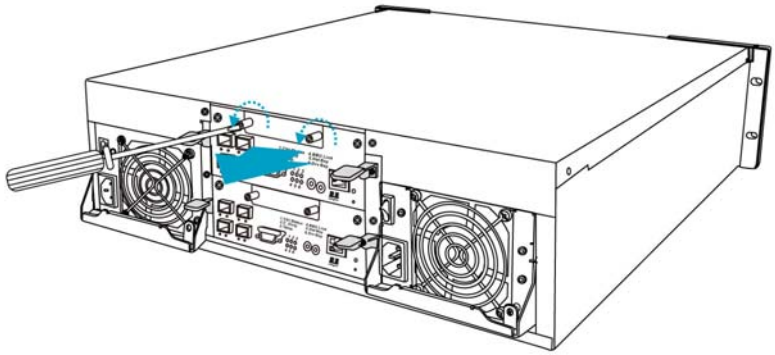


**Figure 2-11: Removing the BBU Slot Dummy Plate**

**Step 2.** **Install a BBU** by aligning it with the module slot, and then gently pushing the BBU until it is fully inserted.

**Step 3.** **Secure the BBU to the subsystem** by fastening the two (2) retention screws on the BBU. (See ***Figure 2-12***)

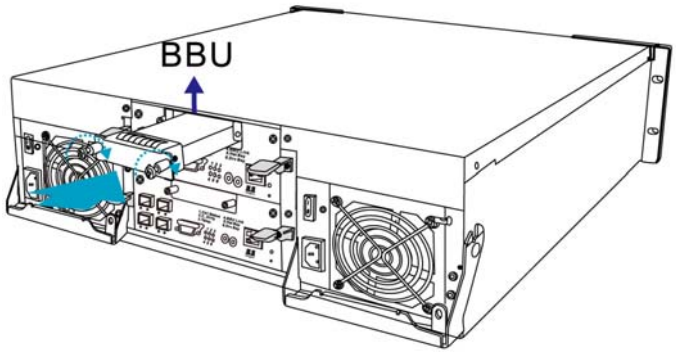



**Figure 2-12: Installing the BBU**

**Step 4.** The LED should start flashing to indicate that the BBU is being charged. When the BBU is fully charged, the LED will turn off. (See ***Figure 2-13***)

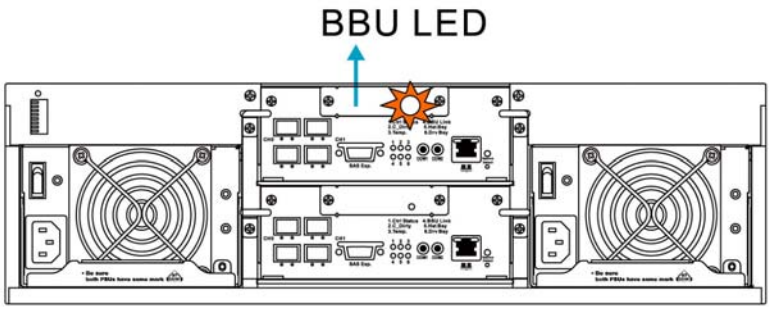



**Figure 2-13: BBU LEDs**



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**NOTE:**

A new or replaced BBU takes at least 12 hours to charge to its full capacity.

**NOTE:**

The life expectancy of a BBU is more than one year. However, batteries' life span can fluctuate depending on how many times batteries are charged. An installation date record is kept in the EEPROM embedded in the battery module. When reaching the one-year life expectancy, system firmware will automatically notify an administrator. Follow the procedures in Section 5.4 to replace a BBU that is not able to hold charge.

## 2.10 Rackmounting

PN: IFT-9273CSlider32

PN: IFT-9273CSlider36

The subsystem is designed to fit into a variety of 19-inch rack cabinets or racks. Make sure you have an appropriate site location and cables prepared with adequate lengths to connect to main power and other devices.

Two (2) slide rails are available from Infortrend for installing the subsystem into a rack or cabinet. The available options are listed above.

Use two (2) forearm handles on the chassis ear to push or pull the subsystem into/out of a rack. Secure the subsystem chassis to the rack using the two (2) screw holes on each chassis ear.

To install the subsystem into a rack or cabinet, please refer to the installation instructions that came with the slide rails.



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# Chapter 3

# Subsystem Connection

This chapter outlines some general configuration rules you should use when configuring a storage system and introduces basic information about Fibre optical cables and Fibre Channel topologies for the subsystem. You can set up the subsystem using these topologies or use them as a guide for developing your own unique topologies. A complete description of the power on and power off procedures is also given in this chapter.

## 3.1 FC Host Connection Prerequisites

### 3.1.1 Choosing the Fibre Cables

The Fibre Channel standard allows for both copper and optical connections. Copper cable is cheaper but limited to lengths of less than 30m (33 yards). Optical cable can be used over longer distances and have been shown to be more reliable. Due to the extreme demands of high data transfer rates, optical cables are preferred for 4Gbps Fibre connectivity. Optical cables are also less susceptible to EMI.

Fiber optical cables are expensive components that need to be purchased separately. You may order Fibre optical cables (IFT-9270CFCCab01, IFT-9270CFCCab02, IFT-9270CFCCab03) of different lengths from Infortrend or your subsystem vendor. These cables have been tested and proven to be compatible with your S16F-R1430/G1430 subsystems.

The Fibre host ports connect to Fibre Channel host adapters (HBA) that features a 4Gbps transfer rate, SFP interface, and support for full-duplex transfer, best capable of operating with 64-bit/133MHz PCI-X or higher standard interfaces.

HBA performance is closely related to the best performance this subsystem can bring you. If an HBA is inadequately configured, for example, installed on a slow system bus, the host link bandwidth will be limited.



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**WARNING!**

All optical cables are sensitive and must be handled with care. To prevent interference within a rack system, the cable routing path must be carefully planned and the cables must not be bent.

### 3.1.2 FC Lasers

**CAUTION!**

Although the 4G Fibre interface sockets comply with the Class 1 safety standard, Lasers can still be hazardous and may cause eye damage. Therefore, the optical transceivers must be treated with caution. Never look at lasers without confirming that they are off.

**Wavelengths:** The lasers on fiber optic cables emit either short wave (SW) beams (770nm-860nm) or long wave (LW) (1270nm-1355nm) beams. Cables using either of these wavelengths can be used.

**Laser types:** Two (2) types of laser devices can be used in FC cables: Optical Fibre Control (OFC) and non-OFC lasers. The OFC lasers are high-powered and can be used over long distances.

**Safety features:** Due to their high power output, OFC lasers usually come with a safety mechanism that switches the laser off as soon as it is unplugged. Non-OFC lasers are low power and do not come with these safety features; however, they can still inflict damage.

SFPs are field-replaceable units (FRUs) and can be ordered from Infortrend. These SFPs have been selected and tested to provide the necessary reliability and performance.

**NOTE:**

SFP and cable assemblies can be ordered from Infortrend. These cabling devices have been selected and tested to provide necessary reliability and performance. SFPs from other vendors may not work well with the subsystem.

### 3.1.3 SFP Transceivers

SFP transceivers should typically have at least 4Gbps bi-directional data links, a laser transmitter (for fiber optical cables), low-profile LC connector, and a metal enclosure to lower the EMI.



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**NOTE:**

LC connectors are small form-factor, fiber-optic connectors based on a 1.25-mm ceramic ferrule with a latching mechanism.

Other beneficial features of a typical SFP transceiver include a single power supply, low power dissipation, and hot-swap capability. It is also important that any transceiver you use meets the FC performance and reliability specifications.

**NOTE:**

SFP transceiver modules must be purchased separately. You may also purchase the SFP transceivers (IFT-9270CSFP4GA01) from your EonStor subsystem vendor/distributor.

# 3.2 Topology and Configuration Considerations

## Basic Configuration Rules

When you are cabling your subsystem, the following are some basic rules that should be followed.

- When selecting the number of hard drives that will be configured into a logical configuration, the mechanical performance of the hard disks should be considered.

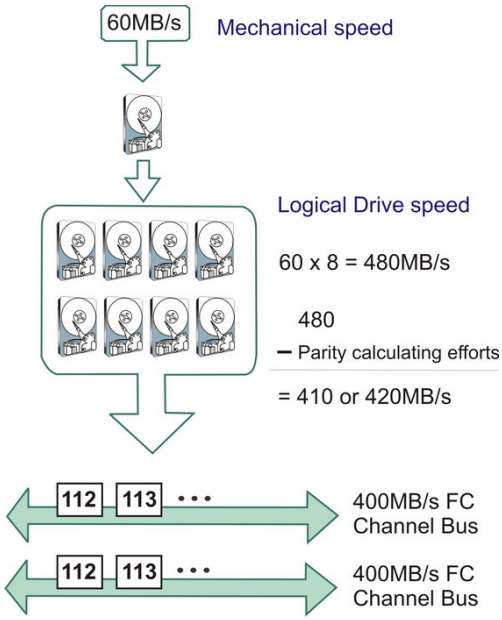



**Figure 3-1: Mechanical Speed and Channel Bus Bandwidth**



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- When cabling, follow all Fibre Channel specifications. Pay attention to signal quality and avoid electronic noise from adjacent interfaces.

- The disk drives in the same logical array should have the same capacity, but it is preferred that all the drives within the subsystem have the same capacity.

- Mixing SAS and SATA disk drives in the same enclosure is allowed. However, including SAS and SATA disk drives in the same logical drive is not recommended.

- A spare drive (Local, Global, or Enclosure spare) should have a capacity equal to the largest drive that it is expected to replace. If the capacity of the spare is smaller than the capacity of the drive it is expected to replace, then the controller will not proceed with the failed drive rebuild.

## Fibre Channel Topologies

The Fibre Channel standard supports separate topologies. They are Fibre Channel Arbitrated Loop (FC-AL) and fabric switch topologies.

- **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 supports 124 devices in a single loop.

- **Fabric:** The fabric topology supports up to $2^{24}$ Fibre Channel devices. This topology allows many devices to communicate at the same time. A Fibre switch is required to implement this topology.

## Host-side Topologies

The primary concern for configuring host-side topologies is to eliminate points of failure. It is therefore recommended that the host interfaces be connected to at least a dual-ported host using two (2) HBAs. It is also preferred to connect the subsystems to host computer(s) through intelligent Fibre switches that feature zoning and fault recovery algorithms.



**NOTE:**

Multipathing software on the host computer(s) is necessary in order to manage the I/O traffic through the fault-tolerant, redundant data paths to a RAID subsystem.



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## Drive-side Connection

The drive-side connection is made through redundant data paths on the back-end PCB that are compatible with the dual-ported connectivity feature of SAS drives. Disk drives are connected through separated SAS domains. And these domains are separately managed by different RAID controllers. I/Os are dynamically distributed through these separate domains; and, in the event of single RAID controller failure, the surviving controller can access disk drives through both domains.

## Internal Connections

The internal connections described here only applied in the S16F-R1430 redundant controller subsystem. The two (2) controllers are connected to each other internally through the backplane board. This also enables the two (2) controllers to synchronize their caches and dynamically distribute the workload according to firmware load-balancing algorithms.

If you prefer cost-effective SATA drives in the subsystem, MUX boards are necessary for directing accesses from different RAID controllers. MUX boards come as default equipment in the dual-controller model.

## Unique Identifier

The unique identifier is a 16-bit hexadecimal number that is used to generate Fibre Channel port names and node names. By factory defaults, each RAID controller is assigned with a separate hexadecimal number and the firmware then determines which unique identifier to use. It is usually not necessary to change the default identifier. To see how to use the front panel LCD screen or the terminal emulation program to enter the unique identifier, please refer to the ***Fibre-to-SAS RAID Subsystem Operation Manual***.

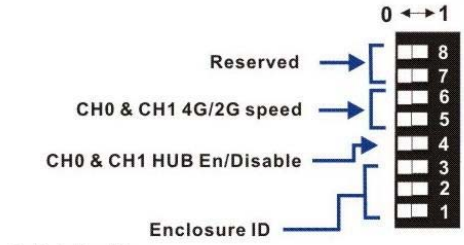
## ID/LUN Mapping

I/O load distribution between the RAID controllers is determined by the host ID/LUN mapping. Different logical groups of drives can be mapped to the LUN numbers under a host ID. For access through different host links, e.g., in a multiple data links configuration, a logical drive configuration can be associated with different ID/LUN combinations on different host channels. In this case, file locking or multi-pathing control is necessary. ID/LUN mapping procedures are described fully in the Fibre-to-SAS firmware Operation Manual.



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## DIP Switch




Switch Position

| SW ID | 0 | 1 | Drive Loop ID |
|---|---|---|---|
| 1 | ✓ | - | SW ID: 0, 0, 0 as default, do not change |
| 2 | ✓ | - | |
| 3 | ✓ | - | |
| 4 | En | Dis | CH0 & CH1 Hub en/disable |
| 5 | - | - | CH0 & CH1 speed selector |
| 6 | - | - | SW ID: 5 6<br>0, 0 - CH0/CH1 in 4G speed<br>1, 1 - CH0/CH1 in 2G speed |
| 7 | ✓ | - | Reserved |
| 8 | ✓ | - | |

**Figure 3-2: Rear Panel DIP Switches**

DIP switches can be used to determine the following parameters:

1. **Onboard hub:** The onboard hub combines the same channels on different RAID controllers into the same host loops. The configuration is diagrammed below:

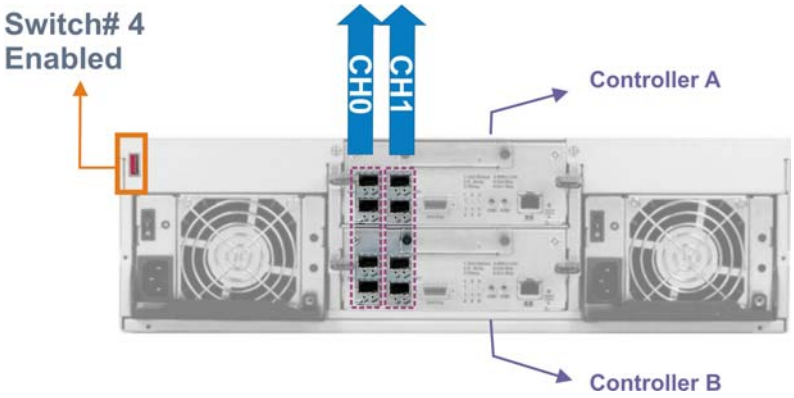



**Figure 3-3: Host Ports Hubbed Together**

**NOTE:**

Currently the Fibre host ports can operate either at a fixed 4Gb/s or a fixed 2Gb/s speed. Make sure all Fibre Channel network devices, HBAs or switches, operate at the specified speed.



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**IMPORTANT:**

1. One drawback of using the hub function is that the host ports looped together may not be connected to the N_ports on a fabric switch. When host ports are hubbed together, they are ideal for connecting direct-attached servers with path redundancy while without the costs on expensive FC switches.
2. Another drawback is that if host ports are hubbed together, e.g., controller A CH0 ports with controller B CH0 ports, the combined host ports' bandwidth is halved.

   For example, the CH0 host ports on each controller feature a 4Gb/s bandwidth and a total of 8Gb/s bandwidth from the CH0 host ports on two controllers.

   If host ports are hubbed together, all four CH0 host ports share a 4Gb/s bandwidth.

2. **Enclosure ID**: For a RAID subsystem the default is "0" and needs not be changed. As diagrammed below, if the RAID subsystem is connected with Infortrend's SAS interface JBODs, each JBOD enclosure should have an enclosure ID starting from #**1**.

   Shown below are a primary RAID enclosure connected with SAS expansion JBODs via SAS external wide links. The enclosure IDs on expansion JBODs are configured using a rotary ID switch.



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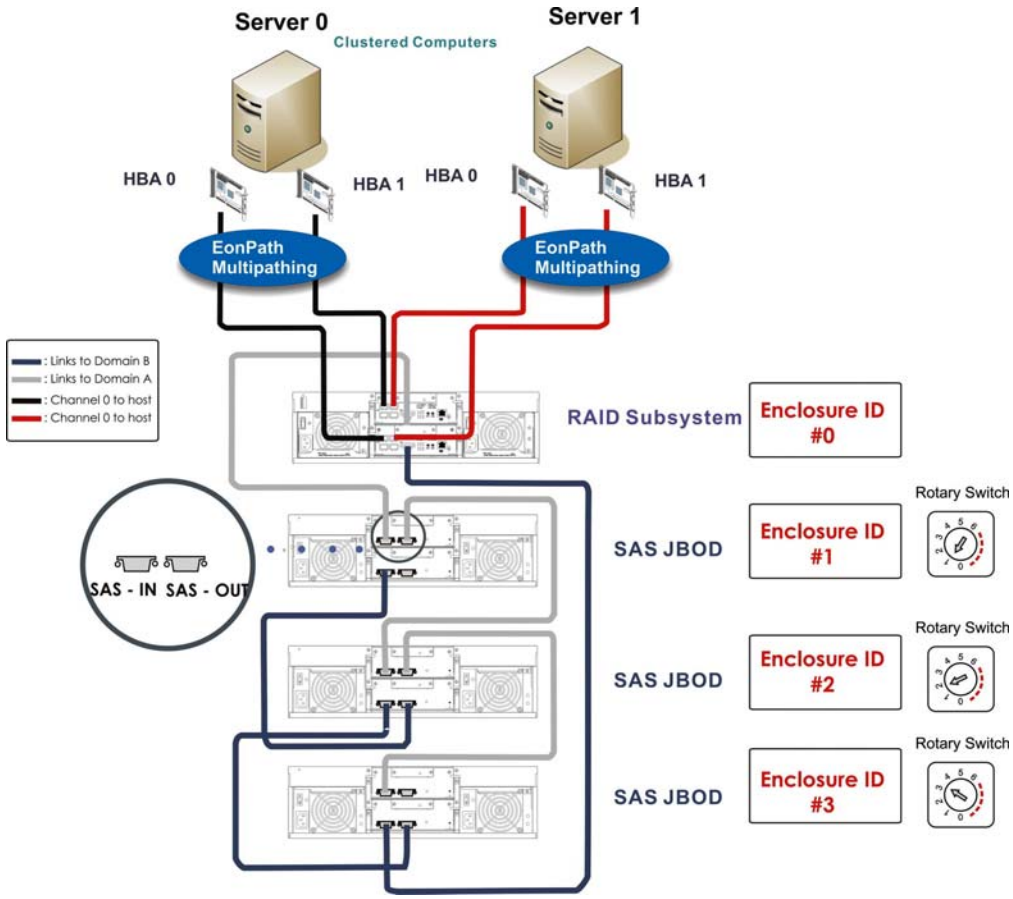



**Figure 3-4: Enclosure ID Sequence**

3. **CH0/CH1 Link Speed**:

Shown below are the combinations of DIP switch mode settings:

| **DIP Switch Mode Setting** | | | | |
|---|---|---|---|---|
| Switches #1 to #3 | Enclosure ID: defaulted to represent number "0," SW ID: 0, 0, 0; No need to change. | | | |
| Switch# 4 | 0: Hub Enabled; 1: Hub Disabled | | | |
| Switches #5 and #6 | Switch ID combinations | | | |
| | | **5** | **6** | Switches |
| | | 0 | 0 | CH0/CH1 at 4G speed |
| | | 0 | 1 | |
| | | 1 | 0 | |
| | | 1 | 1 | CH0/CH1 at 2G speed |

**Table 3- 1 DIP Switch Mode Settings**



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# 3.3 Sample Topologies

Use the Fibre ports, marked as "**CH0**" and "**CH1**", on the controller modules to connect to host computer(s) or to a switched fabric.

## Multiple RAID, Fault-tolerant Connection

Shown below is a DAS configuration using cross-links among up to 3 RAID subsystems.

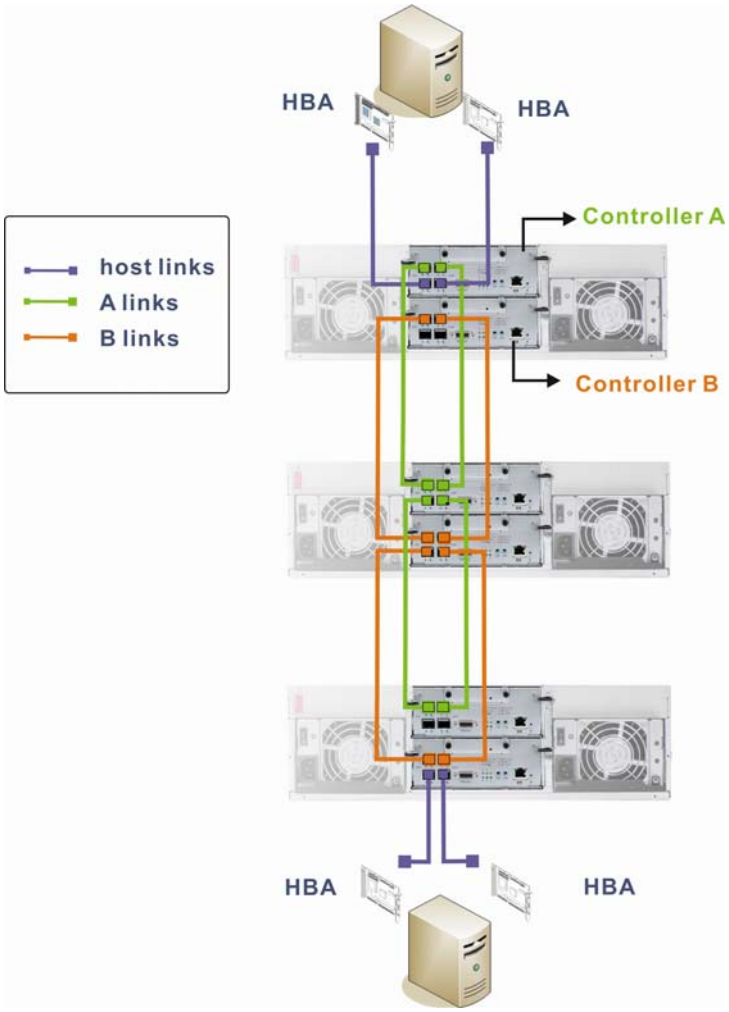



**Figure 3-5: 2 Servers with 3 RAID Subsystems and Fault-tolerant Paths**

| Channel Settings | |
|---|---|
| **Host** | CH0 and CH1 |
| **Drive** | Via system bus, through the backplane |
| **Onboard Hub** | Disabled |



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| Configuration Information | |
|---|---|
| **RAID controller** | 2 |
| **Host server** | Multiple |
| **Data path connection** | Fault-tolerant configuration |
| **Host channel bandwidth** | 16Gb/s |
| **Max. number of drives** | 48 |

### Configuration Rules:

1. When cascading multiple RAID subsystems, you should disable the onboard hub, and separately cross-link the host ports on different RAID controllers.
2. When connecting to a switched fabric, onboard hub should be disabled.
3. Host ports on Controller A always connect to the host ports on the Controller A of the next enclosure. Controller A is defined as one that is installed in the upper slot location, usually the RAID controller managing the whole subsystem.
4. If Controller A fails, host LUNs previously associated with Controller A will be managed by Controller B.
5. Depending on I/O characteristics, each configured array should be properly optimized either for Random or Sequential I/Os.
6. You may also partition a logical capacity into two or more volumes and let each server access separate volumes.
7. With fault-tolerant cabling, host multipathing software is necessary.



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## Single Controller Connection

The diagram below shows a simple direct-attached configuration.

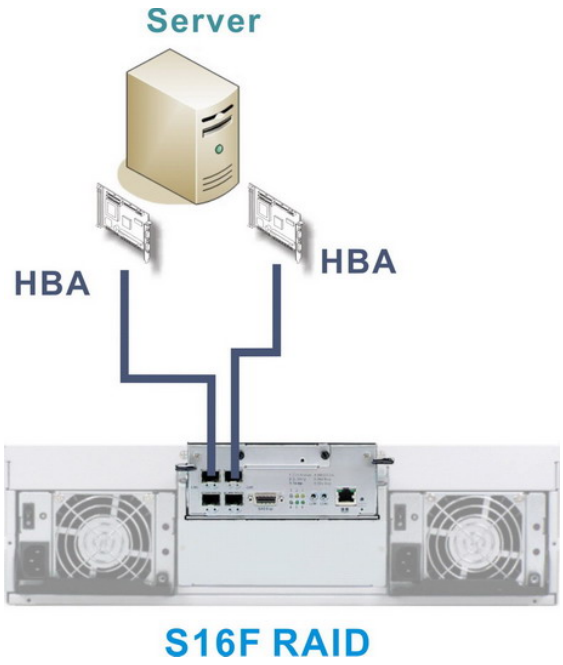



**Figure 3-6: Simple DAS Storage**

| Channel Settings | |
|---|---|
| **Host** | CH0 and CH1 |
| **Drive** | Via system bus, through the backplane |
| **Onboard Hub** | Disabled |

| Configuration Information | |
|---|---|
| **RAID controller** | 1 |
| **Host servers** | 1 or more in a switched fabric |
| **Data path connection** | Direct attached |
| **Host channel bandwidth** | 8Gb/s |
| **Max. number of drives** | 16 |

### Configuration Rules:

1. Shown above is a direct-attached application using direct host links to host HBAs.
2. Depending on I/O characteristics, each configured array should be properly optimized either for Random or Sequential I/Os.
3. You may also partition a logical capacity into two or more volumes and let different servers access separate volumes.



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## Dual-Controller, Fault-Tolerant Connection

The diagram below shows the volumes on a RAID array shared over Fibre Channel network.

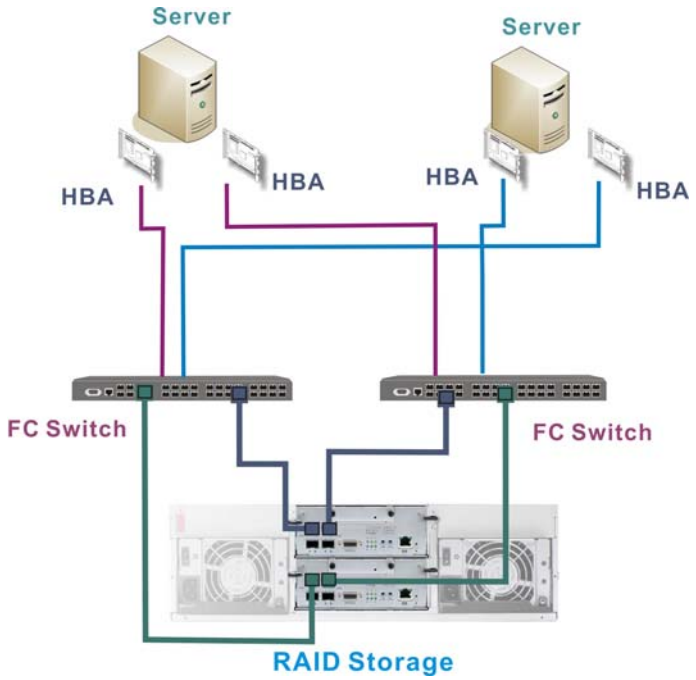



**Figure 3-7: Shared Storage over Fibre Channel Network**

Please note, in the example shown in ***Figure 3-7,*** the host channels are configured in the following way.

| Channel Settings | |
|---|---|
| **Host** | CH0 and CH1 |
| **Drive** | Via system bus, through the backplane |
| **Onboard Hub** | Disabled |

| Configuration Information | |
|---|---|
| **RAID controller** | 2 |
| **Host servers** | 2 or more in the switched fabric |
| **Data path connection** | Fault-tolerant configuration |
| **Host channel bandwidth** | 16Gb/s |
| **Max. number of drives** | 16 |

### Configuration Rules:

1. For details on the relationships among host links, host ID/LUNs, and logical configurations, you may refer to your firmware operation manual.
2. Shown above is a SAN application using independent host links to the host ports on two RAID controllers.



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3. The configuration ensures that an application server can always access a storage array even in the event of cabling component failure.
4. For connections to N_port on FC switches, the onboard hub should be disabled.
5. When the onboard hub is disabled, the host ports on different RAID controllers need to be separately connected to switch ports.
6. If Controller A fails, LUNs previously associated with Controller A will be managed by Controller B.
7. Depending on I/O characteristics, each configured array should be properly optimized either for Random or Sequential I/Os.
8. You may also partition a logical capacity into two or more volumes and let each server access separate volumes.
9. With fault-tolerant cabling, host multipathing software is necessary.

## Drive-side Expansion

### Configuration Rules:

#### Dual-port Configuration Feature:

Following are the rules for connecting SAS interfaces across RAID and JBOD enclosures:

1. Corresponding to SAS drives' **dual-ported** interface, two (2) physical links are available from each disk drive, routed across the backplane board, and then interfaced each through a 4x wide external SAS port.

2. SAS expansion cables will be available with Infortrend's JBODs. Note that if many JBODs are connected, a longer SAS external cable may be necessary to connect a JBOD from the other direction offering path redundancy even when one of the JBODs fails.

   One expansion link connects JBODs from RAID to the nearest JBOD, and then to the farthest JBOD. Another expansion link connects to the farthest JBOD from the opposite direction and then to the nearest JBOD.

3. Each expander controller controls a "**SAS Domain**" that connects one of the alternative interfaces on all of the disk drives in the enclosure. For example, one expander unit controls Domain A and the other Domain B. In a fault-tolerant topology, the SAS ports always connect to the SAS ports on the same SAS Domain. The Domains can be identified by the expanders' locations, i.e., upper controller slot (Controller A) or the lower controller slot (Controller B).



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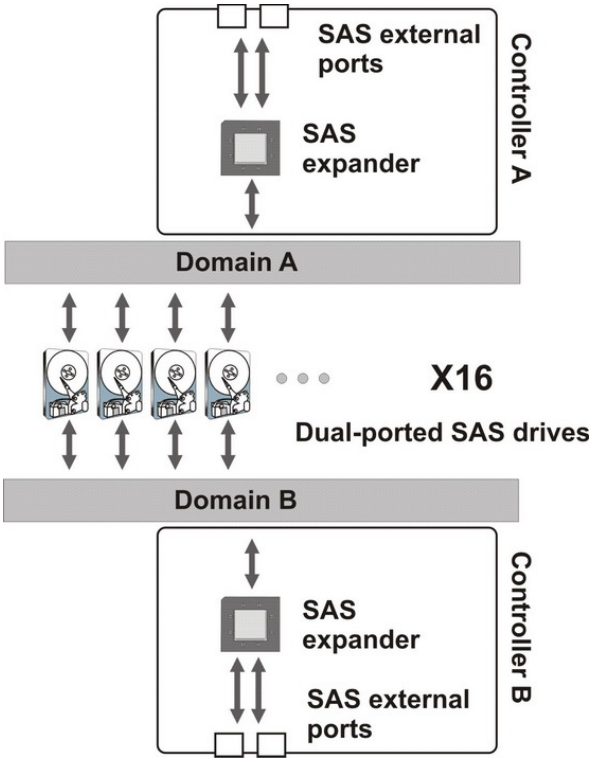



**Figure 3-8: SAS Domains**

4. On the RAID subsystem, each RAID controller can be considered as managing a separate SAS Domain. Firmware supports SAS protocols such as SMP, STP, and SSP transport layers. With the help of redundant circuitry on the MUX boards, the idea of SAS Domain applies even when SATA drives are used.



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**Physical Connections: Redundant-controller RAID to Redundant-controller JBODs**

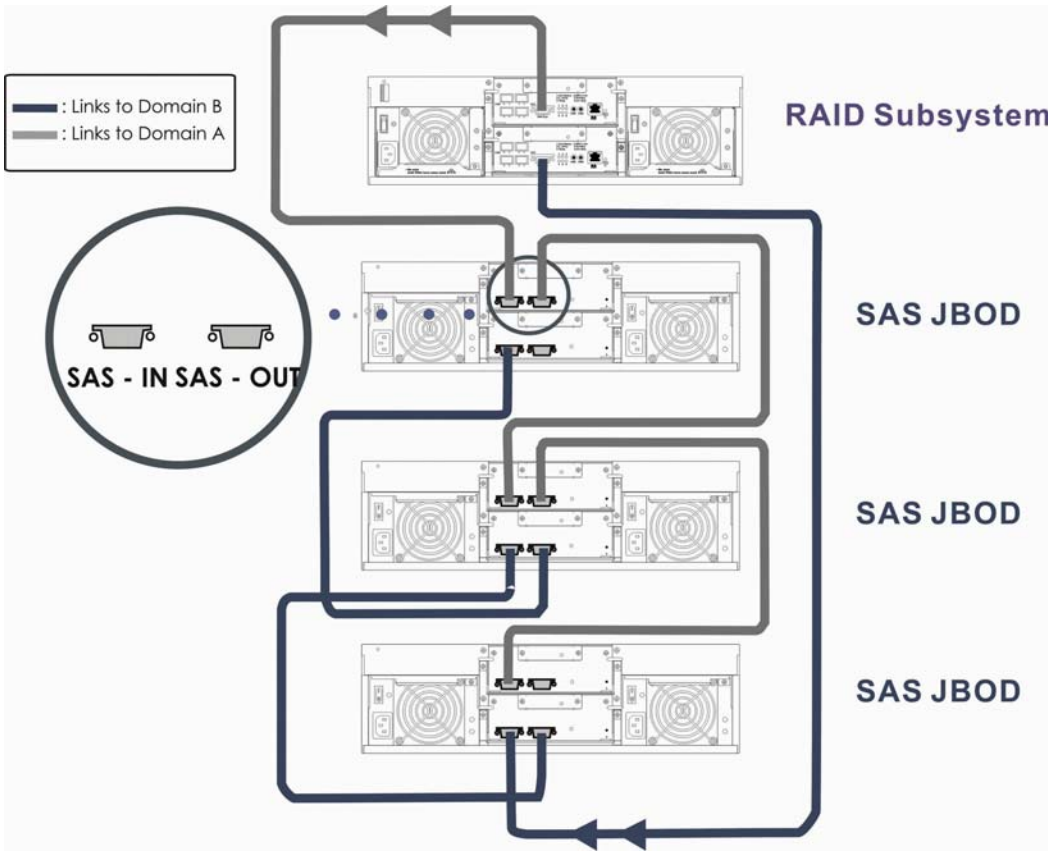



**Figure 3-9: Connecting SAS JBODs with an S16F RAID Subsystem**



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**Physical Connections: Single-controller RAID to Single-controller JBODs**

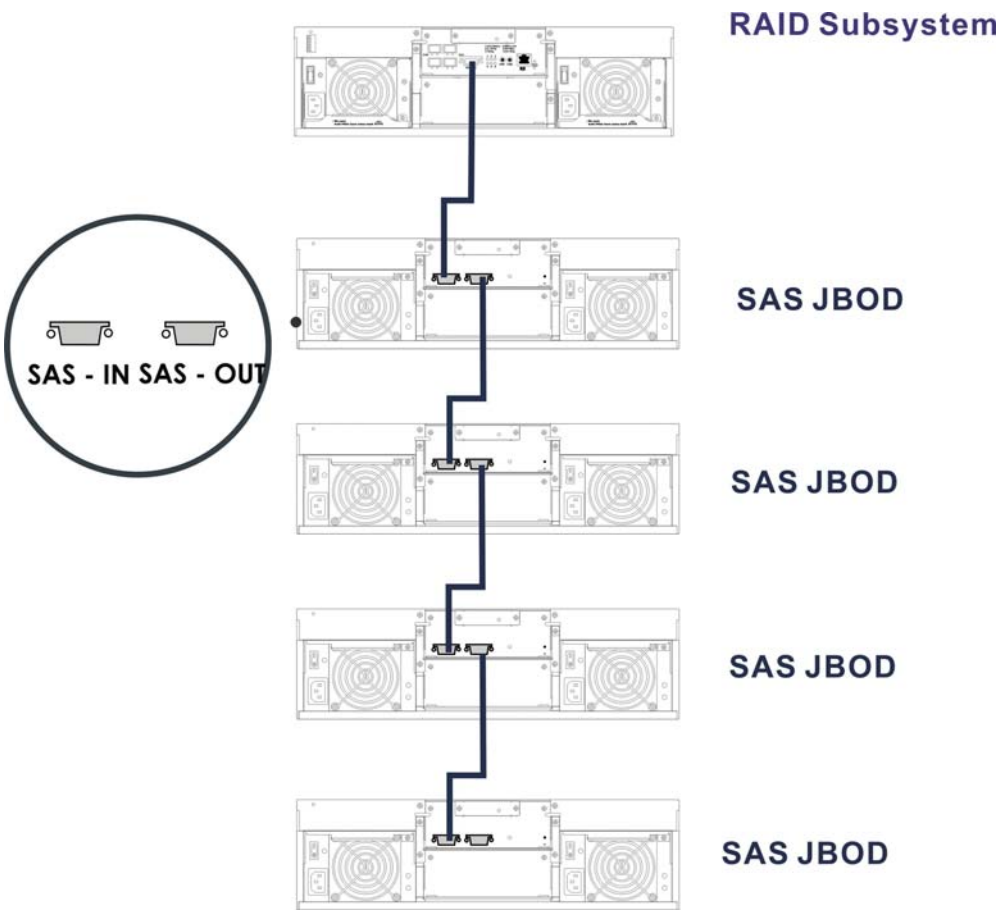



**Figure 3-10: Connecting Single-controller JBODs with a RAID Subsystem**



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# Chapter 4

# System Operation and Monitoring

## 4.1 Power On

Once all of the components have been installed into the S16F-R1430/G1430 and the I/O ports or management interfaces have been connected, the subsystem can be powered on.

### 4.1.1 Check List

**BEFORE** powering on the subsystem, please check the following:

- **Memory module:** Memory modules have been correctly installed on the controller boards.
- **BBU:** Make sure BBU(s) have been installed correctly, if used.
- **MUX Kits:** If SATA hard drives are going to be used on a dual-controller subsystem, a MUX kit should be prsent on each hard tray.
- **Hard drives:** Hard drives have been correctly installed in the drive trays.
- **Drive trays:** All the drive trays, whether or not they contain a hard drive, have been installed into the subsystem.
- **Cable connections:** The subsystem has been correctly connected to host computer(s) or external cabling devices.
- **Power cords:** The power cords have been connected to the PSUs on the subsystem and plugged into the main power source.
- **Ambient temperature:** All the subsystem components have been acclimated to the surrounding temperature.



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### 4.1.2 Power On Procedure

When powering on the subsystem, please follow these steps:



**Step 1.** **Power on the Fibre Channel networking devices.**

These devices include FC switches and any other such device that have been connected between application servers and your RAID subsystem. Please refer to the documentation that came with your networking devices for more information.



**Step 2.** **Power on the expansion enclosures, if applied.**

If you have expansion enclosures, e.g., Infortrend's SAS JBODs, connected to the subsystem, power on those enclosures before powering on the managing RAID subsystem(s).



**CAUTION!**

All necessary SFP transceiver and cable connections must be made between subsystems before turning on the subsystem. If you power on the subsystem before correctly connecting the cables, host computers may recognize host ports only after a LIP is issued across FC nodes if host links are configured to operate as arbitrated loops.



**Step 3.** **Power on the subsystem before the host computers.**

To power on the subsystem please follow the procedures below.

- Using the included power cords, connect both power sockets on the subsystem's power supplies to the main power source.
- Power on by using the two (2) power switches on power supplies. (See ***Figure 4-1***) Each switch controls a single PSU; therefore make sure that both switches are turned on.



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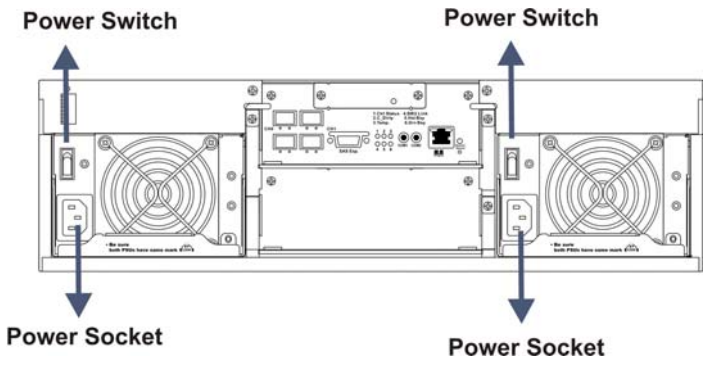



**Figure 4-1: Power Sockets and Power Switches**

**CAUTION!**

Although the PSUs are configured in a fault-tolerant pair and a single PSU can provide sufficient power to the system, it is ncesasary to turn on both power supplies. If only one (1) PSU is operating and that PSU fails, system down time will occur.

**Step 4. Power on the host computers.**

The host computers should be the last devices that are turned on. Please refer to the documentation that came with your host computers to see their power on procedures.

### 4.1.3 Power On Status Check

Once the subsystem has been powered on, you should begin verifying subsystem status via the following monitoring interfaces:

1. **Controller module LEDs:** The Ctlr_Status and BBU_Link LEDs should light constantly green.

2. **Drive tray LEDs:** The blue status LEDs on all drive trays that contain a hard drive should light up showing that power is supplied to the disk drives. The Drive Busy LEDs should also start flashing, indicating that system is attempting to access hard drives.

3. **LEDs on LCD keypad panel:** The blue LED on the LCD keypad panel should illuminate, indicating that system status is ready.

4. **FC port LEDs:** The LED below each FC port should illuminate green, indicating that the Fibre Channel connection has been established.

5. **BBU LEDs:** The LEDs on the BBU rear panel should start flashing amber, indicating that the BBU is being charged.



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6. **PSU LEDs:** If the PSU is operating normally and experiencing no problem after being powered on, the LEDs on the PSU should light green constantly.

7. **Firmware and RAIDWatch:** The overall status of the system may be checked via the embedded firmware utility or the RAIDWatch GUI.

8. **Audible alarm:** If any errors occur during the initialization process, the onboard alarm will sound in a hastily repeated manner.

**NOTE:**

The subsystem has been designed to run continuously. If a component fails, the fault can be corrected online.

### 4.1.4 LCD Screen

When powering on the subsystem, wait for the front panel LCD screen to show "**READY**" or "**No Host LUN**" before the host boots up. Refer to ***Figure 4-2*** and ***Figure 4-3*** on how to read the screens.

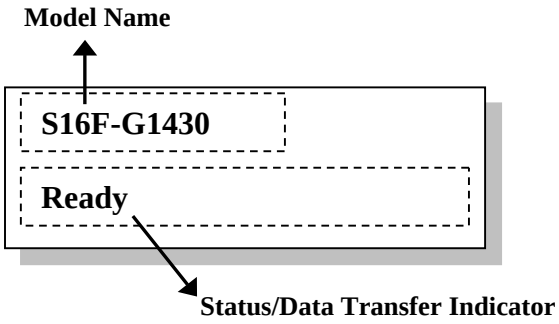



**Figure 4-2: The LCD Startup Screen on the S16F-G1430**

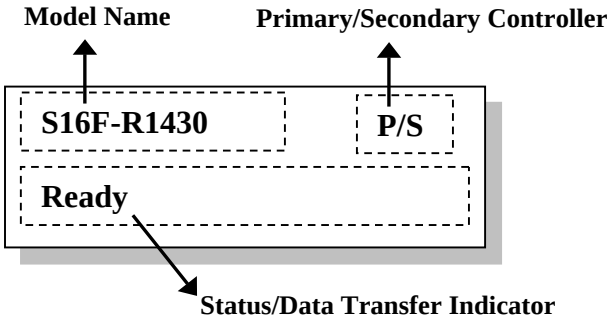
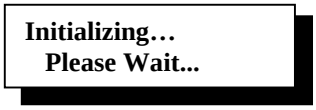



**Figure 4-3: The LCD Startup Screen on the S16F-R1430**

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




This screen appears when the PSUs are turned on.



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| | |
|---|---|
| **Power On Self Test, Please Wait…** | The subsystem will start a self-test. |
| **Power On Init Completed** | The self-test has been completed. |
| **RC Connecting…** | This screen appears while partner controllers are communicating with each other. |
| **S16F-R1430 512MB RAM, Wait…** | Verifying installed cache memory. |
| **S16F-R1430 P No Host LUN** | System is ready. You can now start to configure the subsystem. |

**NOTE:**

The primary/secondary controller status is only shown on the S16F-R1430's LCD screen.

## 4.2 Power Off Procedure

If you wish to power down the subsystem, please follow these steps:

**NOTE:**

If you wish to power down the subsystem, please ensure that no time-consuming processes, like "Regenerate Logical Drive Parity" or a "Media Scan," are taking place.

**Step 1. Stop I/O access to the system.**

Close your applications running on the host computers to stop all I/O access to the subsystem.

**Step 2. Flush the cache.**

Locate the C_Dirty LED on the back of controller module to check if there is still cached data in memory. Use the "Shutdown Controller" function to flush all



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cached data. This prepares the RAID subsystem to be safely powered down.



**Step 3. Turn off the power.**

Power off the subsystem using the power switch on each PSU. Once the subsystem is powered down, other devices/enclosures that are connected to the subsystem can be sequentially powered down.

## 4.3 System Monitoring Overview

The S16F subsystem is equipped with a variety of self-monitoring features that help keep subsystem managers informed of the subsystem operational status. These monitoring features provide vital feedback to help you maintain the operational integrity. Prompt response to warnings and subsystem component failure notifications is necessary and helps ensure the longevity of the subsystem.

Self-monitoring features include:

- **Firmware (FW)**: The RAID controller(s) in the S16F subsystem come with preinstalled FW, which can be accessed using either a PC hyper-terminal connected through the COM ports or the LCD keypad panel. Device status information can be obtained from the FW. The subsystem can be connected to a management computer through the COM1 serial port using the included serial port cable. Device status information can be obtained from the firmware. The FW is fully described in the Fibre to SAS firmware operation manual that came with your subsystem.

- **RAIDWatch:** RAIDWatch is a fully integrated, Java-based, Graphical User Interface (GUI) that came with the subsystem and can be used to monitor and maintain the subsystem over standard TCP/IP. The Ethernet port on each controller module provides the connectivity between the subsystem and your management computer.

  The RAIDWatch Panel View can be customized to show a direct representation of the subsystem components via its graphical interface. RAIDWatch's graphical content panel allows you to quickly determine the operational status of all components. Please refer to the RAIDWatch User's Manual for further details.

- **Configuration Client:** Configuration Client is a powerful module that runs as an independent program from RAIDWatch and can be installed on different hosts. It is used for event notification via email, fax, LAN broadcast, SNMP traps, MSN Messenger, SMS (Short Message Service), and the configuration utility screen. Configuration Client



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helps prevent blind time and keeps you constantly informed as to the status of the storage management subsystem. Instructions on activating Configuration Client functionality are given in the ***RAIDWatch User's Manual***.

- **LEDs**: Device-status-indicating LEDs are located on all active components. The LED inform you of the integrity of a given component or a given link. You shoul become familiar with the different LEDs that are present on the subsystem and be aware of their functions. (See ***Section 4.4***)

- **Audible alarm:** A beeper comes with the RAID controller board and will be triggered if any of a number of threatening events occurs. These events usually jeopardize the functional 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. If a subsystem manager is present, he can use the LED panel, LCD keypad panel, or the PC hyper-terminal to determine the cause of the alarm and take the appropriate measures. (See ***Section 4.5***)

- **$I^2C$:** The $I^2C$ bus connects to sensors or detection circuits that reside on PSUs, backplane, cooling modules, and RAID controller board. (See ***Section 4.6***)

Subsystem monitoring is a necessary part of subsystem management. If disruptive events are detected and reported, the subsystem managers must take appropriate actions 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 subsystem.



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# 4.4 Status-indicating LEDs

## 4.4.1 Brief Overview of the LEDs

All FRUs (Field Replaceable Units) have status-indicating LEDs that reflect the operational status and integrity of the subsystem components. The list in *Error! Reference source not found.* shows the number of LEDs that reside on each component.

## 4.4.2 LCD Keypad Panel

The LCD keypad as shown in ***Figure 4-4*** consists of five (5) buttons, three (3) LEDs, and a 16x2-character LCD screen that displays subsystem status. Press the **ENT** button for two (2) seconds on the initial screen to enter the main menu. Press the **ESC** button to clear the current event.

Press the **UP** and **DOWN** arrow keys to select viewing items. In the last item, "**View and Edit Event Logs**," the most recent event is displayed first.

For dual-controller subsystems, the LCD always displays the status of the Primary Controller. Press the **UP** and **DOWN** arrow keys together for more than one (1) second to display the status of the Secondary Controller.

The **MUTE** button silences the alarm temporarily until the next controller event occurs.

Three (3) LEDs monitor system status. The definitions of these LEDs are given in ***Table 4-1*** below.

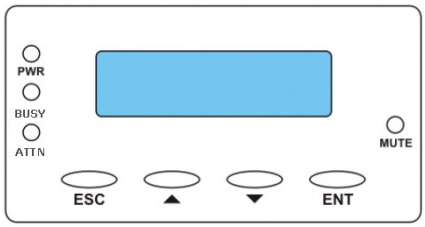



**Figure 4-4: LCD Keypad Panel**

| Name | Color | Status |
|---|---|---|
| **PWR (Power)** | Blue | **ON** indicates that power is supplied to the subsystem.<br>**OFF** indicates that no power is supplied to the subsystem or the subsystem/RAID controller has failed. |
| **BUSY** | White | **FLASHING** indicates that there is active traffic on the host/drive channels. |



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| | | |
|---|---|---|
| | | **OFF** indicates that there is no activity on the host/drive channels. |
| **ATTEN (Attention)** | Red | **ON** indicates that a component failure/status event has occurred.<br>**OFF** indicates that the subsystem and all its components are operating correctly. |

**Table 4-1: LCD Panel LED Definitions**

**NOTE:**

During the power-on process, the ATTEN LED will light up steadily. Once the subsystem successfully boots up with no faults, the ATTEN LED is turned off.

### 4.4.3 Drive Tray LEDs

Two (2) LED indicators are located on the right side of each drive tray. (See ***Figure 4-5***) Refer to ***Table 4-2*** for the LED definitions. When notified by a drive failure message, you should check the drive tray indicators to find the correct location of the faulty drive. Replacing the wrong drive can fatally fail a logical array.

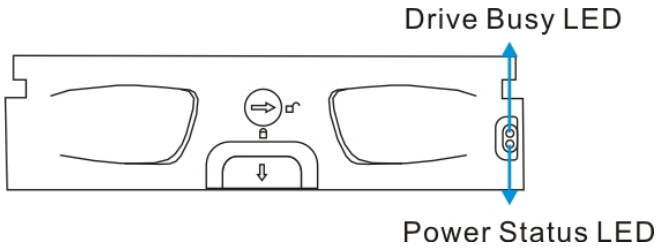



**Figure 4-5: Drive Tray LEDs**

| Name | Color | Status |
|---|---|---|
| **Drive Busy** | Blue/ Amber /Light Purple | **FLASHING**<br>• Flashing **BLUE** indicates Controller A on S16F-R1430 or the single controller on S16F-G1430 is accessing the disk drive. The drive is busy.<br>• Flashing **AMBER** indicates Controller B (S16F-R1430) is accessing the disk drive. The drive is busy.<br>• Flashing **LIGHT PURPLE** indicates the drive is in a spin-up state. (S16F-R1420 only) The drive is not ready. |



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| | | |
|---|---|---|
| | | **OFF** indicates that there is no activity on the drive. |
| **Power Status** | Green/ Red | **GREEN** indicates that a drive is installed in the drive tray.<br><br>**RED** indicates that a drive has failed or is missing. |

**Table 4-2: Drive Tray LED Definitions**

### 4.4.4 Controller Module LEDs

The controller faceplate is shown in ***Figure 4-6***. Four (4) different types of LEDs are present and described in the following sub-sections.

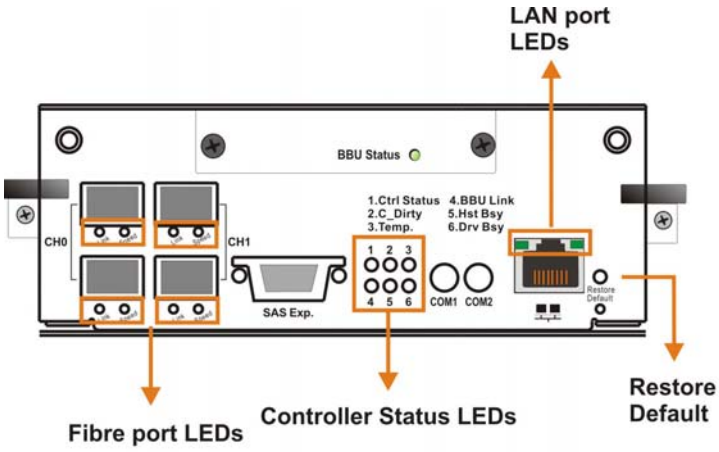



**Figure 4-6: LEDs on the Controller Module**

#### *4.4.4.1 Controller Status LEDs*

The controller status LEDs are numbered from 1 to 6 and are located on the controller's rear-facing faceplate. The definitions are shown in ***Table 4-3***.

| LED | Name | Color | Status |
|---|---|---|---|
| **1** | **Ctrl Status** | Green/ Amber | **GREEN** indicates that the controller is active and operating normally.<br><br>**AMBER** indicates the controller is being initialized or has failed. The controller is not ready. |
| **2** | **C_Dirty** | Amber | **ON** indicates that data is currently cached in memory or is supported by the BBU during a system power loss. |
| **3** | **Temp.** | Amber | **ON** indicates that one of the preset temperature thresholds is violated. |



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| | | | |
|---|---|---|---|
| **4** | **BBU Link** | Green | **ON** indicates BBU is present. |
| **5** | **Hst Bsy** | Green | **FLASHING** indicates there is active traffic through the host ports.<br>**OFF** indicates there is no activity on the host ports. |
| **6** | **Drv Bsy** | Green | **FLASHING** indicates there is active traffic on the drive channels.<br>**OFF** indicates there is no activity on the drive channels. |

**Table 4-3: Controller Status LED Definitions**

#### *4.4.4.2 Fibre Port LEDs*

Each controller module houses four (4) 4G FC host ports. Each of these Fibre ports has two (2) LEDs (see ***Figure 4-6***) for displaying the operating statuses.

| | | | |
|---|---|---|---|
| **1** | **Link** | Green | **ON** indicates there the FC port is connected to a FC node or networking device.<br>**OFF** indicates no valid link. |
| **2** | **Speed** | Green/ Amber | **GREEN** indicates link speed at 4Gbps.<br>**AMBER** indicates link speed at 2Gbps.<br>**OFF** indicates link speed at 1Gbps or other conditions. |

**Table 4-4: FC Port LED Definitions**

#### *4.4.4.3 Restore Default LED*

A restore default LED is located above the restore default push button on the lower right corner of the controller faceplate. (See ***Figure 4-6***) To restore firmware defaults, press and hold the button before turning on the subsystem. Once the factory defaults are successfully restored, the restore default LED lights green. You may then release the button.

#### *4.4.4.4 LAN Port LEDs*

A shielded Ethernet cable is recommended for connecting the RJ-45 Ethernet management port to a local network after you configure an IP address. This enables you to manage your subsystem via LAN or WAN. Two (2) LEDs on the Ethernet port indicate connection statuses. See ***Figure 4-7*** for the locations of the LED indicators. Refer to ***Table 4-5*** for the LED definitions.



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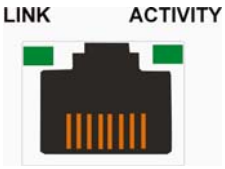



**Figure 4-7: LAN Indicators**

| Name | Color | Status |
|---|---|---|
| **Link Status** | Green | **ON** indicates the management port is connected to a node or networking device. |
| **LAN Activity** | Green | **BLINKING** indicates active transmission |

**Table 4-5: LAN Port LED Definitions**

### 4.4.5 BBU LED

Related locations of BBU LEDs are shown in ***Figure 4-8*** below. BBU LED definitions are shown in ***Table 4-6***.

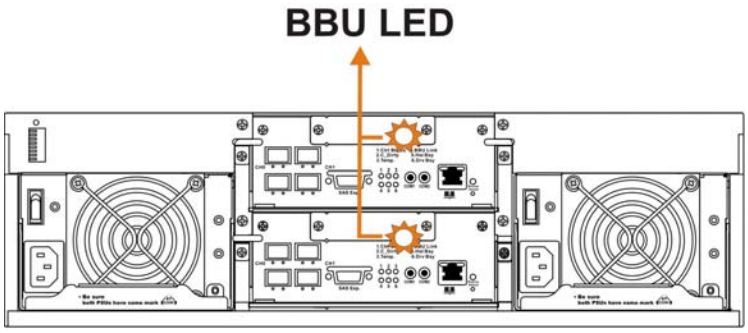



**Figure 4-8: BBU LED**

| Color | Status |
|---|---|
| **Flashing Amber** | The LED flashes to indicate the BBU is charging. |
| **Static Amber** | The BBU fails. |
| **OFF** | The BBU is fully charged and ready to sustain cached data. |

**Table 4-6: BBU LED Definitions**

### 4.4.6 PSU LEDs

Each PSU comes with a single LED at the back (see ***Figure 4-9***) located next to the power switch that turns on the subsystem. This LED indicates the operational status of the PSU. Please refer to the PSU LED definitions shown in ***Table 4-7***.



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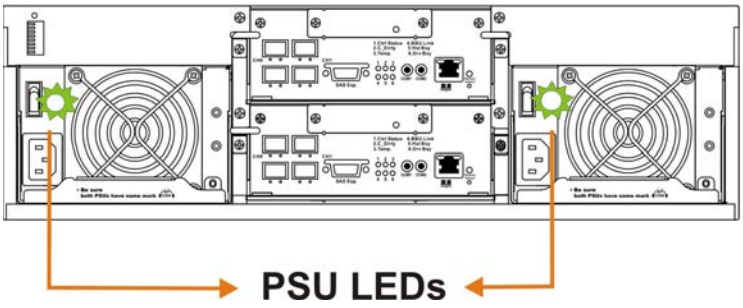



**Figure 4-9: PSU LED**

| Color | Status |
|---|---|
| **Intermittent Flashing Green** | The power supply has not been turned on. The PSU LED flashes when the subsystem is connected to a power source but not yet turned on. |
| **Static Green** | The PSU is operating normally |
| **Static Red** | The PSU has failed and is unable to provide power to the subsystem. |

**Table 4-7: PSU LED Definitions**

### 4.4.7 Cooling Module LEDs

Each cooling module has two (2) red LEDs located on the PSU module. Each LED corresponds to an individual cooling fan. (See ***Figure 4-10***) Please refer to the cooling module LED definitions shown in ***Table 4-8***.

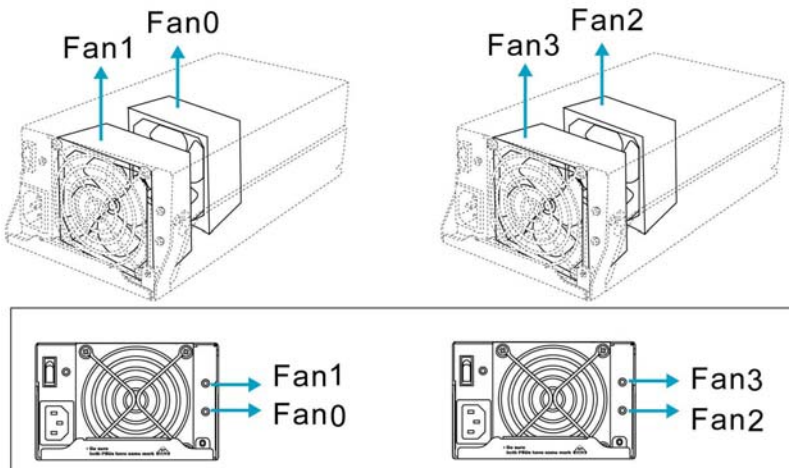



**Figure 4-10: Cooling Module LEDs and Cooling Fan Locations**

| Color | Status |
|---|---|
| **Static Green** | The cooling fan is operating normally. |
| **Static Red** | The cooling fan has failed. |

**Table 4-8: Cooling Module LED Definitions**



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The subsystem has a novel approach to stabilizing the temperature within the chassis:

> When temperature sensors detect an elevated temperature reading or the failure of any cooling fan/power supply, firmware will instruct the remaining cooling fans to operate at a high speed. Once the ambient temperature falls back within the safe range or the fault condition is corrected, cooling fans will resume the low rotation speed.

## 4.5 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 threshold is exceeded, an audible alarm will automatically be triggered. The thresholds are default threshold values and can be adjusted.

The alarm will also be triggered when an active component within the subsystem fails. If the subsystem manager is onsite and hears an alarm, the manager must read the error message on the LCD keypad panel, RAIDWatch session, or a PC terminal to determine what has triggered the alarm. After determining what has occurred, the manager must take appropriate actions to rectify the problem.



**WARNING!**

If an alarm is triggered it is necessary for you to determine the problem. If the audible alarm is ignored and the problem is not rectified, unexpected damages may occur.

### 4.5.1 Failed Devices

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

- RAID controller module
- Cooling module
- PSU
- BBU
- Hard drive
- Sensors and presence detection circuits



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## 4.6 $I^2C$ Monitoring

Presence detection and the general working status of all component modules are monitored through an $I^2C$ serial bus. If any of these modules fails, you will be notified via the various methods described above.



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# Chapter 5

# System Maintenance

## 5.1 Overview

### 5.1.1 About Subsystem Maintenance

Constant monitoring and maintenance of your subsystem minimizes system downtime and preserves the working integrity of the system for a longer period of time. If any of the subsystem components fails, they must be replaced as soon as possible.

**WARNING!**

Do not remove a failed component from the subsystem 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 subsystem.

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

1. RAID controller modules – ***Section 5.2***
2. Memory modules – ***Section 5.3***
3. BBU – ***Section 5.4***
4. PSUs – ***Section 5.5***
5. Cooling modules – ***Section 5.6***
6. Hard drives and drive trays – ***Section 5.7***
7. MUX kits – ***Section 5.8***

**NOTE:**

The graphics used in the following sections only show the S16F-R1430 subsystem. You may follow the same maintenance procedures to work on an S16F-G1430 subsystem.



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### 5.1.2 General Notes on Component Replacement

- Almost all of the major components on the S16F series, including the RAID controllers in the controller pair of S16F-R1430, PSUs, and drive trays, are hot-swappable and can be replaced online.

- Qualified engineers who are familiar with RAID storage hardware should be the only ones who make component replacements. If you are not familiar with the EonStor series or with RAID subsystem maintenance in general, it is strongly advised that you refer subsystem maintenance to a suitably qualified engineer.

- Normalized airflow depends upon the presence of all subsystem components. A subsystem component, even if it has failed, should not be removed from the subsystem until a replacement is readily at hand and can be quickly installed. Removing subsystem components without a replacement can lead to permanent damage.

- When replacing any hot-swappable component, caution should be taken to ensure that the components are handled in an appropriate manner. Rough or improper handling of components can lead to irreparable damage.

- If the single controller module in S16F-G1430 fails, it is necessary to power down the subsystem in order to replace the controller. If a controller module in the dual-controller configuration, namely, S16F-R1430, fails, the controller can be replaced online.

- When removing a component from the subsystem, ensure that all previously stipulated precautions (see ***Section 2.3***) are strictly adhered to.



**WARNING!**

When inserting a removable module, take heed that **DO NOT USE EXCESSIVE FORCE!** Forcing or slamming a module can damage the connector pins either on the module itself or on the backplane. Gently push the module until it reaches the end of module slot. Feel the contact resistance and use slightly more force to ensure the module connectors are properly mated. If the module comes with rejection levers or retention screws, use them to secure the module.



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# 5.2 Replacing Controller Module Components



**IMPORTANT!**

The docking connectors on the controller module are very delicate and the connector pins can be broken easily. Do not touch the connector pins. Visually examine each connector pin before inserting the controller module into the subsystem. A broken pin may damage the subsystem backplane board and cause a subsequent system crash.

## 5.2.1 Considerations

- The controller module contains a DIMM module. It is not recommended to re-use the DIMM module extracted from a failed controller unless you have a similar RAID subsystem that can be used to test the module. You can contact your vendor for sending the failed controller in for repair.

- Only a controller module within a dual-controller subsystem can be replaced online. The S16F-G1430 comes with a single RIAD controller, and therefore does not provide board-level redundancy.

- When replacing the controller module, always remember that the controller board is one of the most sensitive components in the subsystem. All previously stipulated safety precautions (see ***Section 2.3***) must be strictly adhered to. Failure to adhere to these precautions can result in permanent damage to the controller board, resulting in lengthy delays.

- When the S16F-R1430 operates in the dual-active mode and one (1) controller fails, a transparent failover to the partner controller will take place. This ensures the continuous operation of the RAID subsystem. Once the failed controller is replaced, a transparent failback will ensure that the I/O workload is once again distributed between the two controllers.

- The BBU module is installed in a module slot located in the upper center of the controller module. When the controller module is removed from the subsystem, the BBU module is also removed. Make sure the BBU module is installed properly into the module slot before the controller is reinstalled into the subsystem.

## 5.2.2 Removing the Controller Module

To remove the controller module:



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**Step 1.** **Prepare a clean, static-free work pad or container** to place the removed controller.

**Step 2.** **Disconnect all cables** from the controller module. These may include the Ethernet cable, Fibre Channel host links, and serial cables connected to the COM ports.

**Step 3.** **Remove the screws** underneath the ejection levers. (See ***Figure 5-1***)

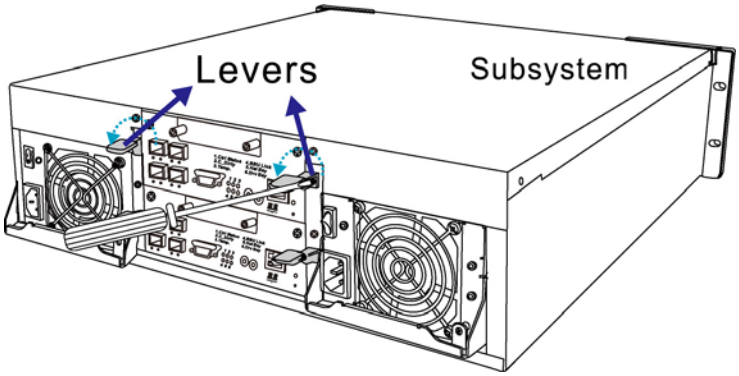



**Figure 5-1: Removing the Controller Retention Screws**

**Step 4.** **Remove the controller module** by pressing down the two (2) levers. The controller module will automatically ease out of the controller module bay. (See ***Figure 5-2***)

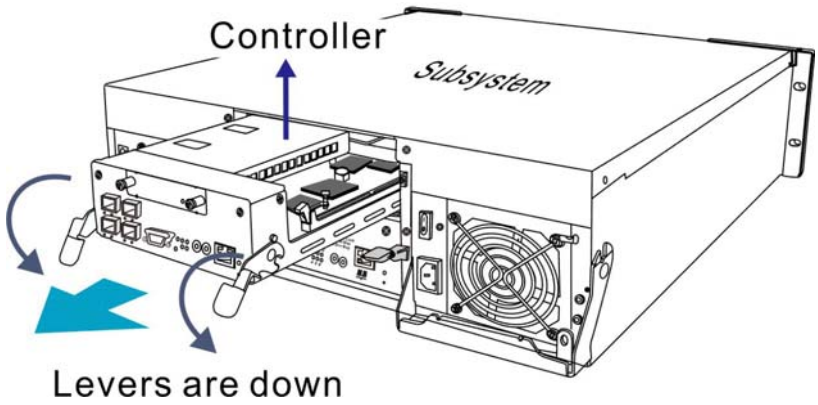



**Figure 5-2: Removing Controller**

**Step 5.** Gently pull the controller module out of the subsystem. Place the controller module on a clean, static-free surface.



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**WARNING!**

- Unnecessary tampering with the controller module can cause severe and permanent damage. Remove the controller only if it is absolutely necessary.
- When removing a controller module from the chassis, all anti-static preventative measures should be strictly adhered to. Failure to adhere to specified cautionary measures could result in damage to the controller board.

### 5.2.3 Replacing the Controller Module

If the controller module itself has failed, replace it with a replacement from your vendor.

**Step 1.** **Remove the failed controller module from the subsystem** (see ***Section 5.2.2***.) It is recommended to obtain a replacement with pre-installed memory. If the DIMM module is obtained otherwise, refer to ***Section 5.3*** for details on handling controller and DIMM module.

**NOTE:**

Contact your vendor with information of your surviving controller. You may access the "System Information" menu in the firmware configuration utility for details.

**Step 2.** **Install the replacement controller.** Make sure the ejection levers are at its lowest position. Align the controller module with the controller module bay. Gently slide the controller module in. (See ***Figure 5-3***)

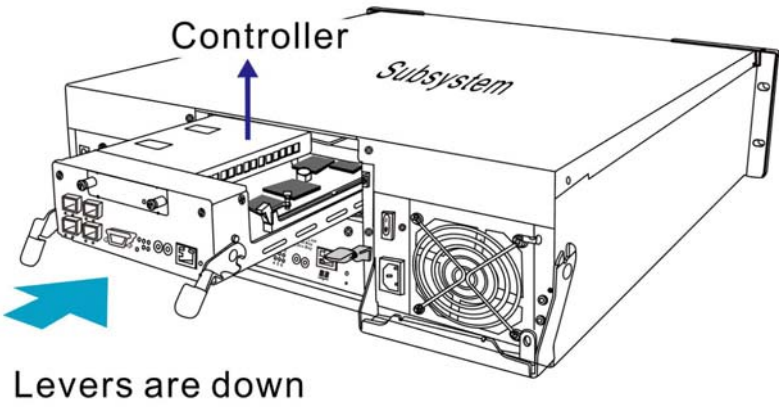



**Figure 5-3: Installing the Controller Module**



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**Step 3.** **Secure the controller module.** Carefully push the controller until you feel the contact resistance when the board edge connectors are engaging the backplane. Do not use force. If unusual contact resistance is felt, remove the controller, wait for a few seconds and try again. Use the ejection levers on the sides of the controller to secure it into the chassis. (See ***Figure 5-4***)

When the controller is inserted with the levers at its lowest position, notches on the levers should properly clinch to the round metal protrusions on the interior walls of the module bay. You may then pull the lever upward to secure the controller into chassis.

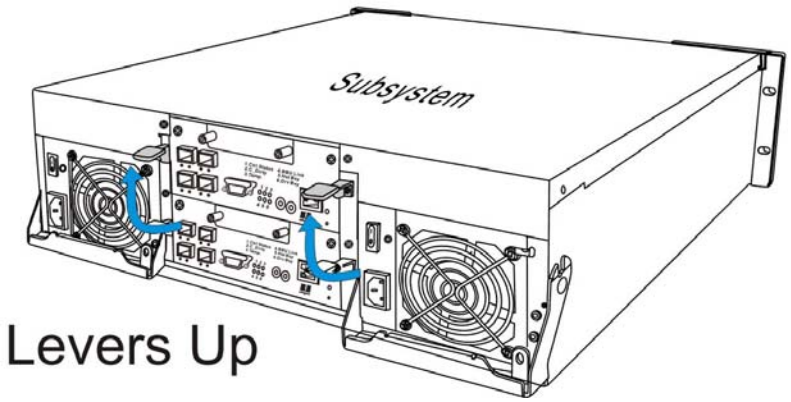



**Figure 5-4: Lifting the Ejection Levers Upward**

**Step 4.** **Secure the controller module to the chassis.** Fasten the two (2) screws previously removed through the screw holes underneath the ejection levers. (See ***Figure 5-5***)

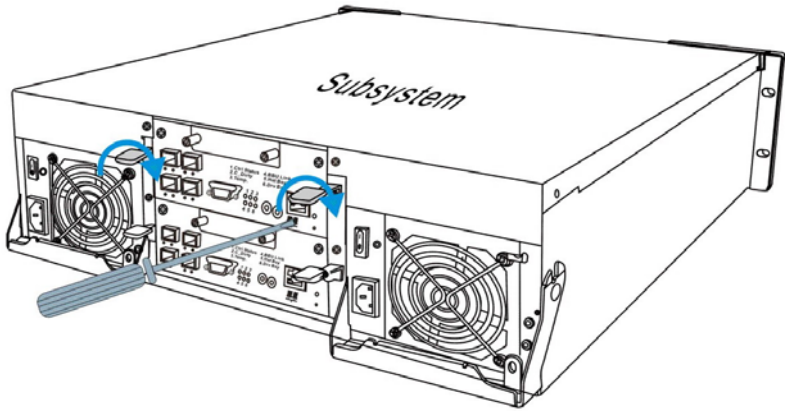



**Figure 5-5: Securing Retention Screws**

**Step 6.** **Re-attach all the cables** that were removed. These include the host link cables, Ethernet cable to the management port, and serial cables to the COM ports.



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# 5.3 DIMM Module Replacement

The subsystem comes with a preinstalled 512MB capacity or above DDR RAM DIMM module on each controller. The controller supports memory up to 2GB in size. If any of the memory modules have failed or a different size DIMM module is preferred, the preinstalled module can be replaced. Replacement and installation instructions are described fully below.

## 5.3.1 DIMM Module Considerations

If the memory module on the controller module is going to be replaced, the following issues must be considered when purchasing a replacement module:

- **Purchasing considerations:** Contact your subsystem vendor for an updated list of compatible DIMM modules.



**IMPORTANT!**

The DIMM modules that reside on partner controllers must be exactly the same, of the SAME SIZE and SPEED.

- **DDR RAM DIMM modules supported:** The controller supports a DDR RAM DIMM module with memory capacities ranging from 512MB to 2GB.

- **The physical size:** The controller only supports DDR RAM DIMM modules those are smaller than 30.5mm wide (1.2 inches).

- **Installation considerations:** When installing the DIMM module, it is necessary to remove the controller module from the chassis and then remove the module from the controller. The controller board is more susceptible to damage than the other components and must be handled with extreme care.

- **Secure installation:** When replacing the DIMM module(s), make sure that the new DIMM module(s) are firmly in place prior to re-installing the controller module(s). If the DIMM module(s) are not firmly in place, the subsystem will not be able to run and the whole procedure must be repeated.

## 5.3.2 DIMM Module Upgrade/Replacement Procedure

To replace the DIMM module:



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**Step 1.** **Remove the controller module from the subsystem**, and place it on a clean, static-free surface. (See Section 5.2.2)

**Step 2.** **Remove the BBU module, if installed.** Carefully place the module for it contains Li-Ion batteries. Do not drop it to the floor or place it near any heat source.

**Step 3.** **Remove the previously installed DDR RAM DIMM module.** To remove the previously installed module, push outward on the ejector tabs, the module will pop-up from the socket. (See ***Figure 5-6***)

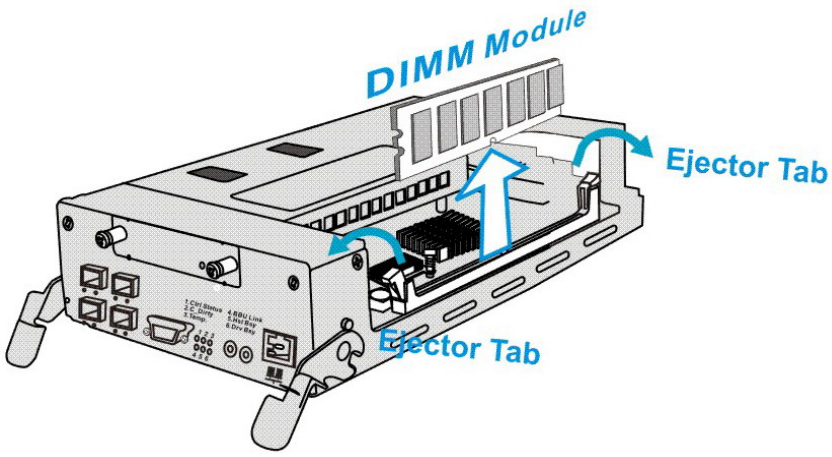
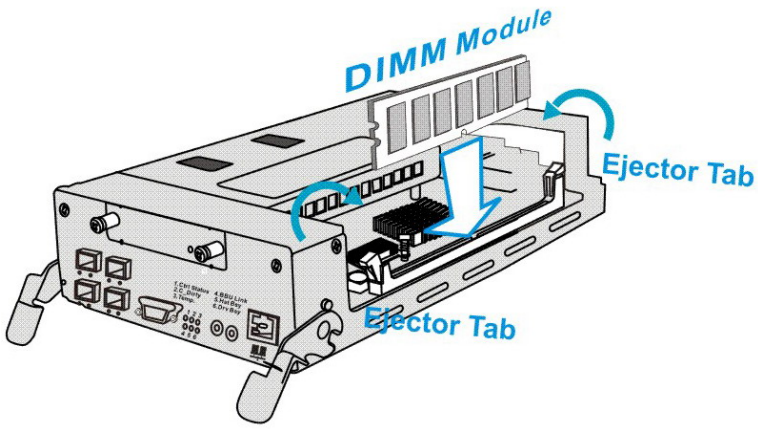



**Figure 5-6: Removing a DIMM Module**

**Step 4.** **Insert the new DDR RAM DIMM module into the DIMM socket.** Align the new module to the DIMM socket and note how the module is keyed. Firmly press the DIMM module into the socket making sure the module is completely seated in the socket. The ejector tabs on each end of the socket will snap into proper positions. (See ***Figure 5-7***)






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**Figure 5-7: Installing a DIMM Module**

**Step 5.** **Install the controller module and BBU module** back in its original locations. (See ***Section 5.2.3***)

## 5.4 Replacing a Faulty BBU

The subsystem comes standard with two (2) BBUs. For the single-controller S16F-G2431, the BBU is an optional item and can be separately purchased from your subsystem vendor. The BBU can sustain cache memory in the event of a power failure or in the extremely unlikely event of failing both PSUs. The BBU provides additional data security and helps minimize the chance of losing data during power outages.

Each BBU contains battery cells mounted on a metal bracket, and connects to an adaptor board within the RAID controller. The BBU is secured to the RAID controller at the top center of the faceplate using two (2) retention screws. If a BBU fails, it should be replaced as soon as possible. Please refer to ***Section 2.8.1*** before replacing it.

### Fault Conditions:

A BBU failure can result from the following:

1. A BBU has lost its ability to hold electrical charge. This may be the case after the battery cells have been recharged for many times regardless of how long the module has been used. Therefore, a stable power source is important for system operation.

2. The charger circuitry implemented within the controller has failed.

There are other conditions that might trigger the BBU fault events and trigger the BBU fault LED:

1. The temperature sensor embedded with the charger circuit reports a temperature reading exceeding the preset threshold. The charger circuits will enter a low-power and self-protection state.

2. A BBU module has been charged for over twelve (12) hours. A timer is embedded with the charger. When this occurs, the charger will enter a timer fault state. The fault condition usually occurs with a brand new BBU or with a totally discharged BBU. Charging will resume automatically if your remove and then re-install the BBU.



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## BBU Warnings and Precautions:

- Install or replace the BBU with BBU's supplied by your EonStor vendors only. Use of battery cells provided otherwise will void our warranty.

- Always dispose of a replaced battery in an ecologically responsible manner. Dispose of used BBU's at authorized battery disposal sites only.

- Do not use nor leave the BBU near a heat source. Heat can melt the insulation and damage other safety features of battery cells, possibly will cause acid leak and result in flames or explosion.

- Do not immerse the BBU in water nor allow it to get wet. Its protective features can be damaged. Abnormal chemical reactions may occur, possibly will cause functional defects, acid leak, and other hazardous results.

- Do not disassemble or modify the BBU. If disassembled, the BBU could leak acid, overheat, emit smoke, burst and/or ignite.

- Do not pierce the BBU with a sharp object, strike it with a hammer, step on it, or throw it. These actions could damage or deform it and internal short-circuiting can occur, possibly will cause functional defects, acid leak, and other hazardous results.

- If a BBU leaks, gives off a bad odor, generates heat, becomes discolored or deformed, or in any way appears abnormal during use, recharging or storage, immediately remove it from the subsystem and stop using it. If this is discovered when you first use the BBU, return it to Infortrend or your subsystem vendor.

To replace a BBU, please follow these steps:



**Step 1.** **Remove the faulty unit from the chassis** by loosening the two (2) retention screws located on the sides, then pulling out the BBU. (See ***Figure 5-8***)



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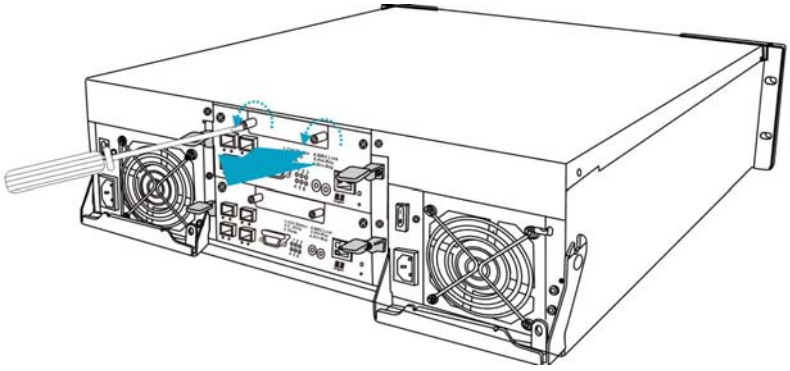


**Figure 5-8: Removing the BBU**

**Step 2.** **Install the replacement BBU.** Align the BBU with the slot, and then gently push the BBU into the slot. When you feel the contact resistance, use slightly more force for the back-end connector to mate with the backplane.

**Step 3.** **Secure the BBU to the subsystem** by fastening the two (2) retention screws. (See ***Figure 5-9***)

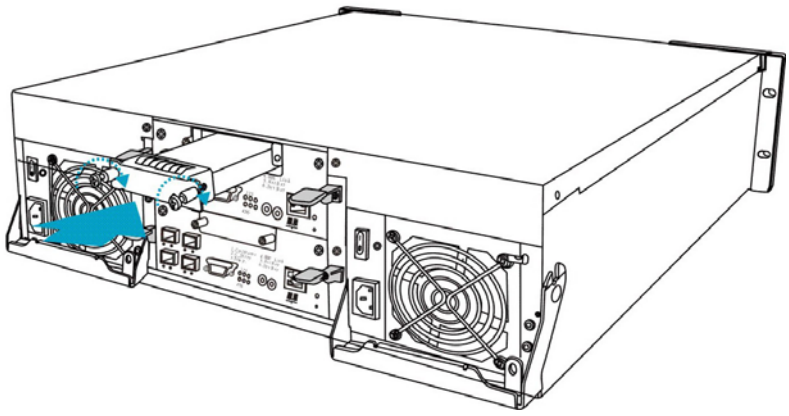


**Figure 5-9: Installing the BBU**

**Step 4.** The LED should start flashing to indicate that the BBU is being charged. When the BBU is fully charged, the LED will go off. (See ***Figure 5-10***)



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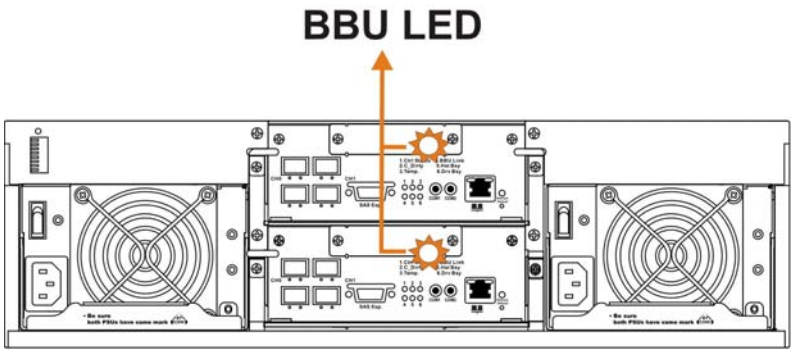



**Figure 5-10: BBU LEDs**

**NOTE:**

1. A new or replaced BBU takes at most twelve (12) hours to charge to its full capacity. Reset the subsystem whenever a BBU is replaced or added in order for the new BBU to take effect.

2. The life expectancy of a BBU is more than one year. However, it is considered a safe procedure to replace the BBU every year. Follow the procedures above to replace a used BBU with a replacement in order to maintain the fault tolerance feature.

3. The chance of charger failure is comparatively low. If the cause of a failure cannot be determined even after a BBU is replaced, contact your system vendor for a replacement controller and return the controller module through Infortrend's standard RMA procedure.

## 5.5 Replacing a Faulty PSU

### 5.5.1 PSU Overview

- **Two (2) redundant PSUs:** The subsystem is preinstalled with two (2) 530W, fully redundant, hot-swappable PSUs. These modules are located at the rear section of the subsystem.

- **PSU bracket:** PSU is 2U canister that house both the power supply converter unit and the cooling module. The PSU is located in the lower level and a removable cooling module is mounted in the upper level. When removing the PSU from the subsystem, the cooling module is also removed.

- **Immediate replacement:** When a PSU fails, it should be replaced immediately. However, do not remove the PSU unless a replacement is readily available. Removing a PSU without a replacement will cause



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severe disruptions to the internal airflow and the subsystem will overheat, possibly causing irreparable damage to some of the subsystem components.

**WARNING!**

Although the PSUs are fully redundant, it is not advisable to run the subsystem with a single PSU for an extended period of time.

### 5.5.2 Replacing the PSU

**WARNING!**

Before you install a replacement PSU, be sure that it has the same warning text on its extraction handle as that shown on the handle of a remaining PSU. Double-check to avoid mixing a similar yet different PSU of another EonStor series.

To replace a PSU, please follow these steps:

**Step 1.** **Turn off the PSU.** The power switch is located on each PSU's rear-facing panel. (See ***Figure 5-11***)

**Step 2.** **Disconnect the power cord** that connects the faulty PSU to the main power source.

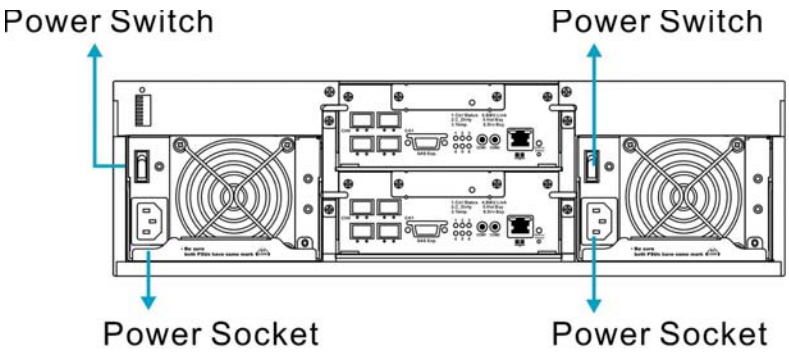



**Figure 5-11: Locations of Power Sockets and Power Switches**

**Step 3.** **Remove the PSU retention screw** that secures the extraction handle to the chassis. (See ***Figure 5-12***)



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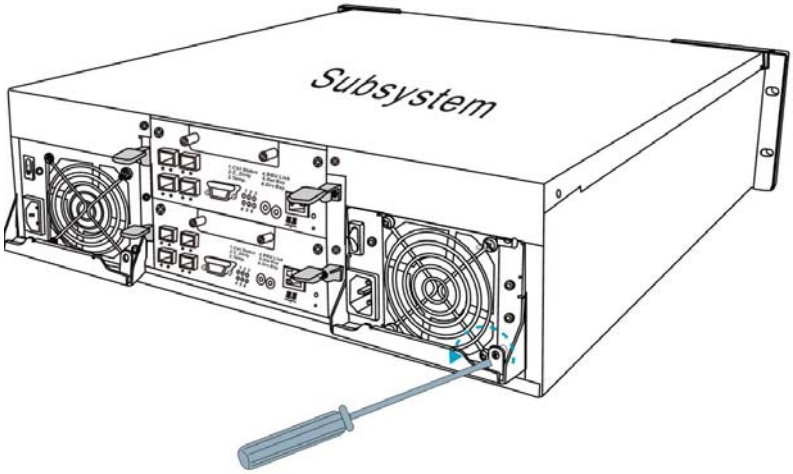



**Figure 5-12: Removing the PSU Retention Screw**

**Step 4.** **Remove the PSU** by grabbing the extraction handle and pulling the handle upwards. The extraction handle should gracefully disconnect the PSU from the backplane connectors. Once dislodged, gently pull the PSU out of the subsystem. If the subsystem is mounted in a rackmount rack, use another hand to support its weight while removing the module. (See ***Figure 5-13***)

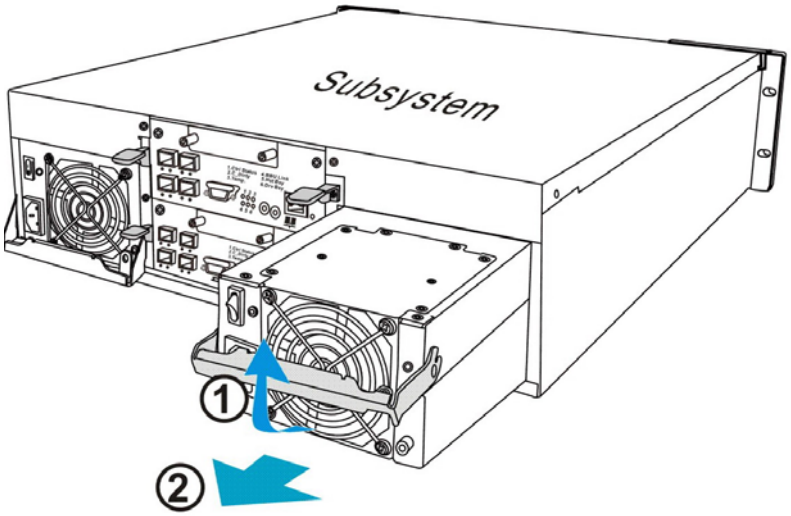



**Figure 5-13: Removing the PSU Module**

**Step 5.** Use the handle to gently pull the PSU out of the chassis.

**Step 6.** **Remove the cooling module** from the upper level of the PSU. Please refer to ***Section 5.6.***



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**WARNING!**

- When a PSU is removed from the chassis, the cooling module is also removed from the chassis.
- It is recommended that the replacement procedure is completed in less than five (5) minutes to prevent the subsystem from overheating.

**Step 7.** **Insert the replacement module.** Make sure the extraction handle is held at its up-most position so that the saddle notches on the sides of the handle can snap onto the metal protrusions along the interior walls of the PSU slot. Push the PSU into chassis, and when you feel the contact resistance, push the handle downward to secure the module. (See ***Section 5.6.***)

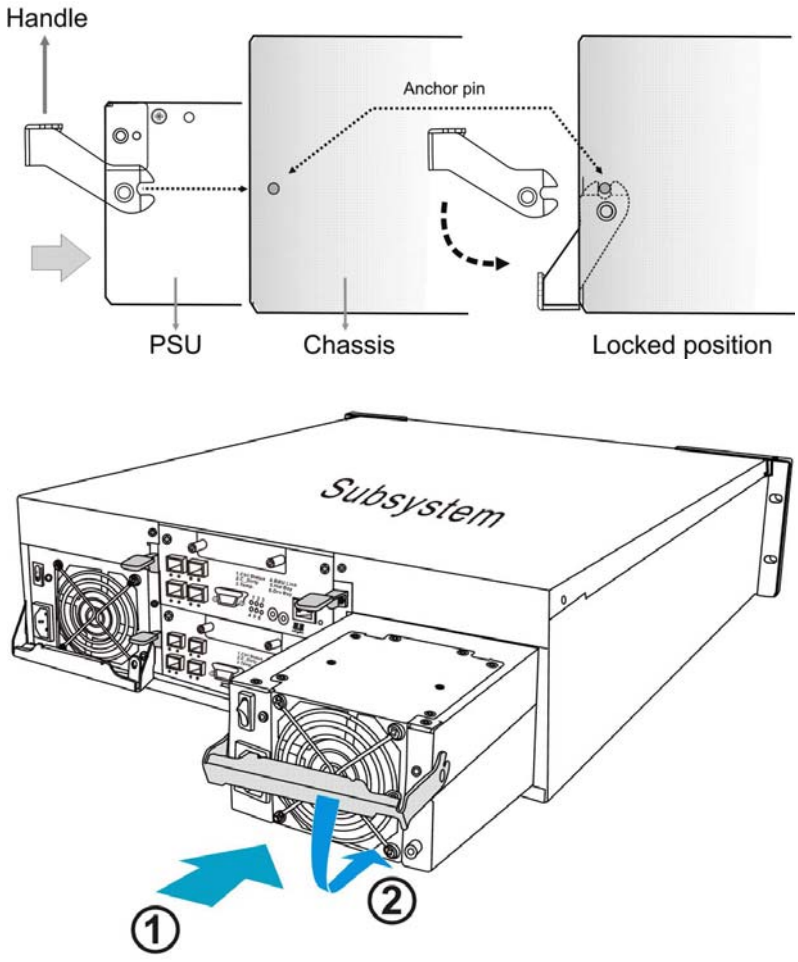



**Figure 5-14: Installing the PSU**

**Step 8.** **Secure the PSU to the subsystem** by fastening the retention screw through the PSU extraction handle. (See ***Figure 5-15***)



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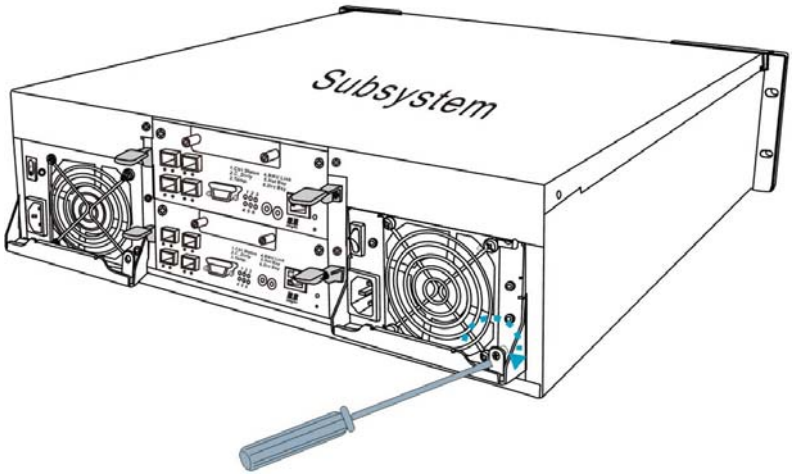



**Figure 5-15: Fastening the PSU Retention Screw**

**Step 8.** **Replace the power cord** that connects the PSU to the main power source.

**Step 9.** **Power on the PSU by flipping its power switch.**

**Step 10.** **Ensure the replacement PSU is working properly by checking its LED.** The LED should light constant green when powered on.

# 5.6 Cooling Module Maintenance

## 5.6.1 Notes on Cooling Module Maintenance

- **Redundant cooling modules:** The subsystem is equipped with four (4) cooling fans, two (2) within each cooling module. These cooling modules control the internal operating temperature of the subsystem and therefore their working integrity should be maintained at all times.

  Although the cooling modules are fully redundant, it is not advisable to run the EonStor subsystem with fans in a single PSU module for an extended period of time. If the cooling fans in the only remaining module fail, the subsystem will quickly overheat.

- **Detecting a failed cooling module:** If a cooling module fails, the LEDs located at rear-facing faceplate of the PSU module, an



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audible alarm, the firmware utility, the RAIDWatch manager software, or the Configuration Client utility can notify you.

- **Immediate replacement:** Once you are notified that a cooling module has failed, it should be replaced as soon as possible. A failed cooling module should only be removed from the subsystem when you have a replacement immediately available.

## 5.6.2 Replacing a Cooling Module

If one of the cooling modules fails, it must be replaced as soon as possible. The cooling modules are secured to the PSU with six (6) screws form the top. To replace a cooling module, follow the steps below:

**WARNING!**

- The fan replacement process should be completed within five (5) minutes. If the process takes too long, the accumulated heat can damage the subsystem.
- Keep a failed module in its bay until a replacement unit is in hand.

**Step 1.** **To remove the cooling module, remove PSU module first.** For instructions, please refer to Section 5.5. Place the PSU on a clean, static-free surface.

**Step 2.** **Use a medium-size Phillips screwdriver to remove the six screws** from the top of the PSU module. (See ***Figure 5-16***)

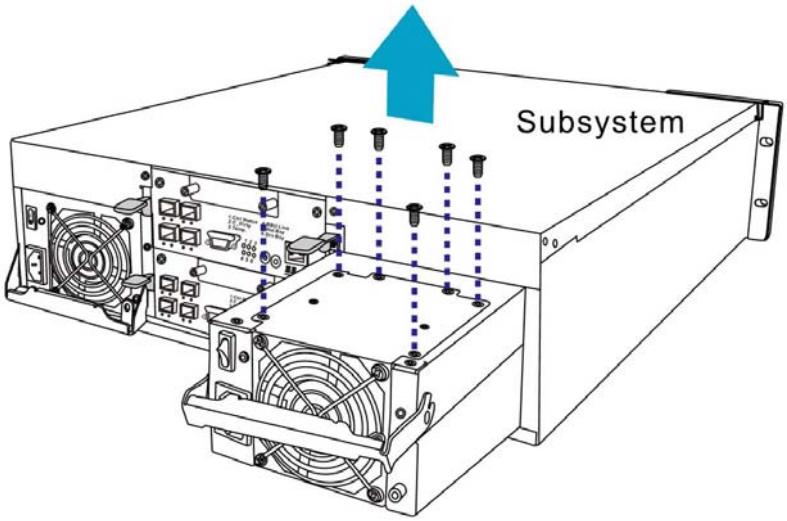



**Figure 5-16: Removing the Cooling Module**



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**Step 3.** **Remove the cooling fan assembly by the following steps:** (See ***Figure 5-17***)

**Step 3-1.** Make sure the PSU handle is in the down position so that you can grab the edge of the cooling fan assembly.

**Step 3-**2. Use your thumb and middle fingers to seize the cooling assembly, your thumb by the upper edge of the fan guard and your middle finger at the hemispheric indent.

**Step 3-**3. Tilt the fan a little bit and remove the fan assembly with a precisely vertical motion.

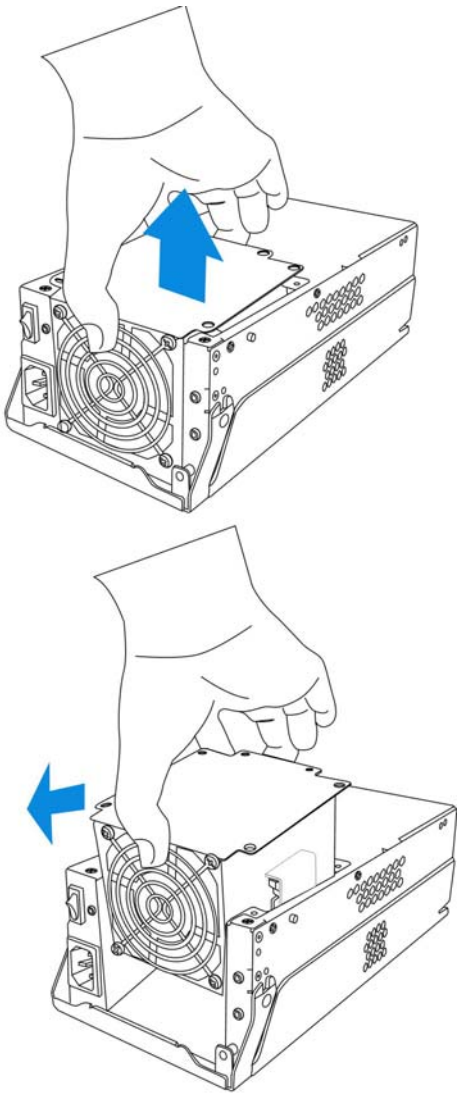


**Figure 5-17: Removing the Cooling Module**



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**Step 4.** **Install the replacement module** by aligning it with the module bay on the PSU module and gently lowering it into. The fan outlet should be aligned with the PSU faceplate and that the side with screw holes should be facing up.

**Step 5.** **Secure the module** by fastening the screws you previously removed.

**Step 6.** **Reinstall the PSU into chassis and power on the module.** When powered on, check if the cooling fan LEDs are lit. If not, that means your cooling fans are operating properly.

# 5.7 Replacing a Failed Hard Drive

## 5.7.1 Hard Drive Maintenance Overview

- **Hot-swappable drive trays:** The drive trays are all hot-swappable. A disk drive failure can be corrected online.

- **Forearm Handles:** If the failed hard drive is behind either the left- or right-side forearm handle, unfold the handles to access the drive trays.

- **Open flap:** Once the front flap on the drive tray has been opened, the drive tray must be removed from the subsystem. Failure to remove the drive tray from the subsystem after the front flap has been opened may cause data errors.

- **Slowly remove a faulty drive:** When removing a drive tray from the subsystem, pull the drive tray out only about one inch and then wait for at least 30 seconds for the hard drive motor to spin down before taking it out completely. Any impact to the hard drive while the drive motor is spinning can damage the hard drive.

  There are situations that healthy drives can be removed. In operations such as Copying & Replacing member drives with drives of larger capacity, you may need the replaced disk drives in other installations.

- **Keep a replacement on hand:** If a hard drive has failed, make sure you have a replacement hard drive readily available before removing the failed drive from the subsystem. Do not leave the drive tray slot open for an extended period of time or the normalized airflow will be disrupted and subsystem components will overheat and may become permanently damaged.



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### 5.7.2 Replacing a Hard Drive

To replace a hard drive, please follow these steps:

**WARNING!**

Hard drives are fragile; therefore, always handle them with extreme care.

- Do not drop a hard drive.
- Always be slow, gentle, and careful when handling a hard drive.
- Handle a hard drive only by the edges of its metal cover, and avoid touching its circuits part and interface connectors.

**Step 1.** **Identify the location of the drive tray** that contains a hard drive indicated as faulty. You may use firmware utility or RAIDWatch software to locate a faulty drive. The drive tray LED should also light red.

**Step 2.** **Make sure the rotary bezel lock is turned to the unlocked position,** (See ***Figure 5-18***) i.e., the groove on its face is in a horizontal orientation. Use a flathead screwdriver to turn the rotary lock to the unlocked orientation.

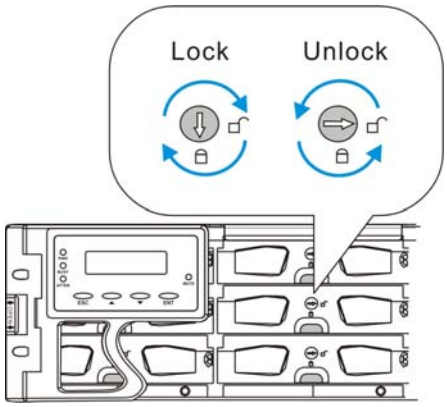



**Figure 5-18: Drive Tray Key-lock Rotation**

**Step 3.** **Open the front flap** by pushing the release button at the front of the drive tray. (See ***Figure 5-19***) The front flap will automatically swings up into position.



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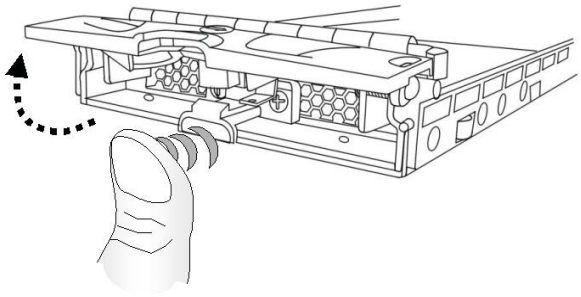


**Figure 5-19: Opening the Front Flap**

**Step 4.** **Remove the drive tray** by pulling it one inch away from the drive bay. Wait for at least 30 seconds for the disk drive to spin down (if the disk drive is removed for a different purpose, e.g., cloning the members of a logical drive or Copy & Replace), and then gently and carefully withdraw the drive tray from the chassis.

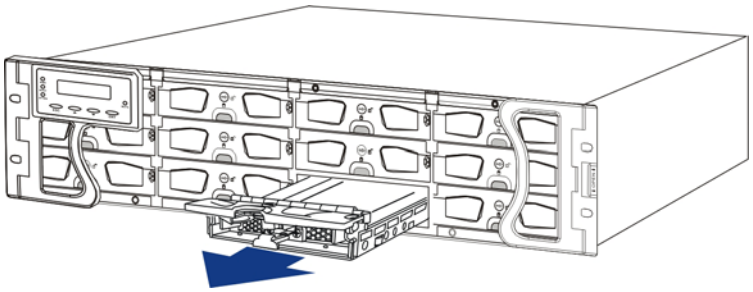


**Figure 5-20: Removing a Drive Tray**

**Step 5.** **Remove the four (4) retention screws** that secure the hard drive from the sides of the drive tray (two on each side). (See ***Figure 5-21***)

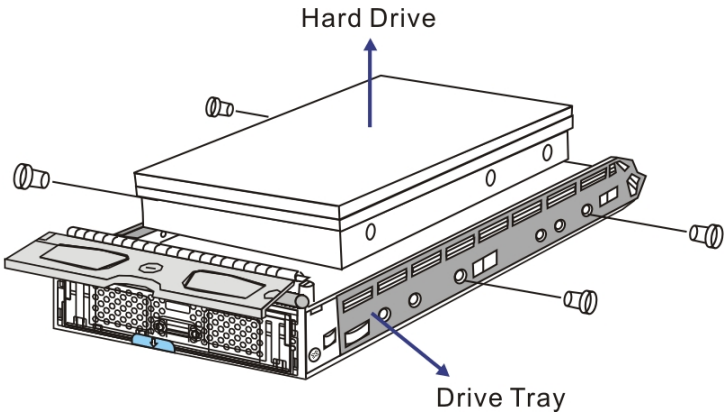



**Figure 5-21: Removing the Hard Drive**



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**Step 6.** Install the replacement drive. Please refer to the complete hard drive installation procedures in ***Section 2.6.***

**Step 7.** **Re-install the drive tray back to the subsystem.** Refer to ***Section 2.7***.

## 5.8 Replacing a MUX Kit

If a MUX kit is damaged or fails, often identified as drive-side signal glitches, follow these instructions to replace it:

**Step 1.** **Remove the drive tray from the drive bay in the subsystem**.

**Step 2.** **Remove the hard drive from the drive tray**, after the drive tray has been removed from the subsystem.

**Step 3.** Turn the drive tray over and **remove the four (4) retention screws** that hold the MUX kit in place.

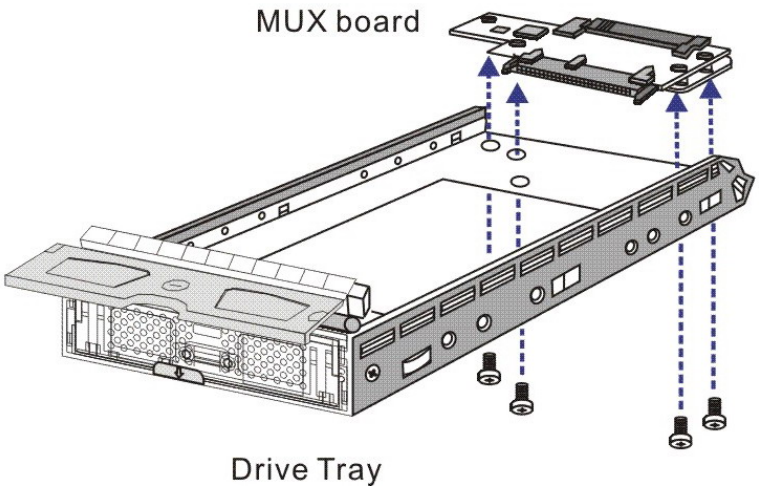



**Figure 5-22: Replacing a SAS to SATA MUX Kit**

**Step 4.** **Install the new MUX kit** using the instructions given in ***Chapter 2***.

**Step 5.** **Re-install the hard drive**, once the new MUX kit has been installed on the drive tray.



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**Step 6.** **Re-insert the drive tray to the subsystem**, after the hard drive has been placed in the drive tray.



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# Appendix A

# Specifications

## A.1 Technical Specifications

| Environmental Specifications | |
|---|---|
| **Humidity** | *Operating*: 5% to 95% (non-condensing)<br>*Non-operating*: 5% to 95% (non-condensing) |
| **Temperature** | *Operating*: 0º to 40ºC (32º F to 104º F)<br>*Non-operating*: -40º to 60ºC (-40º F to 149º F)<br>w/ BBU: 0º to 35ºC (32º F to 95º F) |
| **Altitude** | *Operating*: Sea level to 3,658m (12,000 ft.)<br>*Non-operating*: Sea level to 12,192m (40,000 ft.) |

| Power Requirements | |
|---|---|
| **Input Voltage** | 100VAC @ 9A<br>240VAC @ 4.5A with PFC (auto-switching) |
| **Frequency** | 47-63Hz |
| **Power Consumption** | 530W |

| **Dimensions** | **Without Forearm Handles** (Not including rear-end protrusions) | **Without Forearm Handles** |
|---|---|---|
| **Height** | 131mm (5.2 inches) | 130mm (5.1 inches) |
| **Width** | 482.6mm (19 inches) | 445mm (17.5 inches) |
| **Length** | 504.3mm (19.8 inches) | 488.2mm (19.2 inches) |



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| Certifications |
|---|
| • FCC Class-A<br>• CE<br>• CB<br>• UL60959/ IEC 60950<br>• BSMI |

| Warning Alarms |
|---|
| • Audible alarms<br>• System LEDs<br>• RAIDWatch Manager<br>• LCD screen<br>• RS-232C terminal<br>• Event notifications sent over email, fax, LAN broadcast, SNMP traps, MSN messenger, SMS short messages |

## A.2 Functional Specifications

| Configuration Specifications | |
|---|---|
| RAID Levels | 0, 1 (0 + 1), 3, 5, 6, 10, 30, 50, and 60 |
| Host O/S Compatibility | Host O/S independent |
| Host Interface | 4G FC |
| Host Channels | 2 pre-configured host channels per controller |
| Drive Interface | Supports up to 16 channels of SAS/SATA drives |
| SAS Expansion port | SFF-8470, 4x, wide SAS port to expansion enclosures;<br>To 4 JBODs using single-controller RAID;<br>To 3 JBODs using dual-controller RAID. |
| Drive Channels | SAS/SATA channel |
| Cache Mode | Write-through or write-back |
| Cache Memory | Default 512MB, up to 2GB DDR RAM DIMM modules with ECC |
| Number of LUNs | Up to 32 per host ID |
| Multiple Target IDs/Host Channel | Yes |
| Aliases for Target IDs | Yes |
| Firmware on Flash Memory | Yes |
| Drive Hot-swapping | Yes; with transparent reset of non-responsive drives |
| Controller Hot-swap | S16F-R1430 only |



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| Architectural Specifications | |
|---|---|
| CPU | 800MHz PowerPC 750GL |
| DIMM Slot | One 184-pin DDR DIMM socket |
| ASIC | Infortrend 64-bit chipset (ASIC400) |
| Flash ROM | 64Mbit (8MB) |
| NVRAM | 128Mbit with RTC (with embedded RAIDWatch utility) |
| Hardware XOR | Yes |
| Real-time Clock | For event messages with time record and task scheduling |

## A.3 Power Supply Specifications

| Specifications | |
|---|---|
| Nominal Power | 530W with active PFC |
| DC Output | 12.0V: 32A (Max.)<br>5.0V: 32A (Max.)<br>3.3V: 30A (Max.) |
| Input Frequency | 47 to 63Hz |
| Input Voltage | 100VAC @ 9A or 240VAC @ 4.5A with PFC |
| Power Factor Correction | Yes |
| Hold-up Time | At least 20ms at 115/230VAC full load after a loss of AC input |
| $I^2C$ | Through backplane to RAID controller(s) |
| Over-temperature Protection | Auto shutdown when cooling is lost or exceeding ambient temperature; over-voltage protection is also available. |



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## A.4 Cooling Module Specifications

| Specifications | |
|---|---|
| Speed | High or low rotation speed controlled by firmware proactive mechanisms |
| Max. Airflow (each module) | High speed: 90CFM<br>Low speed: 70.7CFM |
| Input Power | 13.2W max. |
| Input Current | 1.1A max. |
| Rated Voltage | DC 12V |
| Temperature | Operating: -10 to +70ºC<br>Storage: -30 to +70ºC |
| Acoustic Noise | High speed: 51dB max.<br>Low speed: 46dB max. |

## A.5 RAID Management

| Specifications | |
|---|---|
| Configuration | • Text-based firmware-embedded utility over RS-232C through the included serial cable; Y-cable for the dual-controller model.<br>• LCD keypad panel<br>• The RAIDWatch Manager program using in-band or Ethernet connection |
| Performance Monitoring | Yes |
| Remote Control and Monitoring | Yes |
| Event Broadcast/Alert | Yes, (via RAIDWatch sub-module, the Configuration Client utility, NPC, or Embedded browser-based RAIDWatch) |
| Event Notification | Yes, (via RAIDWatch sub-module, the Configuration Client utility, NPC, or Embedded browser-based RAIDWatch) |
| Hardware Connection | In-band over Fiber, out-of-band via Ethernet or RS232C |
| Configuration on Disk | Configuration data stored on disks so that logical drive configurations exist after controller replacement; basic settings, e.g., channel mode settings, are stored on NVRAM. |
| Failure Indicator | Faults are indicated via audible alarm, module LED indicators, LCD panel, RAIDWatch Manager session, or terminal emulation. |



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## A.6 Fault Tolerance Management

| Specifications | |
|---|---|
| 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, life expectancy and charge level aware |
| Host Link Multipathing | Yes, via EonPath drivers |
| Sensors and module presence detection through an $I^2C$ serial bus | Yes |
| Automatic Drive Failure Detection | Yes |
| Automatic Rebuild on Spare Drives | Yes |
| Regenerate Logical Drive Parity | Yes |
| Bad Block Reassignment | Yes |
| Automatic Rebuild upon Failed Drive Replacement | Yes |
| Manual Clone of Suspected Failed Drive | Yes |
| Concurrent Rebuild on Multiple Drives in a RAID (0 + 1) Logical Drive | Yes |
| Salvage the 2nd Temporary Failed Drive in a RAID 1, 3, 5 or 6 Logical Drive | Yes |
| Salvage the 1st Temporary Failed Drive in a RAID 0 Logical Drive | Yes |



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# Appendix B

# Spare Parts and Accessories

## B.1 Spare Parts

The active components and their model names are listed in the following tables:

| Model Name | Description |
|---|---|
| IFT-83SF14RE16M5 | Fibre to SAS RAID controller module, for ES S16F-R1430 subsystem, 4 x 4G FC SFP host ports, RAID 6 |
| IFT-83SF14GE16M5 | Fibre to SAS RAID controller module, for ES S16F-G1430 subsystem, 4 x 4G FC SFP host ports, RAID 6, 512MB DDR RAM |
| IFT-83SF14GE16M5 | Fibre to SAS RAID controller module, for ES S16F-G1430 subsystem, 4 x 4G FC SFP host ports, RAID 6 |
| IFT-83SF14GE16M5 | Fibre to SAS RAID controller module, for ES S16F-G1430 subsystem, 4 x 4G FC SFP host ports, RAID 6, 512MB DDR RAM |
| IFT-9273CHandR | Right-side forearm handle for EonStor 3U series subsystems |
| IFT-9273CHandLLCD | Left-side forearm handle for EonStor 3U series subsystems, LCD panel included |
| IFT-9273CBTE | Battery Li-Ion cell pack for EonStor ASIC400 series |
| IFT-9273ECPSU | Power supply module for ES 3U, ASIC400 series subsystem, 530W capacity |



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| | |
|---|---|
| IFT-9273ECFanMod | Cooling fan module for ES 3U, ASIC400 series subsystems |
| IFT-9273CDTray | Drive tray, Type-III bezel and Type-II LED lightpipe |
| IFT-DDRESCM5 | 512MB DDR RAM DIMM module |
| IFT-DDRESCMA | 1GB DDR RAM DIMM module |
| IFT-DDRESCMB | 2GB DDR RAM DIMM module |
| IFT-9273S1DT2S1S | Drive tray, 2 SAS-to-1 SATA(SATA-II) MUX conversion, power MOS switch embedded, dual-controller subsystems. |

**Table B-1: Spare Parts**

## B.2 Accessories

Accessories that came with the subsystem are listed in ***Table B-2.***

| Model Name | Description |
|---|---|
| IFT-9011 | Null modem, DB9 female to DB9 male, wires swapped |
| IFT-9270AYCab<br><br>(S16F-R1430) | Serial port Y-cable for dual-controller subsystems, 2 audio jacks -to- 1 DB-9; maintenance-free during controller failover |
| IFT-9270ASCab<br><br>(S16F-G1430 only) | RS-232C serial cable, audio-jack to DB9 |

**Table B-2: Accessories Shipped with the Subsystem**

Accessories that must be purchased separately are listed in ***Table B-2.***

| Model Name | Description |
|---|---|
| IFT-9273CDTrayDmy | Dummy Drive tray, Type-II bezel |
| IFT-9279S1N2S1S | HDD MUX board, 2 SAS-to-1 SATA (SATA-II) MUX conversion, active-active port selector, dual-controller subsystems, 5V only. |



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| | |
|---|---|
| IFT-9273S1DT2S1S | Drive tray, 2 SAS-to-1 SATA(SATA-II) MUX conversion, power MOS switch embedded, dual-controller subsystems. |
| IFT-9270CUPSCab | UPS cable, audio-jack to DB-9 |
| IFT-9270CUPSYCab | UPS Y-cable, audio jacks to DB-9's |
| IFT-9270CSFP4GA01 | Agilent Fibre Channel 4.25 / 2.125 / 1.0625 GBd Small Form Pluggable Optical Transceiver, LC, wave-length 850nm, multi-mode |
| IFT-9270CFCCab01 | Optical FC cable, LC-LC, MM-62.5/125, Duplex, LSZH, O.D.=1.8mmx2, 1 meter |
| IFT-9270CFCCab02 | Optical FC cable, LC-LC, MM-62.5/125, Duplex, LSZH, O.D.=1.8mmx2, 5 meters |
| IFT-9270CFCCab03 | Optical FC cable, LC-LC, MM-62.5/125, Duplex, LSZH, O.D.=1.8mmx2, 10 meters |
| IFT-9273CSlider32 | Enhanced slide rail assembly for ES 3U series subsystem, 28 to 32 inches rack depth |
| IFT-9273CSlider36 | Enhanced slide rail assembly for ES 3U series subsystem, 32 to 36 inches rack depth |

**Table B-3: Optional Accessories**

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# Appendix C

# Pinouts

## C.1 SFP Connector Pinouts

Each of the SFP host or expansion ports is comprised of a case bottom, an EMI case, and a 20-pin host connector. These port sockets receive Small-Form-Factor (SFP) fiber optical and copper-based transceivers. Please refer to the latest Interoperability Test Report for compatible modules that have been tested to comply with the sockets. The pinouts are shown in ***Figure C-1*** and their definitions are shown in ***Table C-1***.

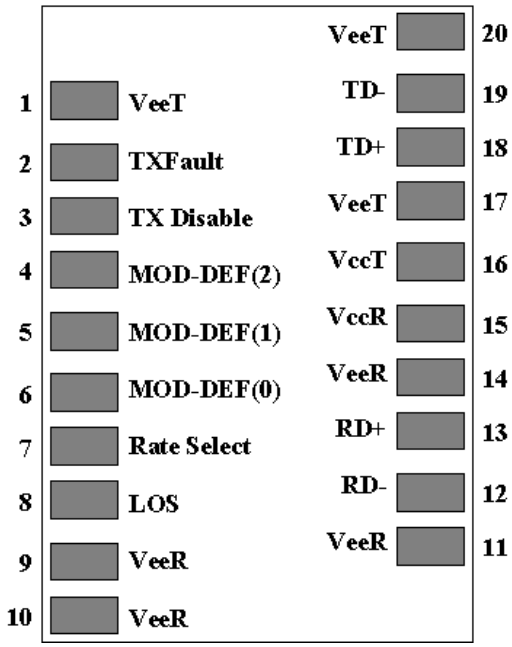



**Figure C-1: SFP Connector Pinouts**



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| Pin | Name | Pin Description |
|---|---|---|
| **1** | $V_{EET}$ | Transmitter Ground (common with Receiver Ground) |
| **2** | $T_{FAULT}$ | Transmitter Fault: not supported |
| **3** | $T_{DIS}$ | 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** | $V_{EER}$ | Receiver Ground (common with Transmitter Ground) |
| **10** | $V_{EER}$ | Receiver Ground (common with Transmitter Ground) |
| **11** | $V_{EER}$ | Receiver Ground (common with Transmitter Ground) |
| **12** | RD- | Receiver Inverted DATA out; AC coupled |
| **13** | RD+ | Receiver Non-inverted DATA out; AC coupled |
| **14** | $V_{EER}$ | Receiver Ground (common with Transmitter Ground) |
| **15** | $V_{CCR}$ | Receiver Power Supply |
| **16** | $V_{CCT}$ | Transmitter Power Supply |
| **17** | $V_{EET}$ | 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** | $V_{EET}$ | Transmitter Ground (common with Receiver Ground) |

**Table C-1: SFP Pinout Definitions**



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## C.2 SAS Expansion Port Pinouts

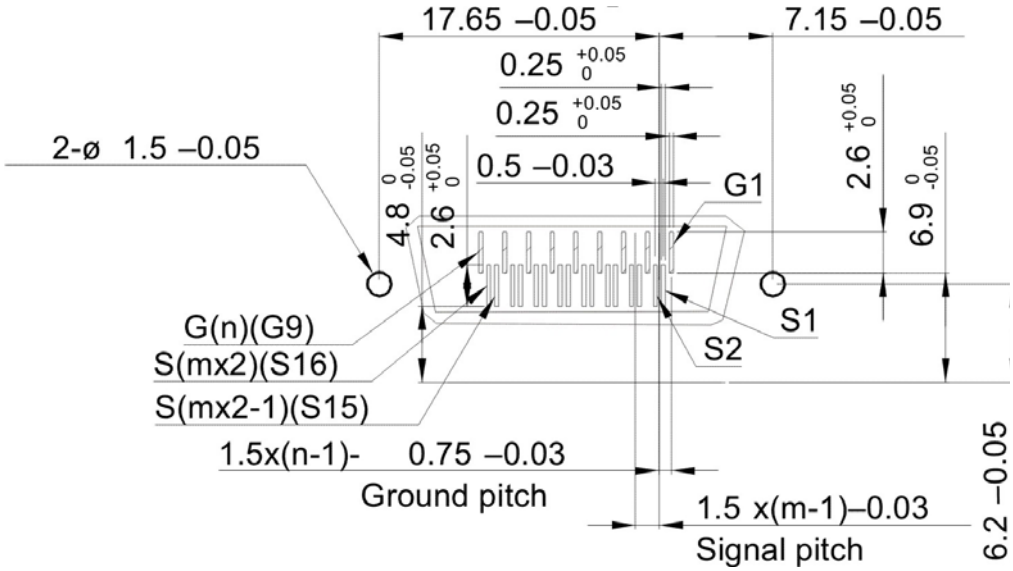



**Figure C-2: SAS Connector Pinouts**

| Pin | Pin Description |
|---|---|
| **G1-G9** | Signal Ground |
| **S1** | IBtxlp(0) |
| **S2** | IBtxln(0) |
| **S3** | IBtxlp(1) |
| **S4** | IBtxln(1) |
| **S5** | IBtxlp(2) |
| **S6** | IBtxln(2) |
| **S7** | IBtxlp(3) |
| **S8** | IBtxln(3) |
| **S9** | IBtxOn(3) |
| **S10** | IBtxOp(3) |
| **S11** | IBtxOn(2) |
| **S12** | IBtxOp(2) |
| **S13** | IBtxOn(1) |
| **S14** | IBtxOp(1) |
| **S15** | IBtxOn(0) |
| **S16** | IBtxOp(0) |

**Table C-2: SAS Expansion Port Pinout Definitions**

## C.3 COM1 Cable: DB9 and Audio Jack Pinouts

**COM1 cable** is used to connect a management computer running a terminal emulation program.



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PN: IFT-9270ASCab




**Figure C-3: COM1 Cable CN1 and CN2 Connectors**

| CN1 Pin Number | Pin Name |
|---|---|
| 1 | Ground |
| 2 | TXD |
| 3 | RXD |

| CN2 Pin Number | Pin Name |
|---|---|
| 1 | NC |
| 2 | RXD |
| 3 | TXD |
| 4 | DTR (Shorted) |
| 5 | GND |
| 6 | DSR (Shorted) |
| 7 | RTS (Shorted) |
| 8 | CTS (Shorted) |
| 9 | NC |

**Table C-3: COM1 Cable CN1 and CN2 Pinout Definitions**

## C.4 COM1 Cable: DB9 Audio Jack Y-Cable Pinouts

The 2-audio jacks to DB9 Y-cable connects the COM1 serial ports on the redundant RAID controllers for maintenance-free terminal emulation connection during controller failover/failback.

IFT-9270AYCab




**Figure C-4: COM1 Cable CN1 and CN2 Connectors**



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| CN1 Pin Number | Pin Name |
|---|---|
| 1 | Ground |
| 2 | TXD |
| 3 | RXD |

| CN2 Pin Number | Pin Name |
|---|---|
| 1 | NC |
| 2 | RXD |
| 3 | TXD |
| 4 | DTR (Shorted) |
| 5 | GND |
| 6 | DSR (Shorted) |
| 7 | RTS (Shorted) |
| 8 | CTS (Shorted) |
| 9 | NC |

**Table C-4: COM1 Cable CN1 and CN2 Pinout Definitions**

## C.5 COM2 UPS Cable: DB9 and Audio Jack Pinouts

**COM2 cable** is used to connect the COM2 port to a UPS.

PN: IFT-9270CUPSCab




**Figure C-5: COM2 Cable CN1 and CN2 Connectors**

| CN1 Pin Number | Pin Name |
|---|---|
| 1 | Ground |
| 2 | TXD |
| 3 | RXD |

| CN2 Pin Number | Pin Name |
|---|---|
| 1 | TXD |
| 2 | RXD |
| 3 | NA |



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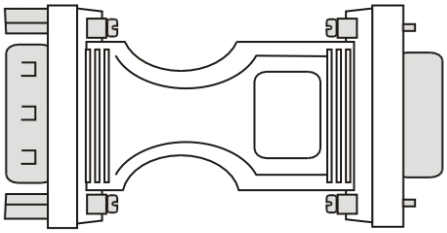
| | |
|---|---|
| 4 | NA |
| 5 | NA |
| 6 | NA |
| 7 | NA |
| 8 | NA |
| 9 | Ground |

**Table C-5: COM2 Cable CN1 and CN2 Pinout Definitions**

## C.6 IFT-9011 Null Modem

A null modem is used for wire-swap and is necessary for connecting COM1 CN2 to a PC serial port.

PN: IFT-9011



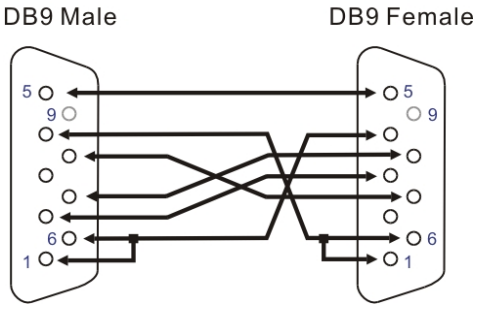



**Figure C-6: Null Modem Pinouts**

| |
|---|
| Swap pin 2 and pin 3 |
| Swap pin 4 and pin 6 |
| Swap pin 7 and pin 8 |

**Table C-6: Null Modem Pinouts**



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## C.7 Ethernet Port Pinouts

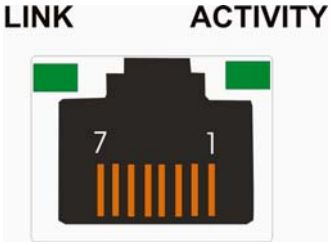



**Figure C-7: Ethernet Port Pinouts**

| Pin | Pin Name | Pin | Pin Name |
|---|---|---|---|
| **1** | LAN_TXP | **5** | N2 |
| **2** | LAN_TXN | **6** | LAN_RXN |
| **3** | LAN_RXP | **7** | N1 |
| **4** | N2 | **8** | N1 |

**Table C-7: Ethernet Port Pinouts**

## C.8 Power Connectors

IEC-type receptacle.

## C.9 Connector Type and Other Information

- The Agilent AFBR-57R5APZ optical transceivers as optional accessories.
- The SFP host ports are compatible with transceivers running at 4.25/2.215 GBd.
- The SFP host ports receive transceivers compliant with LC Duplex optical interface conforming to ANSI TIA/EIA 604-10 (FOCIS 10)
- SFP (SFF-8074i); SFF-8472 (rev. 9.3)
- FC-PI; FC-PI-2



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