

# Instruction Manual

071-8136-01  
SEPTEMBER 2002

**PROFILE XP PFR 500/E**  
FIBRE CHANNEL RAID STORAGE SYSTEM

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## Revision Status

Rev Date	Description
October 16, 2001	Initial release of the PFR500/E Fibre Channel RAID Storage Chassis Instruction Manual. 071-8136-00
September 20, 2002	Revised service and introduction chapters. 071-8136-01

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# Contents

## Safety Summaries

### Preface

About this manual.....	9
Using the Profile XP documentation set.....	9
Manual descriptions.....	10
How this manual is organized.....	11
Getting more information.....	12
Grass Valley Group Web site.....	12
Other on-line documentation.....	12
Grass Valley Group Product Support.....	13

## Chapter 1

### About the PFR 500/E

PFR 500/E features.....	15
Capacity and redundancy.....	16
PFR 500/E components.....	16
Chassis.....	18
Midplane.....	18
Disk modules.....	19
Circuit board modules.....	20
PFR 500E RAID Expansion Chassis circuit board modules.....	20
PFR 500 RAID Storage Chassis circuit board modules.....	22
Power supplies.....	23
Fan modules.....	24
Configurations.....	24

## Chapter 2

### PFR 500/E Installation Information

Installation requirements.....	25
Site requirements.....	25
Power.....	25
Cooling.....	25
Chassis address setting requirement.....	26
Cabling requirements.....	27
Binding disk modules into groups.....	27
Installing a PFR 500/E in an equipment rack.....	28
Unpacking the Chassis.....	28
Installing the rack mounts.....	29
Inserting the PFR 500/E chassis in the rack.....	31
Installing the chassis with drive the support bracket.....	31
Installing chassis without the drive support bracket.....	31
PFR 500/E power-up and initialization.....	33
Connecting electrical cables.....	33
Powering-up the PFR 500/E system.....	33
PFR 500/E power-down.....	34
Battery Backup recharge.....	34

## Chapter 3

### Servicing the PFR 500/E

Maintenance procedures using GVG Disk Utility.....	36
Monitoring PFR 500/E status using NetCentral.....	36
Interpreting disk module LEDs.....	37
Interpreting rear panel status LEDs.....	38
LBB 7-segment display codes.....	39



Removing and installing disk modules .....	40
Moving disk modules .....	40
Removing a disk module .....	41
Installing disk module .....	42
Replacing the Loop Bypass Board (LBB) or RAID Controller .....	43
Removing the LBB or RAID Controller .....	43
Installing the LBB or RAID Controller .....	44
Replacing GBIC data ports .....	45
Replacing a power supply .....	46
Replacing the fan module .....	47
<b>Appendix A    Technical Specifications and                   Operating Limits</b>	
AC power requirements .....	49
Size and weight.....	49
Copper cable lengths .....	49
Environmental limits .....	50
<b>Index</b> .....	51

# Safety Summaries

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## General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

*Only qualified personnel should perform service procedures.*

While using this product, you may need to access other parts of the system. Read the *General Safety summary* in other system manuals for warnings and cautions related to operating the system.

### Injury Precautions

- |  |  |
|--|--|
| <b>Use Correct Power Cord</b>                    | Power cords for this equipment, if provided, meet all North American electrical codes. Operation of this equipment at voltages exceeding 130 VAC requires power supply cords which comply with NEMA configurations. International power cords, if provided, have the approval of the country of use. |
| <b>Ground the Product</b>                        | This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.             |
| <b>Do Not Operate Without Covers</b>             | To avoid electric shock or fire hazard, do not operate this product with covers or panels removed.   |
| <b>Do Not operate in Wet/Damp Conditions</b>     | To avoid electric shock, do not operate this product in wet or damp conditions.  |
| <b>Do Not Operate in an Explosive Atmosphere</b> | To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.  |
| <b>Avoid Exposed Circuitry</b>                   | To avoid injury, remove jewelry such as rings, watches, and other metallic objects. Do not touch exposed connections and components when power is present.   |

### Product Damage Precautions

- |   |   |
|---|---|
| <b>Use Proper Power Source</b>                | Do not operate this product from a power source that applies more than the voltage specified.     |
| <b>Provide Proper Ventilation</b>             | To prevent product overheating, provide proper ventilation.                                       |
| <b>Do Not Operate With Suspected Failures</b> | If you suspect there is damage to this product, have it inspected by qualified service personnel. |



## Safety Terms and Symbols

### Terms in This Manual

These terms may appear in this manual:



**WARNING:** Warning statements identify conditions or practices that can result in personal injury or loss of life.



**CAUTION:** Caution statements identify conditions or practices that may result in damage to equipment or other property, or which may cause equipment crucial to your business environment to become temporarily non-operational.

### Terms on the Product

These terms may appear on the product:

DANGER indicates a personal injury hazard immediately accessible as one reads the marking.

WARNING indicates a personal injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

### Symbols on the Product

The following symbols may appear on the product:



DANGER high voltage



ATTENTION – refer to manual

## Service Safety Summary

### Do Not Service Alone

Do not perform internal service or adjustment of this product unless another person capable of rendering first aid and resuscitation is present.

### Disconnect Power

To avoid electric shock, disconnect the main power by means of the power cord or, if provided, the power switch.

### Use Care When Servicing With Power On

Dangerous voltages or currents may exist in this product. Disconnect power and remove battery (if applicable) before removing protective panels, soldering, or replacing components.

To avoid electric shock, do not touch exposed connections

## **Certifications and Compliances**

### **Canadian Certified Power Cords**

Canadian approval includes the products and power cords appropriate for use in the North America power network. All other power cords supplied are approved for the country of use.

### **FCC Emission Control**

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. Changes or modifications not expressly approved by Grass Valley Group can affect emission compliance and could void the user's authority to operate this equipment.

### **Canadian EMC Notice of Compliance**

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

### **EN55022 & EN55024 Class A Warning**

This product has been evaluated for Electromagnetic Compatibility under the EN 55022 and 55024 standards for Emissions and Immunity and meets the requirements for E4 environment.

This product complies with Class A (E4 environment). In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

### **FCC Emission Limits**

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 must accept any interference received, including interference that may cause undesired operation.



## Safety Certification

This product has been evaluated and meets the following Safety Certification Standards:

Standard	Designed/tested for compliance with:
UL1950	Safety of Information Technology Equipment, including Electrical Business Equipment (Third edition).
IEC 950	Safety of Information Technology Equipment, including Electrical Business Equipment (Second edition, 1991).
CAN/CSA C22.2, No. 950-95	Safety of Information Technology Equipment, including Electrical Business Equipment.
EN60950	Safety of Information Technology Equipment, including Electrical Business Equipment 1992.

### ATTENTION

This product has been designed and certified to comply with certain regulatory requirements pertaining to Information Technology Equipment. This product has not been designed for use as a medical device. Without limitation of the foregoing, this product is not intended and has not been certified for use in a hospital or clinical environment to diagnose, treat, or monitor patients under medical supervision, and is not intended and has not been certified to make physical or electrical contact with patients, nor to transfer energy to or from patients and/or to detect such energy transfer to or from patients.



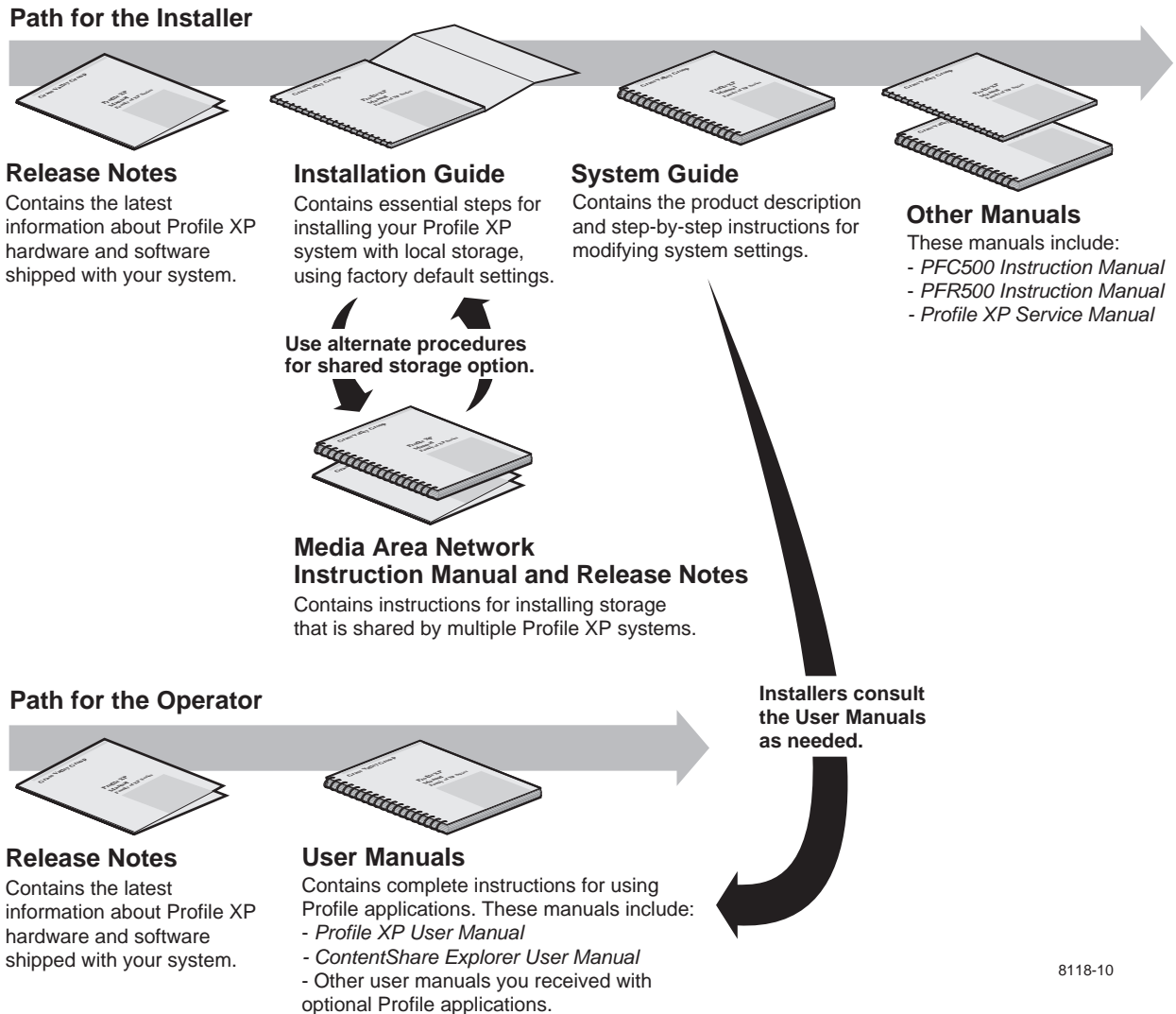
# Preface

## About this manual

The PFR 500/E Fibre Channel RAID Storage Chassis provides RAID protected storage for Profile XP Media Platforms and Grass Valley Group Media Area Networks. If you are responsible for installing and servicing the PFR 500/E in one of these systems, you should read this manual.

## Using the Profile XP documentation set

This manual is part of a full set of support documentation for the Profile XP Media Platform. The following figure illustrates how to use the Profile XP documentation depending on the task you are performing. For instructions on connecting and configuring the PFR 500 Fibre Channel RAID Storage Chassis, consult the Profile XP Installation Guide (local storage) or Media Area Network Instruction Manual depending on the system you are installing.



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## Manual descriptions

- **Installation Guide** (for each Profile XP Model) This guide provides step-by-step instructions for installing the Profile XP Media Platform using factory default settings for all record/play channels. Factory default settings are indicated within the guide. After installing the Profile XP system using this installation guide, you can refer to this *Profile XP System Guide* to customize system settings for your installation.
- **Profile XP System Guide** This guide provides all the information you need to go beyond factory default settings and customize your system's configuration to meet your site-specific needs. This guide also provides an overview of your Profile XP system, and provides all the specifications you need to integrate the Profile XP Media Platform into your operation.
- **Profile XP User Manual** Contains complete instructions for using Profile applications to operate the Profile XP Media Platform.
- **Profile XP Service Manual** Contains information for servicing the Profile XP Media Platform, and includes procedures for the following tasks:
  - Problem analysis using symptom, problem, solution tables.
  - Running diagnostics locally and remotely
  - Set up and operate NetCentral Lite monitoring software.
  - Replacing field replaceable units.
- **Profile XP Release Notes** Contains the latest information about the Profile hardware and the software release shipped on your system. This information includes software specifications and requirements, feature changes from the previous releases, helpful system administrative information, and any known problems.
- **PFC 500/E Instruction Manual** Contains information for servicing the PFC 500 Fibre Channel RAID Storage Chassis (PFC 500/E) including step-by-step procedures for replacing field replaceable units.

## **How this manual is organized**

The following identifies and describes the chapters included in this manual:

### **Chapter 1 - About the PFR500/E**

Introduces the PFR500 Fibre Channel RAID Storage Chassis and the PFR500E RAID Expansion Chassis. You can read this chapter to get familiar with key features and components.

### **Chapter 2 - PFR500/E Installation Information**

Contains information needed for installation of a RAID Storage Chassis and RAID Expansion Chassis, including rack mounting information.

### **Chapter 3 - Servicing the PFR500/E**

Contains service information, such as FRU replacement procedures.

### **Appendix A - Technical Specifications and Operating Limits**

This appendix consists of electrical and environmental specifications.



## Getting more information

In addition to printed documents, Profile XP product information is available in electronic form. Use these as additional sources for information.

### Grass Valley Group Web site

Current versions of this manual and other Profile product documentation may be downloaded via the Product Documentation link on the Grass Valley Group home page.

### Other on-line documentation

Electronic versions of the following manuals are located on the system drive of your Profile XP Media Platform and on the Profile XP software CD-ROM.

- *Installation Guide* (for your model)
- *Profile XP System Guide*
- *Profile XP User Manual*
- *Profile XP Service*
- *PFR500/E Instruction Manual*
- *Profile XP Release Notes*

You can view these manuals using Adobe Acrobat Reader which is also pre-installed on your Profile XP system.

# Grass Valley Group Product Support

To get technical assistance, check on the status of problems, or report new problems, contact Grass Valley Product Support via e-mail, the Web, or by phone or fax.

## Web technical support

To access support information on the Web, visit the product support Web page on the Grass Valley Group Web site. You can download software or find solutions to problems by searching our Frequently Asked Questions (FAQ) database.

**World Wide Web:** <http://www.grassvalleygroup.com/support/>

**Technical Support E-mail Address:** [gvgtechsupport@grassvalleygroup.com](mailto:gvgtechsupport@grassvalleygroup.com).

## Phone support

Use the following information to contact product support by phone during business hours. Afterhours phone support is available for warranty and contract customers.

### USA and Americas (includes Latin America and Canada)

Telephone (800) 547-8949 (Toll Free)  
(530) 478-4148 (Direct Dial Toll Call)  
Fax (530) 478-3181

### Europe and UK

UK Regional Service Location  
Tel +44 1753 218 777  
Fax +44 1753 218 757

France  
Tel +33 145 297 300  
Fax +33 145 297 302

Italy  
Tel +39 72 901 428  
Fax +39 72 905 371

Germany  
Tel +49 221 1791 234  
Fax +49 221 1791 235

### Asia Pacific

Australia  
Tel (612) 8877 6800  
Fax (612) 8877 6825

China  
Tel (86) 10 6235 1185  
Fax (86)10 6235 1190

Hong Kong  
Tel (852)-2531-3000  
Fax (852)-2802-2996

India  
Tel (91) 11 373 0544  
Fax (91) 11 373 0543

Japan  
Tel (813) 5484 6869  
Fax (813) 5484 3775

South East Asia  
Tel (65) 6 7328 729  
Fax (65) 6 7327 649

## Authorized support representative

A local authorized support representative may be available in your country. To locate the support representative for your country, visit the product support Web page on the Grass Valley Group Web site.

## Profile Users Group

You can connect with other Profile XP Media Platform users to ask questions or share advice, tips, and hints. Send e-mail to [profile-users@grassvalleygroup.com](mailto:profile-users@grassvalleygroup.com) to join the community and benefit from the experience of others.



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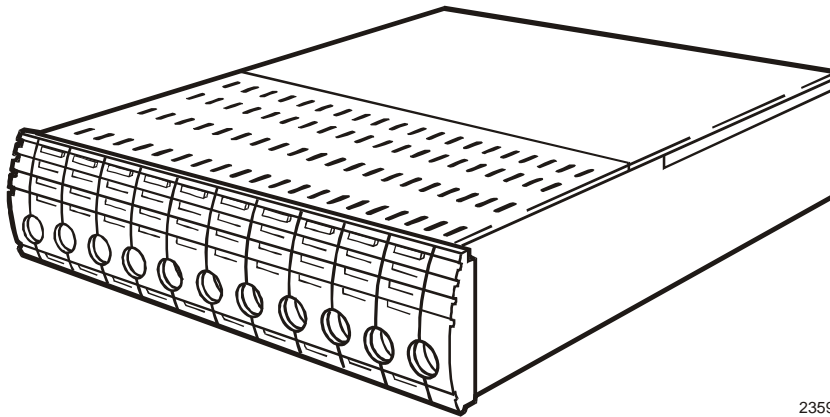
## About the PFR500/E

This chapter introduces the PFR 500 Fibre Channel RAID Storage Chassis. Topics include:

- PFR 500/E features
- PFR 500/E components
- Configurations

### PFR 500/E features

The PFR 500 Fibre Channel RAID Storage Chassis is a high performance, high availability mass storage system. High-bandwidth storage is made possible using Fibre Channel Arbitrated Loop (FC-AL) technology. The PFR 500's modular, scalable design provides additional disk storage as your needs increase.



2359

Feature highlights:

- Ten drives in a 3U vertical rack space
- No single point of failure
- All active components are hot-serviceable
- Scalable expansion using PFR 500E RAID Expansion Chassis
- Optional dual RAID controllers provide Fibre Channel failover
- Copper Fibre Channel interface (GBIC)

The PFR 500 utilizes dual FC-AL technology, allowing two loop configurations within a single chassis. Port-Bypass Circuits have been added to maintain loop integrity during failures without user intervention. Each loop and associated Port Bypass Circuits along with all other active components are on redundant, separate hot



swappable modules. This improves serviceability and increases fault tolerance by eliminating any single point of failure. With two RAID Controllers, the two loops within a single standard chassis are configured as a single loop with a backup loop in standby mode.

## Capacity and redundancy

The PFR 500 contains five or ten half-height 3.5" Fibre Channel Arbitrated Loop (FC-AL) disk drives. The chassis also supports one or two hardware RAID Controllers in one 3U high rack-mountable chassis. The PFR 500 currently uses 73GB or 180GB drive capacities. With ten drives, one chassis holds up to 730GB or 1.8TB depending on the disk drive option.

The PFR 500E RAID Expansion Chassis provides additional storage capacity. It is an identical chassis with two Loop Bypass Board installed. Up to nine PFR 500E RAID Expansion Chassis can be connected to a single PFR 500 comprising a single disk-array storage system with a total of 100 drives and 7.3TB or 18TB of storage depending on the disk drive option. The built-in chassis daisy-chaining capabilities provide for cost effective storage expansion as requirements grow.

Throughout this manual, the term PFR 500/E is used to refer to either the PFR 500 or the PFR 500E interchangeably.

## PFR 500/E components

The PFR 500/E components are:

- The chassis with passive midplane board
- One or two RAID controllers (PFR 500 only)
- One or two Loop Bypass Boards
- As many as ten Fibre Channel disk drives per chassis
- Two power supplies
- Two fan modules

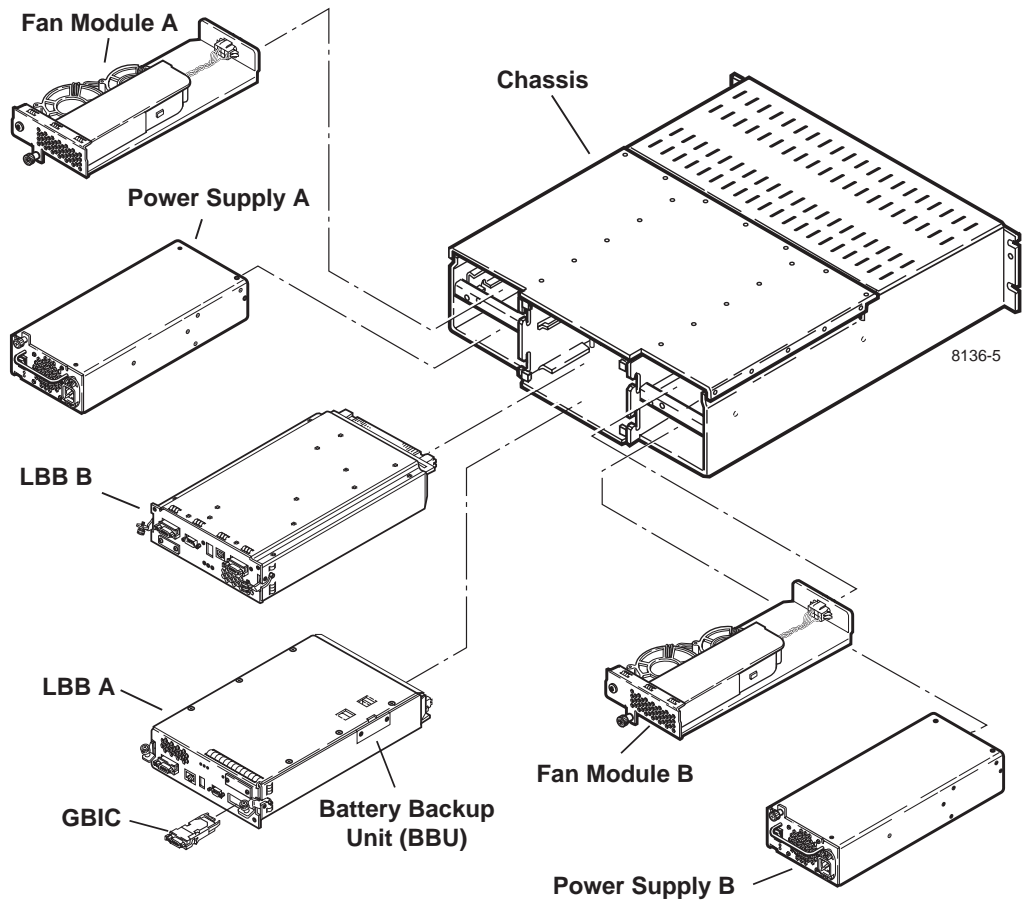
The RAID Controllers, Loop Bypass Boards, disk drives, power supplies, and fan modules are hot-swappable field replaceable units (FRUs), which means you can add or replace them while the PFR 500/E is powered up.

An optional second RAID Controller Module in the PFR 500, allows for continued access to the PFR 500 if the primary RAID Controller fails. Adding a second RAID Controller to the same chassis is not intended to increase performance, but rather to add redundancy. Refer to your Profile XP PVS Series Installation Guide for detailed connection and configuration instructions.

***NOTE: Hotswapping the RAID Controller or LBB modules (removing or inserting) causes approximately a 10 second loss of video (record/play). This happens regardless of whether you exchange the primary controller or the secondary controller.***

The following figure shows the PFR 500/E components. Details on each component follow the figure.





**NOTE:** Every PFR500/E RAID controller includes a backup battery so that if electrical power is lost, data stored in cache memory will be saved. Data store cache is not used in the PFR500/E, so the Battery Backup module is not used, even though it ships as part of the LBB module.

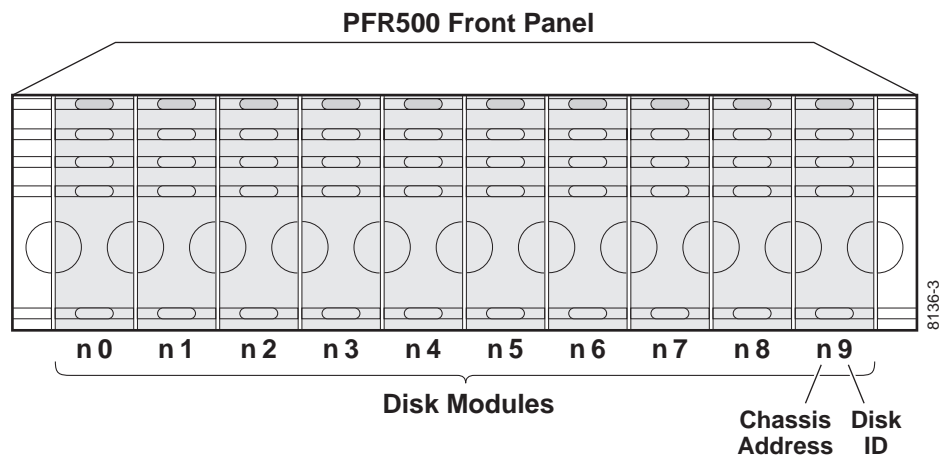


## Chassis

The chassis is a sheet-metal housing which contains a passive midplane and chassis slots for the RAID Controllers, or Loop Bypass Boards, disk drives, power supplies, and the fan modules.

Each chassis includes a *chassis address switch* on the midplane board that must be set to a unique address 0 through 9 during installation. Refer to your *PVS Series Installation Guide* or the *Media Area Network Installation Manual* for information on setting the chassis address switch depending how the PFR 500 is used. See also, [“Chassis address setting requirement” on page 26](#).

The following diagram shows how disk modules are identified based on the chassis address and physical location. The chassis with an address set to 0 contains drives from 0 to 9; the chassis with an address set to 1 contains drives from 10 to 19; and so forth.



## Midplane

The midplane distributes power and signals to all the chassis components. All FRUs plug directly into midplane connectors. The midplane includes a chassis address switch that must be set during installation. Refer to [“Chassis address setting requirement” on page 26](#) for information on setting the chassis address.

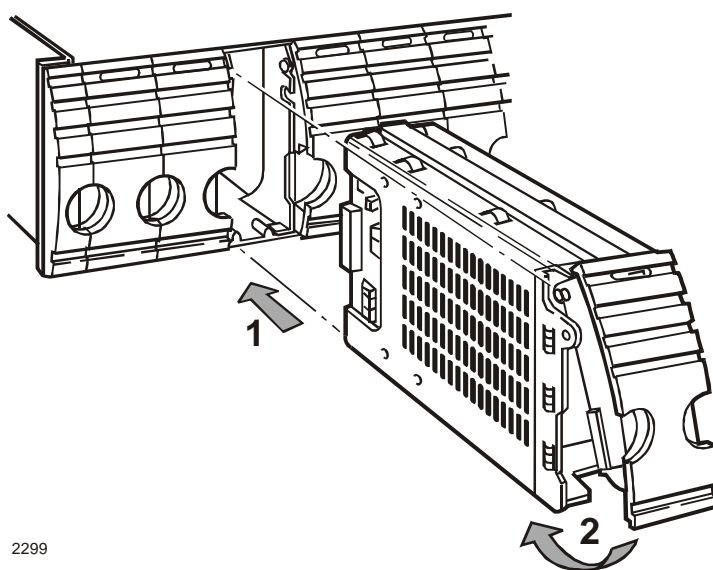
## Disk modules

Each disk module consists of a Fibre Channel disk drive in a carrier assembly. If a disk drive fails, and needs replacing, you can do so while the PFR500/E is powered up. Replacement disk drives take 3-4 minutes to begin rebuild after being installed. (See [“Removing and installing disk modules” on page 40.](#))

The disk drives are 3.5-inch FC-AL drives that conform to the Fibre Channel Arbitrated Loop (FC-AL) standards and support dual-port FC-AL interconnects through the two RAID controllers and their cabling.



**CAUTION:** *Once the PFR500/E is installed and configured, the disk modules become slot dependent. Moving disk modules between physical slots will result in loss of data and the need to reconfigure the system.*



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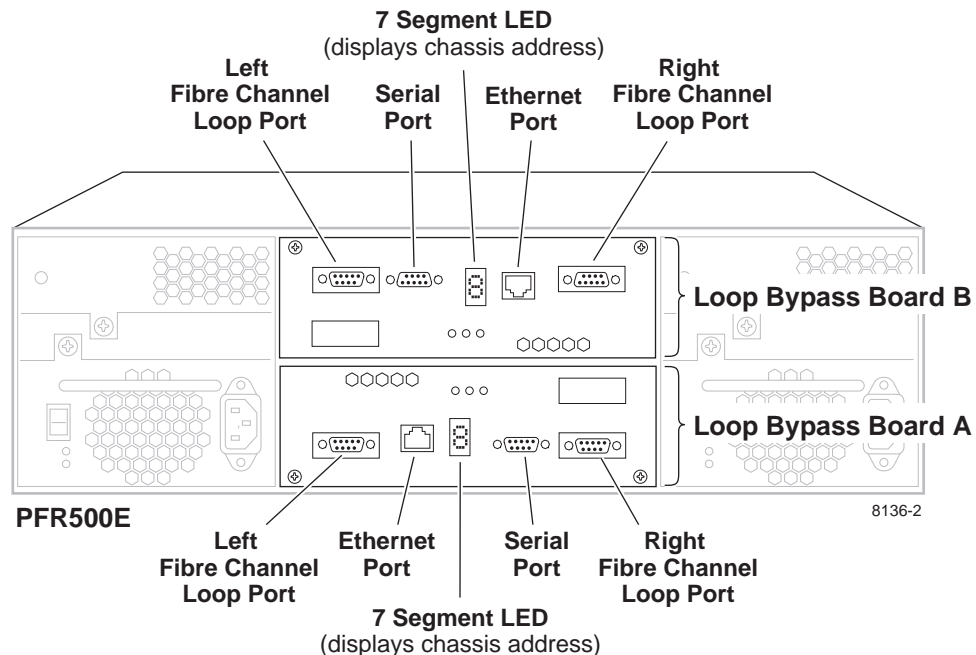


## Circuit board modules

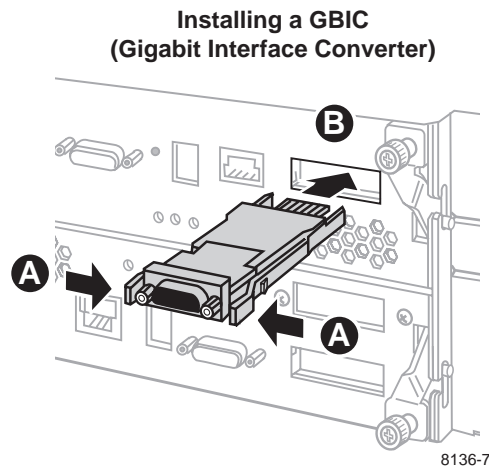
There are two circuit board modules used: the Loop Bypass Board module (LBB) and the RAID Controller module. The LBB module contains one Loop Bypass Board which provides an internal Fibre Channel loop for the disk modules installed in the chassis. The RAID Controller module also contains a Loop Bypass Board plus a RAID Controller board used to manage the disk drives and provide a Fibre Channel interface to the Profile system.

### PFR500E RAID Expansion Chassis circuit board modules

PFR500E RAID Expansion Chassis always has two LBB modules installed as shown in the following figure. This provides two internal Fibre Channel loops for the disk modules. At power-up, odd numbered disk drives are supported by the LBB in the 'A' slot, while even numbered disk drives are supported by the LBB in the 'B' slot. In the event of an LBB module failure, the faulty loop is bypassed and all disk drives failover to the remaining LBB module. The LBBs are clearly labeled "A" or "B" on the rear panel of the canister.



The LBB in the PFR500E has two Fibre Channel ports: the Left and Right Fibre Channel Loop Ports. Copper GBICs (Gigabit Interface Converter) are used in these ports to connect Fibre Channel cabling to a PFR500 or PFR500E. This extends the Fibre Channel loop of the corresponding PFR500/E chassis. There is a port status LED for each Fibre Channel port. Refer to [“Interpreting rear panel status LEDs” on page 38](#).



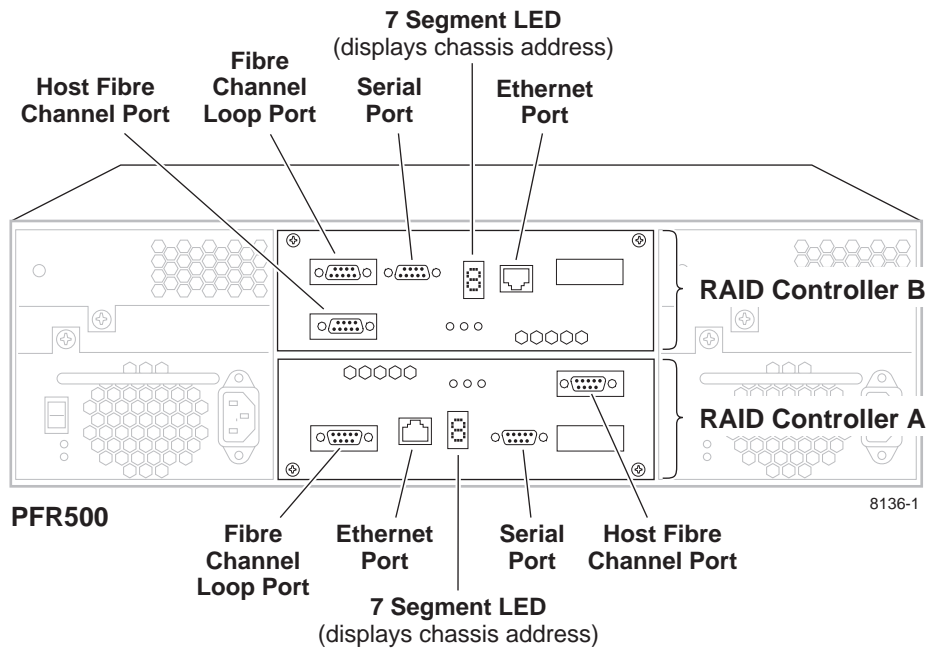
An RJ-type connector is provided for Ethernet network connection. A DB-9 serial communications connector is provided for serial communications with a console program. These connectors are used when NetCentral monitoring software is used. Refer to your *PVS Series Installation Guide* or the *Media Area Network Instruction Manual* for information how these connectors are used.

***NOTE: The PFR500E Expansion chassis and PFR500 Controller chassis must be powered on and off in the proper sequence. Refer to proper power procedures in Chapter 2, "PFR500/E Installation Information".***

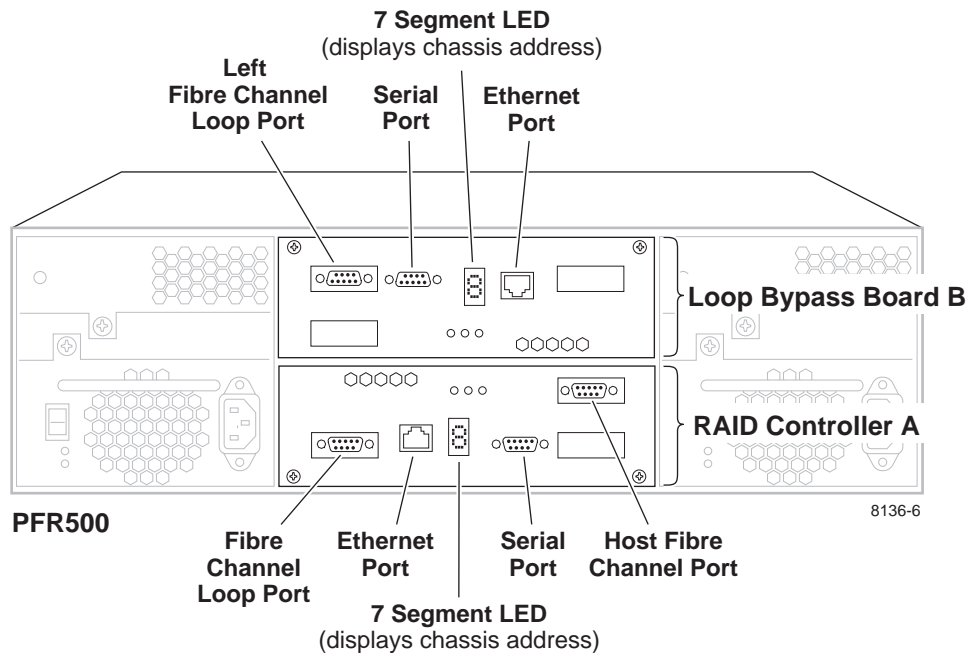


### PFR500 RAID Storage Chassis circuit board modules

A PFR500 includes one or two RAID Controller modules. Two RAID Controller modules are installed when the redundant Fibre Channel option is installed. This provides redundant Fiber Channel interface ports to the Profile system or Fibre Channel switch fabric. The following figure shows a PFR500 Fibre Channel RAID Storage Chassis with the two RAID Controller Modules installed. The RAID Controllers are clearly labeled “A” or “B” on the rear panel of the canister. The “A” and “B” RAID Controllers must be installed in the chassis as shown, they cannot be swapped.



When the redundant Fiber Channel option is not installed, only one RAID Controller is installed along with one LBB module as shown in the following figure. The LBB module and the LBB contained in the RAID Controller module provide the two LBBs required in the PFR500 Fibre Channel RAID Storage Chassis. The LBB and RAID Controller modules are clearly labeled on the rear panel of each canister.



The RAID Controller is equipped with a passive 9-pin copper GBIC installed as the Fibre Channel host port. The RAID Controller also has a Fibre Channel loop expansion port which extends the internal Fibre Channel Loop to the corresponding Loop Bypass Board in a PFR500E Expansion Chassis.

An RJ-type connector is provided for Ethernet network connection. A DB-9 serial communications connector is provided for serial communications with a console program. These connectors are used when NetCentral monitoring software is used. Refer to your *PVS Series Installation Guide* or the *Media Area Network Instruction Manual* for information how these connectors are used.

The RAID Controller includes rear panel Fibre Channel loop port status LEDs and other status LEDs. Refer to [“Interpreting rear panel status LEDs” on page 38](#).

**NOTE:** *The PFR500E Expansion chassis and PFR500 Controller chassis must be powered on and off in the proper sequence. Refer to proper power procedures in Chapter 2, “PFR500/E Installation Information”.*

## Power supplies

There are two auto-ranging power supplies, each with its own power cord and standby switch. Each supply supports a fully configured PFR500 and shares load currents with the other supply, if it is present. The power supplies are designed so as to protect the disk drives if you install them while the PFR500/E is powered up. A disk with power-related faults will not adversely affect the operation of any other disk.

Each power supply has status LEDs visible from the rear panel. The status LEDs are described in the [“Interpreting rear panel status LEDs” on page 38](#).

A retaining screw secures the power supply in place. You can add or remove one power supply in the PFR500/E while the PFR500/E is powered up.



## Fan modules

There are two fan modules used to cool the components installed in the PFR500/E chassis. The fan modules connect to the midplane board for power.

One status LED on the rear panel of the fan module indicates status. The status LED is described in the [“Interpreting rear panel status LEDs” on page 38](#).

A retaining screw on the fan module holds the module in place.

**NOTE:** *If power is connected, fans run at low speed even with the power supply switches in standby position.*

## Configurations

The PFR 500 RAID Storage Chassis minimum and maximum configurations are as follows.

PFR 500 Configuration	RAID Controller Module (Includes one LBB)	Loop Bypass Board Module	Power Supplies/Fan modules	Disk Modules
minimum	1	1	2	5
maximum	2	0	2	10

The maximum configuration provides the most redundancy, and therefore the highest degree of system availability.

The PFR500E RAID Expansion Chassis minimum and maximum configurations are as follows.

PFR500E Configuration	Loop Bypass Board Module	Power Supplies/Fan modules	Disk Modules
minimum	2	2	5
maximum	2	2	10

**IMPORTANT:** *Grass Valley Group does not support mixing disk drives of differing capacities in any RAID chassis. All disk drives in any RAID chassis must be of the same capacity. For example, if a PFR500 and a PFR500E are connected, all the disk drives in both the PFR500 and the PFR500E must be of the same capacity.*



---

# **PFR500/E Installation Information**

This chapter describes information you'll need to install the PFR500 Fibre Channel RAID Storage Chassis (PFR500/E). Major topics are:

- [Installation requirements](#)
- [Installing a PFR500/E in an equipment rack](#)
- [PFR500/E power-up and initialization](#)
- [PFR500/E power-down](#)

## **Installation requirements**

This section describes the following requirements:

- [“Site requirements” on page 25](#)
- [“Chassis address setting requirement” on page 26](#)
- [“Cabling requirements” on page 27](#)
- [“Binding disk modules into groups” on page 27](#)

## **Site requirements**

For proper PFR500/E operation, the installation site must conform to certain environmental specifications. These are detailed below and in [Appendix A, “Technical Specifications and Operating Limits”](#).

### **Power**

Refer to [“AC power requirements” on page 49](#) for AC power requirements. The values indicate either the values for the power cord of a PFR500/E with a single power supply, or the total values shared by the line cords of two power supplies in the same PFR500/E, with the division between the power cords and supplies at the current sharing ratio. If one of the two power supplies fails, the remaining supply and cord must support the full load. You must use a rack mount cabinet with ac power distribution, and have main branch ac distribution that can handle these values for the number of PFR500s and PFR500Es that you will interconnect.

### **Cooling**

Make sure your site has air conditioning of the correct size and placement to maintain the specified ambient temperature range. The air conditioning must be able to handle the requirements of the PFR500s and any connected PFR500Es as indicated under [“Environmental limits” on page 50](#).

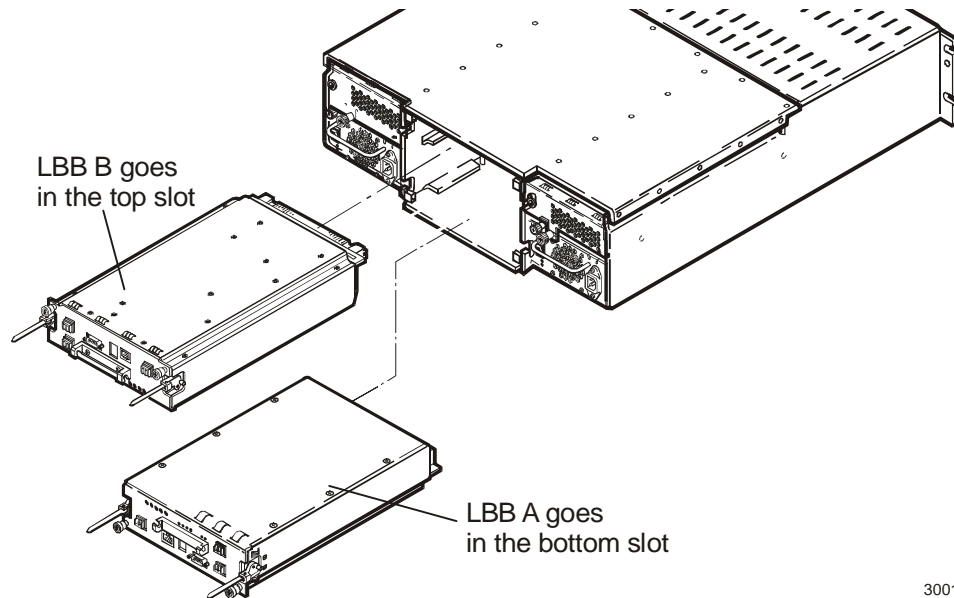


## Chassis address setting requirement

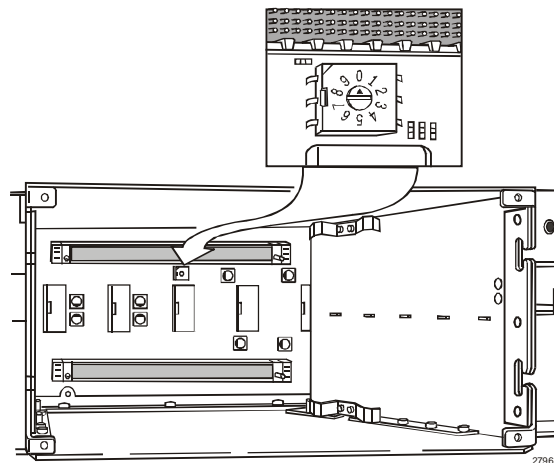
Each PFR500/E storage chassis has a chassis address switch that must be set to a unique chassis address. Valid chassis addresses are 0-9 with 0 being reserved for the PFR500 RAID Chassis. All chassis are shipped with the chassis address set to 0.

The chassis address switch is located inside the chassis on the midplane board. The following figures show how to gain access to the switch by removing the board canisters.

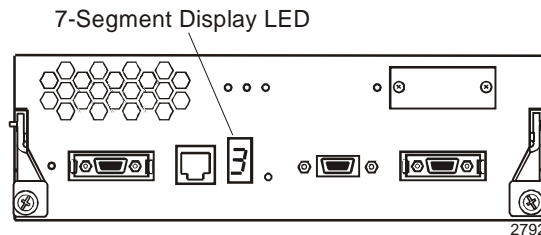
**CAUTION:** Refer to the PVS Series Installation Guide you received with your Profile XP storage system or the Media Area Network Instruction Manual for step-by-step instructions for setting the chassis address.



The midplane is at the back of the slot that held the LBB canisters. On the midplane is a small, white rotary switch.



After the chassis addresses have been set and the chassis powered-up, the chassis address is displayed on the 7-segment display LED as shown.



## Cabling requirements

It is recommended that you use the copper Fibre Channel cables shipped with your PFR500 when making connections.

Any copper cables you use must meet the appropriate standards for 1-Gbit FC-AL loops. Such cables are fully shielded, twin-axial, full-duplex cables with DB-9 connectors. Cables greater than 10 meters must be equalized; cables equal to or less than 10 meters do not need to be equalized. Do not use copper cables longer than 15 meters for any Fibre Channel connection in a Profile system.

PFR 500 and PFR 500E interconnections should maintain LBB consistency. That is, one FC loop should connect the PFR500's RAID Controller A and each PFR500E's LBB A. The other FC loop should connect the PFR500/E's RAID Controller B and each PFR500E's LBB B.

Do not leave an unused (that is, dangling) cable connected to a Fibre Channel port because it may cause excess noise on the loop.

## Binding disk modules into groups

After cabling a PFR500 and any PFR500Es, you must bind disk modules into LUNs using a GVG Disk Utility provided by Grass Valley Group. Refer to the appropriate manual for information on using the GVG Disk Utility to bind drives.

Type of PFR500/E installation	Manual to use for binding procedures
Part of a Media Area Network	<i>Media Area Network Instruction Manual</i>
Connected directly to a Profile XP Media Platform as local storage	<i>PVS Installation Guide</i> (for your Profile XP model) or the <i>Profile XP System Guide</i>



## Installing a PFR500/E in an equipment rack

Use the information in this section to unpack the PFR500/E chassis and mount in an equipment rack.

Procedures include:

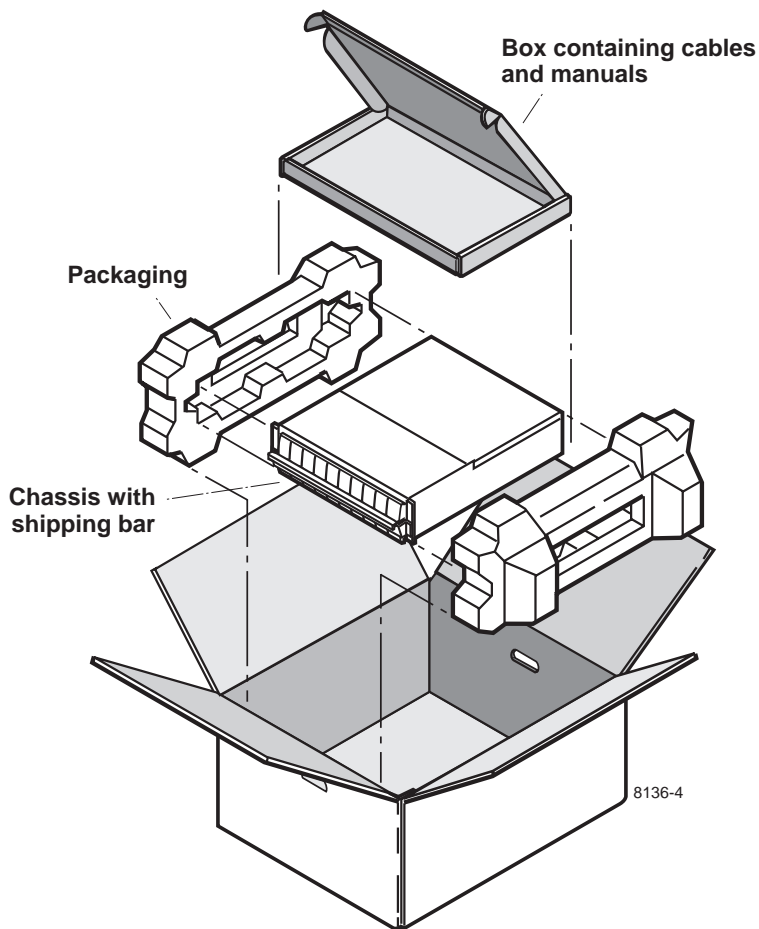
- [Unpacking the Chassis](#)
- [Installing the rack mounts](#)
- [Installing the chassis with drive the support bracket](#)
- [Installing chassis without the drive support bracket](#)

### Unpacking the Chassis

Unpack the PFR500/E chassis, cables, and installation kit.

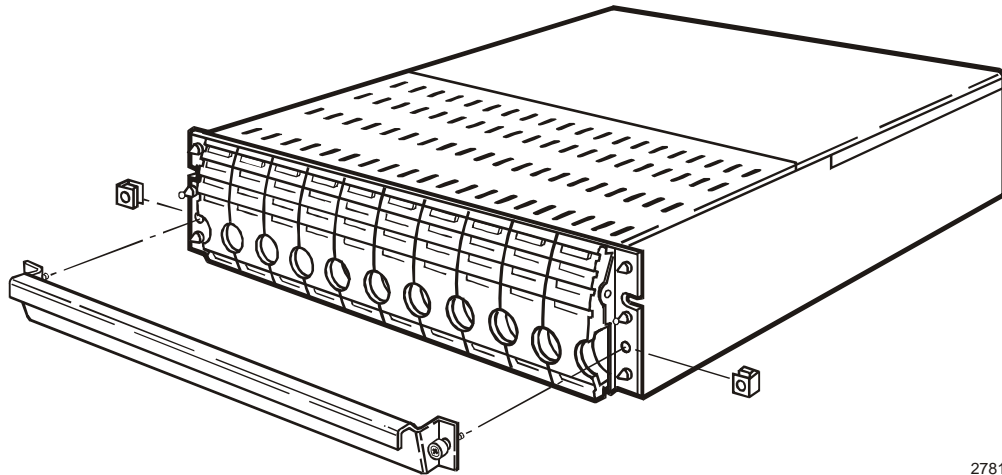


**WARNING:** A PFR500/E chassis is heavy. Two people should lift and move it.



**CAUTION:** Save the chassis packaging. Use only PFR500 approved packaging to ship.

You can either remove the drive support bracket, as shown in the following figure so that you can hot-swap drives, or you can leave the bracket in place for greater drive stability. In either case, keep the bracket and retaining screws in case you have to ship the chassis in the future.

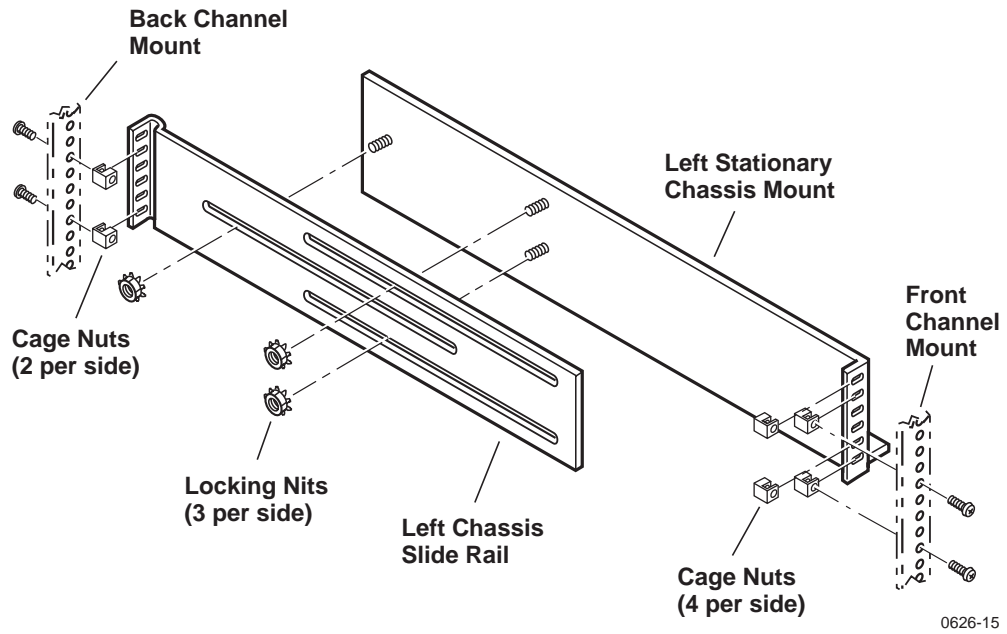


2781

## **Installing the rack mounts**

To install the PFR500/E rack mounts:

1. Loosely fasten the left stationary chassis mount to the left chassis slide rail with the locking nuts.
2. Adjust the length of the outside edges of the chassis mount assembly to fit between the front and back channel mounts. Secure these two pieces together. Pull chassis mount assembly away from channel mounts.
3. Place cage nuts around the top and bottom two holes on the front of the chassis mount assembly, such that the nuts are inside the front and the back of the chassis mount assembly.
4. Place one cage nut on the bottom hole, and one cage nut on the second hole from the top on the back, such that the nuts are inside the front and the back of the chassis mount assembly.
5. Slide the chassis mount assembly between the left front and back channel mounts. Secure the screws through the channel mounts into the cage nuts.



6. Repeat steps 1 through 5 for the right side.

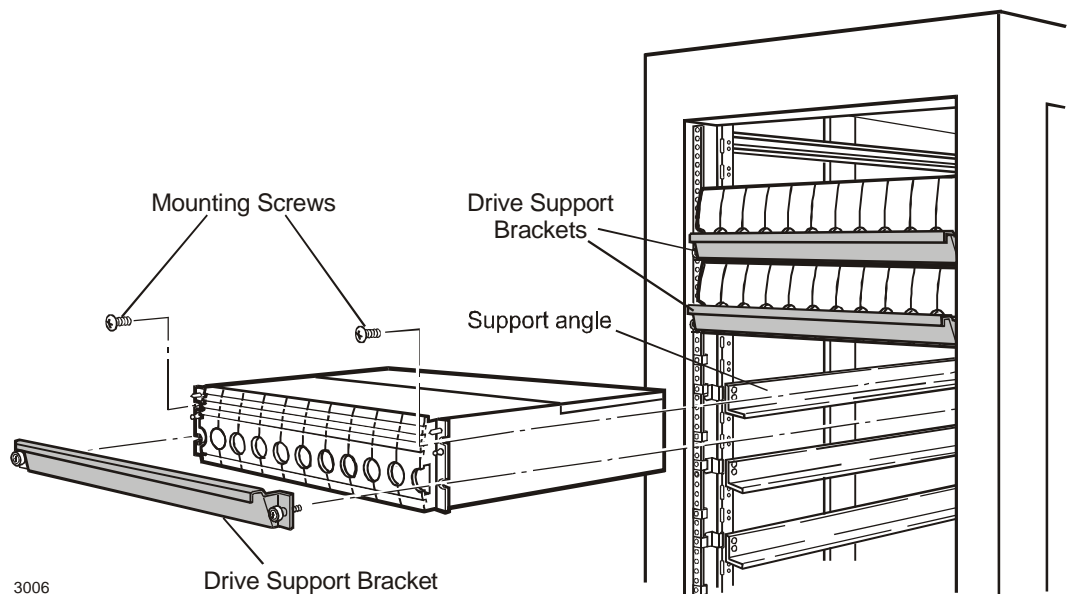
## Inserting the PFR500/E chassis in the rack

Every PFR500/E chassis ships with drive support brackets. The support bracket provides additional disk module support. If the chassis will operate in a high-vibration area, leave the brackets on. This adds time when hot-swapping drives, but provides additional stability.

### Installing the chassis with drive the support bracket

To install a chassis with the drive support bracket:

1. Rest the chassis on the support angles shown. Slide the chassis back and into place.
2. Add the drive support bracket and secure the chassis to the rack with the mounting screws that shipped with the chassis.



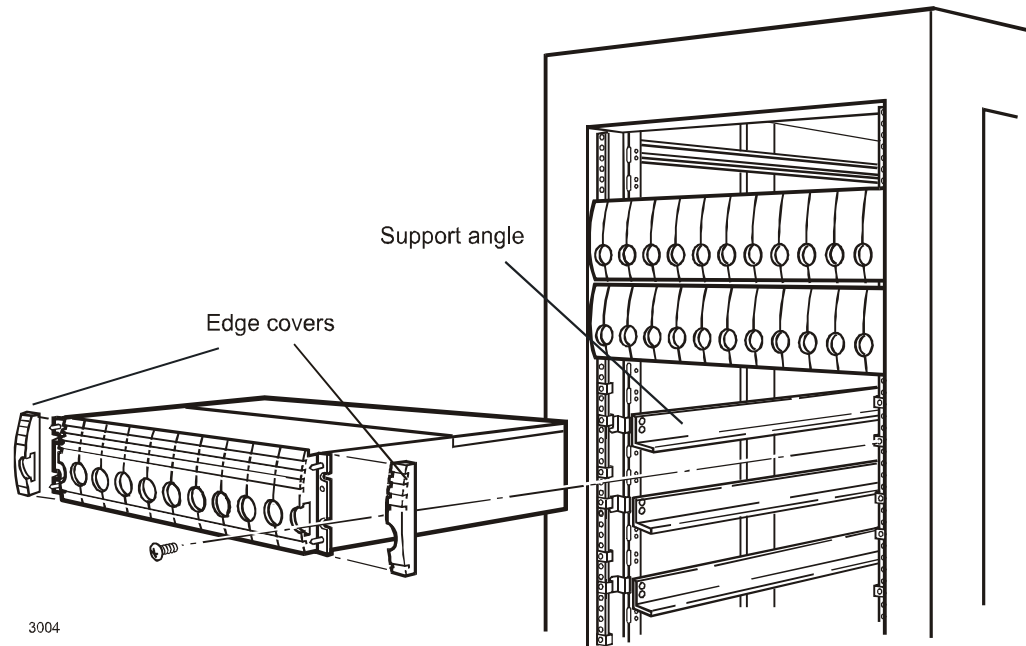
3. Repeat steps 1-2 to insert each PFR500/E chassis in the rack.

The drive support brackets preclude edge covers.

### Installing chassis without the drive support bracket

To install a chassis without the drive support bracket:

1. Rest the chassis on the rack mounts as shown. Slide the chassis back and into place.
2. Secure the chassis to the rack with the mounting screws included in the installation kit.



3. Apply the edge covers that are packaged with the PFR500/E.
4. Repeat steps 1-3 to install each PFR 500/E chassis in the rack.

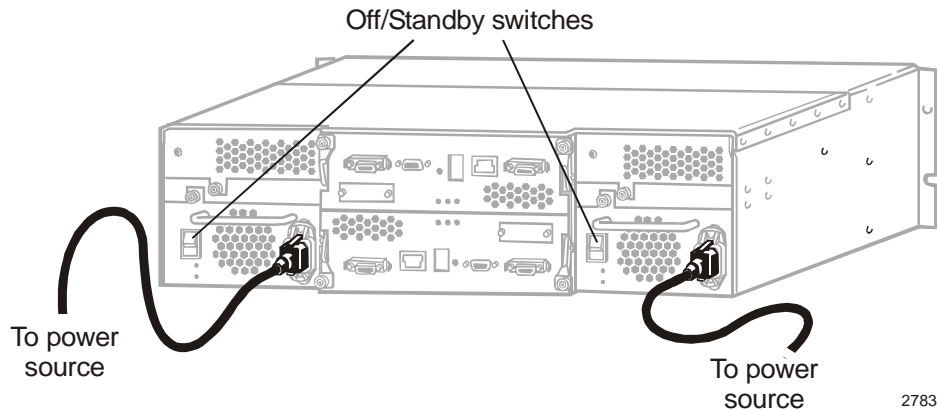


## PFR500/E power-up and initialization

This section gives information about connecting power and powering-on the PFR500/E system.

### Connecting electrical cables

For each chassis, there are two electrical cables which should be connected to separate outside power sources, as shown.



**⚠ WARNING:** Make sure the power cords meet local safety and electrical standards.

**⚠ CAUTION:** The PFR500/E system must be electrically grounded. Operating the system without proper grounding can damage disk drives. If the outlet you use is not grounded, make sure that a licensed electrician replaces it and installs a grounding conductor.

### Powering-up the PFR500/E system

1. Power-up the PFR500E Expansion chassis prior to, or at the same time as the PFR500 Controller chassis.

**NOTE:** You must always power-up the PFR500E Expansion chassis prior to, or at the same time as the PFR500 RAID Controller chassis. Failure to do so may prevent some LUNs in the expansion chassis from being recognized.

2. Wait for RAID storage initialization, as follows:
  - Rear panel 7-segment LED displays the chassis address, and Host RDY LED is ON— approximately 2 minutes.
  - Wait until all disk access LEDs are steady green— approximately 3 minutes.
  - Refer to sections in [Chapter 3, “Servicing the PFR500/E”](#) for information on interpreting status LED behavior.

**NOTE:** Refer to the Profile XP System Guide or Media Area Network Instruction Manual for complete system power-up procedures.



## PFR 500/E power-down

**IMPORTANT:** *If your PFR500/E system is part of a Media Area Network, refer to the Media Area Network Instruction Manual for instructions on shutting down the Media Area Network before powering down a PFR500/E.*

To power-down the PFR 500/E correctly:

1. Stop all read/write activity to the PFR 500/E storage system.
2. Power-down the RAID storage system by powering-down the PFR 500 Controller chassis prior to, or at the same time as with the PFR 500E Expansion chassis.

>>> **CAUTION:** *You must always power down the PFR 500 RAID Controller chassis prior to, or at the same time as the PFR 500E Expansion Chassis. Failure to do so may force some LUNs offline. This will cause loss of access to the media file system when the system is powered up again. Refer to “Forcing LUNs online: Recovery from improper power- sequence” in Chapter 3 of the Profile XP System Guide.*

To turn on power, refer to [“PFR 500/E power-up and initialization”](#) on page 33.

## Battery Backup recharge

Every PFR 500/E RAID controller includes a backup battery so that if electrical power is lost, data stored in cache memory will be saved.

Data store cache is not used in Profile storage systems, so the Battery Backup module is not used, even though it ships as part of the LBB module.

# Chapter 3

## ***Servicing the PFR500/E***

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This chapter describes how to monitor PFR500/E status and replace Field Replaceable Units (FRU).

Topics include:

- “Maintenance procedures using GVG Disk Utility” on page 36
- “Monitoring PFR500/E status using NetCentral” on page 36
- “Interpreting disk module LEDs” on page 37
- “Interpreting rear panel status LEDs” on page 38
- “LBB 7-segment display codes” on page 39
- “Removing and installing disk modules” on page 40
- “Replacing the Loop Bypass Board (LBB) or RAID Controller” on page 43
- “Replacing GBIC data ports” on page 45
- “Replacing a power supply” on page 46
- “Replacing the fan module” on page 47



## Maintenance procedures using GVG Disk Utility

Several maintenance procedures can be performed using the GVG Disk Utility installed on the Profile XP Platform for standalone storage, or on the FSM in Media Area Network systems.

To perform the following tasks, refer to Chapter 3 of the *Profile XP System Guide*:

- Verifying and loading RAID controller microcode
- Downloading PFR 500 disk drive firmware
- Forcing LUNs online: Recovery from improper power-off sequence
- Forcing a replacement drive to rebuild
- Checking and restoring default PFR 500 RAID Controller settings
- Checking and restoring disk settings

## Monitoring PFR500/E status using NetCentral

You can monitor PFR 500/E RAID Storage systems using Grass Valley Group's NetCentral monitoring software. Enabled by SNMP, NetCentral can continuously monitor the storage system and send notifications if there is a problem. The SNMP agent software required for NetCentral monitoring runs on the PFR 500 RAID Controller module. As a result, the PFR 500 appears in NetCentral as a standalone device rather than a subsystem of the Profile XP platform.

Communication with NetCentral takes place over the RAID Controller Ethernet port. To monitor the PFR500, you must connect network cabling, power on the system, then configure network and SNMP settings as described in the *PVS Series Installation Guide*.

Refer to the *Profile XP Service Manual* for information on monitoring the PFR 500 with NetCentral.

## Interpreting disk module LEDs

The disk module LEDs and the 7-segment display on the back of the RAID Controllers are used to indicate system status. The following table describes how to interpret the the disk module LED behavior and rear panel 7-segment display for various conditions.

LEDs <sup>a</sup>	7-Segment Display	Meaning
All drives are green, non-blinking	chassis address	Drives are behaving normally— no disk access in progress <sup>b</sup>
All drives are green, rapid blinking	chassis address	Disk I/O in progress
One drive is blue		Drive has been identified using the GVG Disk Utility.
	F	Drive is failed.
One drive is red		Drive itself has determined it is bad.
All drives are alternating blue/green at two second intervals	F and chassis address (alternating)	Something (such as a power supply, blower, etc.) in the array failed.
RAID only: All drives are blue for 5 minutes, then green for 30 seconds		Failed drive in the array needs to be replaced.
RAID only: All drives are blue		System-wide failure has occurred. Do not remove a drive. Call Grass Valley Group Support as described in page 13.
One drive is green while all other drives are blinking blue.	Chassis ID	LUN is rebuilding. Do not power down the array until the rebuild finishes.

<sup>a</sup>. If the disk access LED is unlit at any point, it indicates one of the colored LEDs has failed. The access LED should display some color at all times.

<sup>b</sup>. A RAID LUN may fail without providing blue LED indication, however, NetCentral alerts can provide this information.



## Interpreting rear panel status LEDs

Refer to the following table to interpret rear panel LEDs on FRUs.

Module	LED Name	Meaning
Loop Bypass Board	Loop	LED is ON when the Fiber Channel port <b>does not</b> detect a valid Fibre Channel signal on the GBIC. LED is OFF when signal is valid.
	7-segment LED	Chassis number and event code display. Refer to <a href="#">“LBB 7-segment display codes” on page 39</a> . Flashing decimal point indicates heartbeat for communication between LBB modules. Solid indicates LBB has critically failed (steady for more than 30 seconds).
RAID Controller	Host Loop	LED is ON when the Fiber Channel port <b>does not</b> detect a valid Fibre Channel signal on the GBIC. LED is OFF when signal is valid.
	Host RDY	LED is ON when the host port is initialized and ready for communication. LED OFF indicates the RAID Controller is not fully initialized.
	Disk ACT	LED is ON when there is disk activity, i.e. data packets on the disk loops.
	Host ACT	The host activity LED is ON when there is host port activity, i.e. data packets on the host loop.
	Tx and Rx	LEDs indicate Ethernet port transmit and receive status.
Power Supply	Output Good	LED is ON (green) when power supply output is good.
	Fault	LED is ON (amber) when there is a fault in the power supply.
Fan Module	Fault	LED is ON (red) when there is a fan failure

## LBB 7-segment display codes

The following table shows event codes for the rear panel 7-segment display on each LBB.

Code	Type	Blink Rate	Meaning
0 thru 9	Informational	Steady or alternating with other code.	Chassis address. Refer to <a href="#">“Chassis address setting requirement”</a> on page 26.
C	Power-up	Steady during power-up	Initially displayed during cold boot, will switch to chassis address within 30 seconds
C	Critical	Steady >30 seconds from power-up	If C remains longer than 30 seconds after power up, the LBB has failed. Board may not be fully seated or may have suffered a critical error during a firmware upgrade.
F	Critical	Alternating with chassis address	An error or event has occurred that requires human intervention. Check disk LEDs and rear panel LEDs. Also, check system status using NetCentral.
.	Informational	Blinking throughout operation	Indicates the LBB is functioning properly.
.	Critical	Blinking halted	The LBB has critically failed (steady for greater than 30 seconds)
H	Informational	Alternating with the chassis address	A firmware update is in progress
H	Warning	Steady for short duration with no alternating	Ethernet link has been detected
H	Identify	Alternating with the chassis address	LBB has been sent an identify command by GVG Disk Utility



## Removing and installing disk modules

Use the following instructions to replace a faulty disk module. It should be replaced while the array is running (hot-swapped).

**NOTE:** *Grass Valley Group does not support mixing disk drives of differing capacities within a RAID chassis connected to a Profile XP Media Platform or Media Area Network. All disk drives in any RAID chassis must be of the same capacity. For example, if a PFR500 and a PFR500E are used, all the disk drives in both the PFR500 and the PFR500E must be of the same capacity.*

### Moving disk modules



**CAUTION:** *You can destroy the media file system beyond recovery if you move a disk module to a different slot. The service person can move a disk module when you don't care about losing the media in the media file system and under the following cautions:*

- The disk module must be unbound.
- Moving a drive module that is part of a LUN to another slot makes all information on the LUN inaccessible.
- You must remove and install the disk module while the storage system is powered up.

A disk module must be inserted all the way or removed entirely. Do not leave a disk module partially removed except for periods when you are allowing it to spin down. When replacing multiple disks, observe the following:

- After removing a disk module, wait for the activity LEDs on the other disk modules to resume a steady flicker before removing the next module.
- After inserting a disk module, wait for the activity LEDs on the other drives to resume a steady flicker before inserting the next module.



**CAUTION:** *Handle a disk module gently and use an ESD wristband. Do not remove a faulty disk module until you have a replacement module (with the same part number) or a filler module available.*



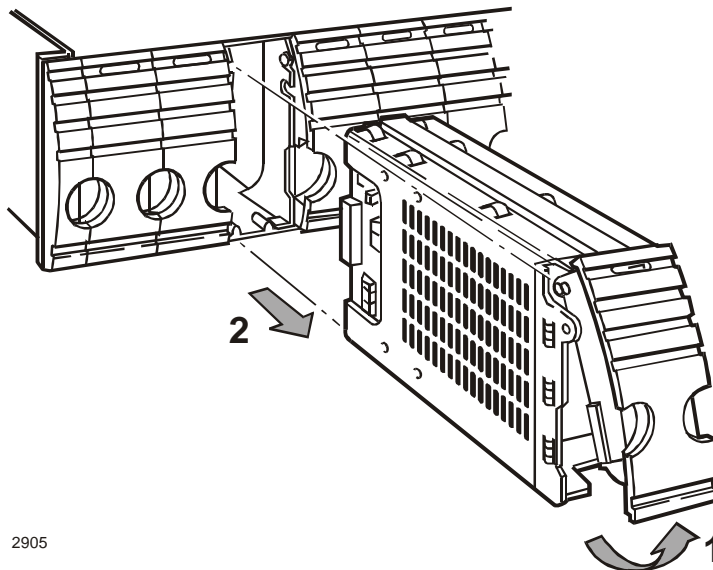
## Removing a disk module

**NOTE:** *If a disk module has been bound into a LUN, do not move it to another slot unless you do not care about the data on the LUN. Each module has LUN identifying information written when it is bound. Moving it to another slot can make information on the original LUN inaccessible.*

Generally, you should not remove a disk module unless it is faulty. Refer to [“Interpreting disk module LEDs” on page 37](#) and [“Monitoring PFR 500/E status using NetCentral” on page 36](#).

To remove the disk module:

1. Confirm the drive location by ensuring that the disk module LED is blue or red.  
NetCentral messages may report disk faults by disk module number. To locate a disk module by number, look at the 7-segment LED display on the rear panel of the RAID Controller or Loop Bypass Boards. It displays a single digit (0 through 9). This indicates the chassis address of the chassis. The chassis displaying chassis address 0 contains drives from 0 to 9; the chassis displaying chassis address 1 contains drives from 10 to 19; and so forth.
2. Remove the drive support bracket, if installed (refer to [“Installing the chassis with drive the support bracket” on page 31](#).)
3. Grasp the release lever with your thumb and index finger and pull outward to open the door.



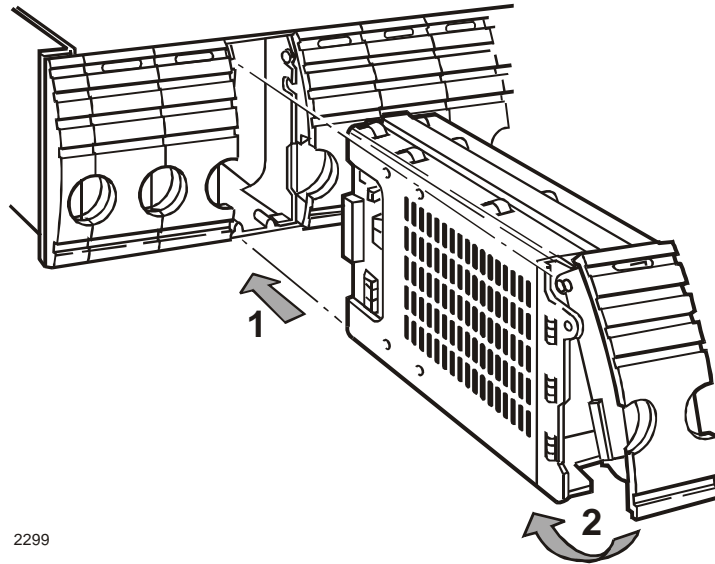
4. Carefully slide the disk module out until it is free and out of its bay.



## Installing disk module

To install a disk module:

1. Insert the replacement disk module into the empty bay.



2. Press the release lever down and into place, as shown.
3. The disk spins up automatically.
4. Disk module rebuild begins in approximately 3-4 minutes. If not, refer to Chapter 3 of the *Profile XP System Guide* for instructions on forcing disk module rebuild using GVG Disk Utility. Also refer to [“Interpreting rear panel status LEDs” on page 38](#) for disk module LED status during rebuild. Afterward, check disk module status using NetCentral or GVG Disk Utility.
5. Replace the drive support bracket, if used (refer to [“Installing the chassis with drive the support bracket” on page 31.](#))

## Replacing the Loop Bypass Board (LBB) or RAID Controller

Use the following instructions to replace an LBB or RAID Controller module. It should be replaced while the chassis is powered up (hot-swapped).

**NOTE:** Ensure that the RAID Controller or LBB you are installing has the same microcode version as the module being replaced. Otherwise, the replacement module will not initialize. Refer to the Profile XP System Guide for information on checking controller firmware versions.

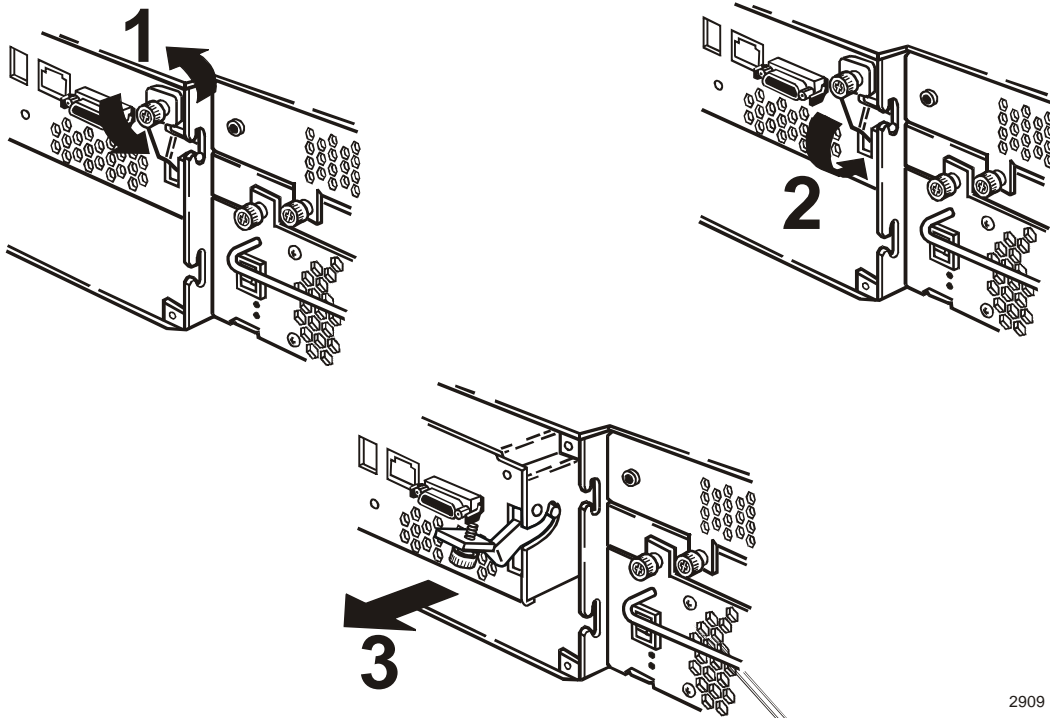
**NOTE:** A PFR500 must have at least one RAID Controller installed while it is powered up. Do not remove both RAID Controller while the PFR500 is powered up.

### Removing the LBB or RAID Controller

**NOTE:** Removing or inserting the RAID Controller or LBB causes approximately a 10 second loss of video (record/play). This happens regardless of whether you are exchanging the primary controller or the secondary controller.

To remove the LBB or RAID Controller:

1. Identify the module to be replaced using NetCentral or rear panel LED indicators.
2. Remove the cables connected to the module. Note where the cables connect to the module.
3. Loosen captive screws as shown in the figure below.



2909



4. Unseat the module by pushing down on the two ejector levers.
5. Pull the module out of the chassis.

## Installing the LBB or RAID Controller

Before installing the replacement RAID Controller or LBB, ensure it has the same microcode version as the module being replaced. Otherwise, the replacement module will not initialize.

**NOTE:** *Removing or inserting the RAID Controller or LBB causes approximately a 10 second loss of video (record/play). This happens regardless of whether you are exchanging the primary controller or the secondary controller.*

To install the LBB or RAID Controller:

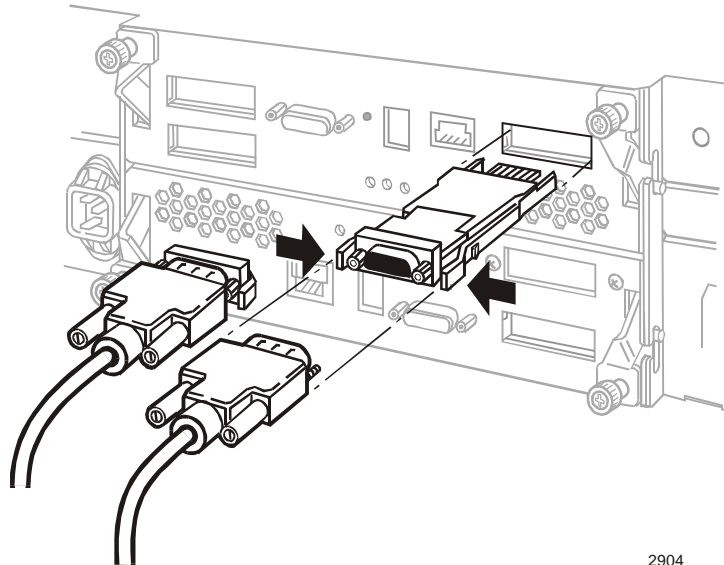
1. Insert the replacement module into the empty bay. Make sure the module is seated.
2. Push up the two ejector levers to seat the module.
3. Tighten the captive screws.
4. Reconnect cabling.
5. Verify module initialization using rear panel status LEDs. Refer to [“Interpreting rear panel status LEDs” on page 38](#). If the replacement module fails to initialize, it may have the wrong microcode version installed. Refer to Chapter 3, “Working with Storage Using GVG Disk Utility”, in the *Profile XP System Guide* for information on checking and loading controller firmware.
6. Check module status using NetCentral or GVG Disk Utility.

## Replacing GBIC data ports

The PFR 500/E ships with passive copper data ports installed in the RAID Controller and Loop Bypass Board (LBB) modules.

To replace the GBIC:

1. Remove cabling and remove the GBIC as shown.
2. Insert the replacement GBIC into the module as shown, then reconnect cabling.
3. Verify the Fibre Channel connection using the port Loop LED. Refer to [“Interpreting rear panel status LEDs” on page 38](#).



2904



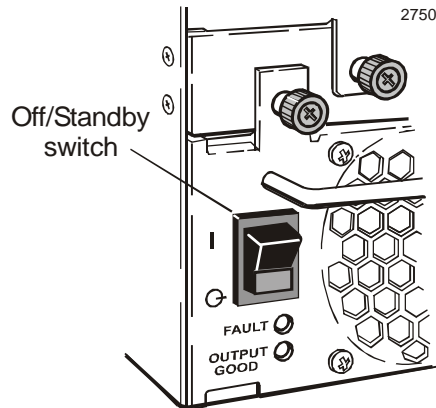
## Replacing a power supply



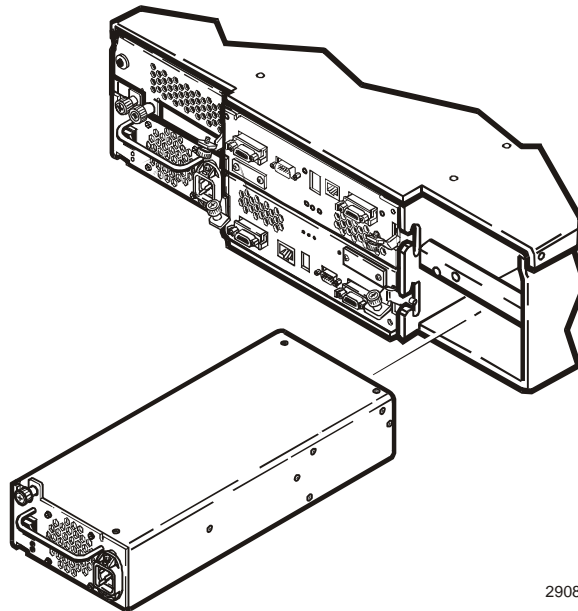
**CAUTION:** Turn off the power supply before unplugging the power cord from the supply or removing the supply from the chassis.

To replace the power supply:

1. Turn the standby switch to Standby (0), as shown.



2. Remove the electrical cable from the power supply.
3. Loosen the captive screw on the power supply.
4. Pull the module out of the enclosure, as shown.



5. Insert the replacement power supply into the empty bay.
6. Tighten the captive screw on the power supply.

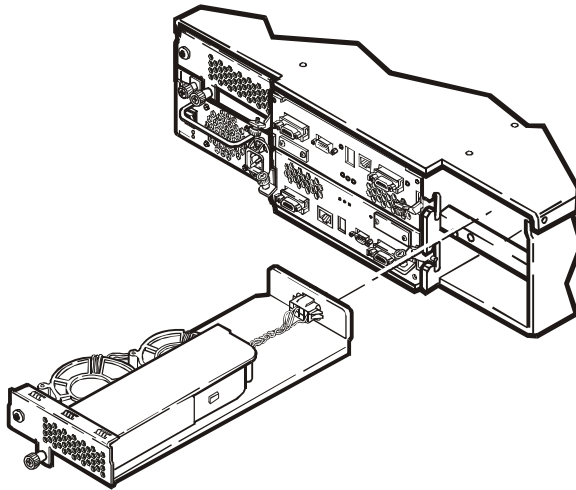
7. Plug the electrical cable into the power supply.
8. Turn on the power supply. Turn the standby switch to ON (1).
9. Monitor the status of the power supply using rear panel status LEDs and NetCentral.

## Replacing the fan module

**CAUTION:** Do not remove a faulty fan module until you have a replacement fan module available. You can remove the drive fan module while the PFR500/E is powered up.

To replace a fan module:

1. Loosen the captive screw on the fan module.
2. Pull the module out of the enclosure.
3. Insert the replacement fan module into the empty bay.
4. Tighten the captive screw on the module.



2907

5. As soon as the module is reinstalled, the fans start spinning and the system fault indicators are cleared if no other FRUs are faulty.





## **Technical Specifications and Operating Limits**

### **AC power requirements**

<b>Power Input</b>
100-120 VAC, 50/60Hz, 6amps
200-240 VAC, 50/60Hz, 3 amps

If one of the two power supplies fails, the remaining supply and cord must support the full load. Your rackmount cabinet must include ac power distribution that can handle these values.

### **Size and weight**

<b>Item</b>	<b>Measurement</b>
Height	13.34 cm (5.25 in) (3 rack units)
Width	44.83 cm (17.65 in)
Depth	55.88 cm (22 in)
Weight	34.0 kg (75.0 lbs)

### **Copper cable lengths**

It is recommended that you use the copper Fibre Channel cables shipped with your PFR500 when making connections.

Any copper cables you use must meet the appropriate standards for 1-Gbit FC-AL loops. Such cables are fully shielded, twin-axial, full-duplex cables with DB-9 connectors. Cables greater than 10 meters must be equalized; cables equal to or less than 10 meters do not need to be equalized. Do not use copper cables longer than 15 meters for any Fibre Channel connection in a Profile system.



## Environmental limits

Requirements	Description
Temperature (Operating)	5 to 35 degrees C (41 to 95 degrees F)
Temperature (Non-operating)	-40 to 65 degrees C (-40 to 149 degrees F)
Relative Humidity (Operating)	5 to 75%, non-condensing
Relative Humidity (Non-operating)	5 to 95%, non-condensing

The system includes two temperature level sensors used to issue auto-warning and auto-shutdown incase the over temperature limit is reached.

# Index

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## Numerics

9-pin cable 23

## A

AC power

current draw 49

overview 25

address switch, chassis 26

Authorized support representative 13

## B

Battery Backup Unit 17, 34

binding disk modules 27

blinking disk module LEDs 37

blue drive LED, blinking 37

## C

cabling

max lengths 27, 49

requirements 27

cabling requirements 27, 49

Canadian Certified Power Cords 7

Canadian EMC Notice of Compliance 7

capacity 16

chassis address switch 26

chassis description 18

chassis dimensions 49

chassis weight 49

colors, disk module LEDs 37

components 16

See FRUs (field replaceable units)

configurations 24

console program 21, 23

## D

depth, chassis 49

disk module

description 19

disk module LED colors 37

identification 18

installing 42

removing 41

replacing 40

disk module LED displays, interpreting 37

disk utilities 27

documentation set 9

documentation, online 12

drive support bracket 31

## E

ejector lever 44

Emission Control, compliance 7

EN55022 Class A Warning 7

error codes 39

Ethernet connector 21, 23

## F

fan module

description 24

replacing 47

running in standby 24

status LEDs 38, 39

FC-AL (Fibre Channel Arbitrated Loop)

cabling requirements 27

FCC Emission Limits 7, 8

features 15

Fibre Channel Host Port 23

Fibre Channel Loop Port 23

field replaceable units (see FRUs)

flashing disk module LEDs 37

FRUs (field-replaceable units)

defined 16

disk module

description 19

replacing 40

fan module

description 24

replacing 47

GBIC

description 20

replacing 45

Loop Bypass Board

description 20

replacing 43

power supply

description 23

replacing 46



RAID Controller  
description 22  
replacing 43

**G**

GBIC 21, 23, 45  
General Safety Summary 5

**H**

height, chassis 49  
high availability features 16

**I**

Injury Precautions 5  
installing  
disk module 42  
PFR 500/E 28

**L**

Laser Compliance  
FCC Emission Limits 7, 8

**LBB**

see Loop Bypass Board

**LEDs**

7-segment display codes 39  
disk modules 37  
rear panel 38, 39

**Loop Bypass Board**

description 20  
replacing 43  
status LEDs 38, 39

loose cable 27

**M**

midplane board  
chassis address switch 26  
description 18

**N**

NetCentral 36

**O**

online documentation 12

**P**

packaging 28

**PFR 500/E**

chassis  
midplane 18  
chassis depth 49  
components 16  
configurations 24  
description 16  
disk module description 19  
fan modules 24  
high availability features 16  
installation requirements 25  
installing in rack 31  
monitoring status 36  
operating limits 50  
power supply, description 23  
powering down 34  
rear panel view 20, 22  
requirements  
cabling 27  
operating 50  
weight 49

**power**

cord 33  
outlet 33

**power supply**

description 23  
replacing 46  
status LEDs 38, 39

**powering-up 33**

Product Damage Precautions 5

Profile Users Group 13

**R**

rack mounting 28  
RAID configuration 27

**RAID Controller**

description 22  
replacing 43  
status LEDs 38, 39

remote monitoring 36

**replacing**

disk module 40  
fan module 47  
GBIC 45  
Loop Bypass Board 43

---

power supply 46  
RAID Controller 43

## **S**

safety ground 33  
Safety Terms and Symbols 6  
serial port 21, 23  
seven-segment display 27  
site requirements  
    See also Appendix A  
    see also Appendix A  
size and weight 49  
SNMP monitoring 36  
standby switch 33, 46  
status  
    monitoring PFR500/E 36  
storage capacity 16  
support, phone numbers 13

## **T**

technical support 13

## **U**

users group 13

## **V**

voltage, PFR 500/E requirements 49

## **W**

web site 13  
weight, chassis 49  
width, chassis 49

