grass valley

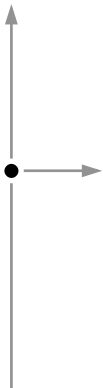# PFR600/E

FIBRE CHANNEL RAID STORAGE SYSTEM

Instruction Manual

071-8266-00
FEBRUARY 2004

the most watched worldwide

Revision Status

Rev Date	Description
20 February 2004	First release. 071-8266-00

Contents

Contents

Safety Summaries

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

Use Correct Power Cord
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.

Ground the Product
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.

Do Not Operate Without Covers
To avoid electric shock or fire hazard, do not operate this product with covers or panels removed.

Do Not operate in Wet/Damp Conditions
To avoid electric shock, do not operate this product in wet or damp conditions.

Do Not Operate in an Explosive Atmosphere
To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.

Avoid Exposed Circuitry
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

Use Proper Power Source
Do not operate this product from a power source that applies more than the voltage specified.

Provide Proper Ventilation
To prevent product overheating, provide proper ventilation.

Do Not Operate With Suspected Failures
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 préscrites 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 600/E Fibre Channel RAID Storage Chassis provides RAID protected storage for Profile XP Media Platforms and Grass Valley Open SANs. If you are responsible for installing and servicing the PFR 600/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 600 Series Fibre Channel RAID Storage Chassis, consult the *Profile XP Installation Guide* (local storage) or *Open SAN Instruction Manual* depending on the system you are installing.

Path for the Installer
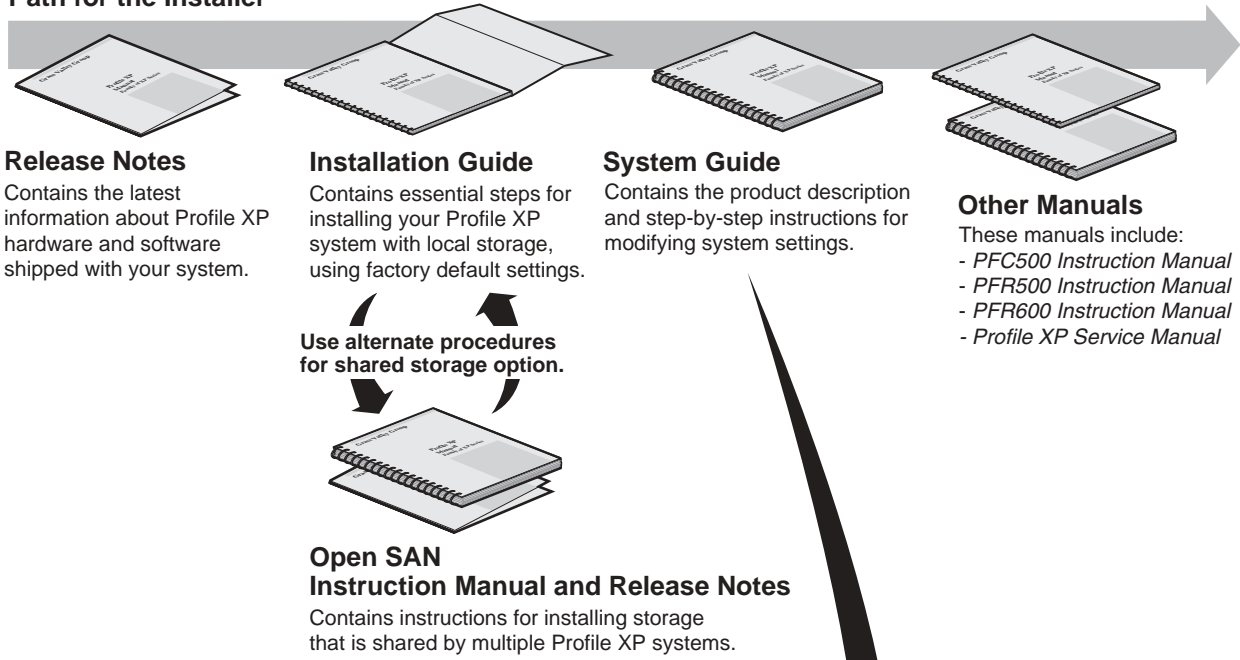
Release Notes
Contains the latest information about Profile XP hardware and software shipped with your system.

Installation Guide
Contains essential steps for installing your Profile XP system with local storage, using factory default settings.

System Guide
Contains the product description and step-by-step instructions for modifying system settings.

Other Manuals
These manuals include:
- *PFC500 Instruction Manual*
- *PFR500 Instruction Manual*
- *PFR600 Instruction Manual*
- *Profile XP Service Manual*

Use alternate procedures for shared storage option.

**Open SAN
Instruction Manual and Release Notes**
Contains instructions for installing storage that is shared by multiple Profile XP systems.
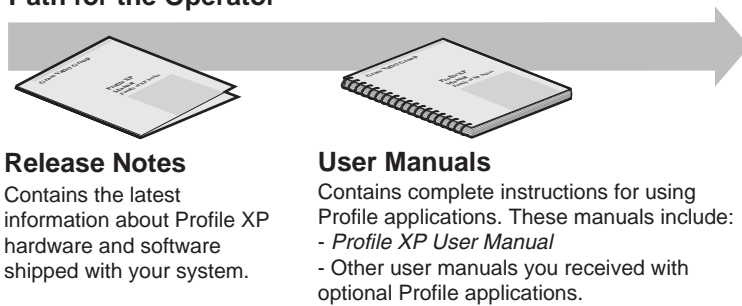
Installers consult the User Manuals as needed.

Path for the Operator

Release Notes
Contains the latest information about Profile XP hardware and software shipped with your system.

User Manuals
Contains complete instructions for using Profile applications. These manuals include:
- *Profile XP User Manual*
- Other user manuals you received with optional Profile applications.

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 operation of NetCentral 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.

- **PFR Series Instruction Manual** Contains information for servicing the PFR 600 Series Fibre Channel RAID Storage Chassis including step-by-step procedures for replacing field replaceable units.

How this manual is organized

The *PFR Series Instruction Manual* is organized around the tasks you'll be performing to install and service your Fibre Channel RAID Storage System. You can see this reflected in the chapter titles chosen for this manual. The following identifies and describes the chapters included in this manual:

Chapter 1 - About the PFR 600 Series
Introduces the PFR 600 Series Fibre Channel RAID Storage Chassis (PFR 600) and the RAID Expansion Chassis (PFR 600E). You can read this chapter to get familiar with the RAID Storage Chassis key features and components.

Chapter 2 - PFR 600 Series Installation Information
Describes how to install a RAID Storage Chassis and RAID Expansion Chassis, including rack mounting. Refer to the *Profile XP System Guide* for connection and configuration information.

Chapter 3 - Servicing the PFR 600 Series RAID
Describes how to replace CRUs, such as disk modules, and add disk modules and redundant CRUs.

Appendix A - Technical Specifications and Operating Limits
This appendix consists of electrical and environmental specifications.

Glossary
The Glossary explains terms used throughout this manual.

Getting more information

In addition to printed documents, Profile XP product information is available in on-line manuals. Use these as additional sources for information.

On-line manuals

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 Manual*

- *PFR Series 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 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 Web site. You can download software or find solutions to problems by searching our Frequently Asked Questions (FAQ) database.

World Wide Web: http://www.thomsongrassvalley.com/support/
Technical Support E-mail Address: gvgtechsupport@thomson.net.

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.

United States	(800) 547-8949 (Toll Free)	France	+33 (1) 34 20 77 77
Latin America	(800) 547-8949 (Toll Free)	Germany	+49 6155 870 606
Eastern Europe	+49 6155 870 606	Greece	+33 (1) 34 20 77 77
Southern Europe	+33 (1) 34 20 77 77	Hong Kong	+852 2531 3058
Middle East	+33 (1) 34 20 77 77	Italy	+39 06 8720351
Australia	+61 3 9721 3737	Netherlands	+31 35 6238421
Belgium	+32 2 3349031	Poland	+49 6155 870 606
Brazil	+55 11 5509 3440	Russia	+49 6155 870 606
Canada	(800) 547-8949 (Toll Free)	Singapore	+656379 1390
China	+86 106615 9450	Spain	+ 34 91 512 03 50
Denmark	+45 45968800	Sweden	+46 87680705
Dubai	+ 971 4 299 64 40	Switzerland	+41 (1) 487 80 02
Finland	+35 9 68284600	UK	+44 870 903 2022

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 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@thomson.net to join the community and benefit from the experience of others.

About the PFR 600 Series

This chapter introduces the PFR 600 Series Fibre Channel RAID Storage Chassis. Topics include:

- PFR 600 Series features
- PFR 600 Series components
- Configurations

PFR 600 Series features

The PFR 600 Series 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 600 Series's modular, scalable design provides additional disk storage as your needs increase.
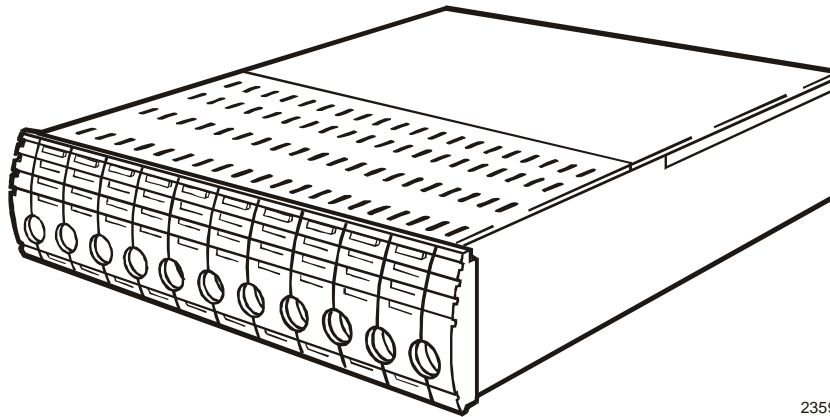
2359

Feature highlights:

- Ten drives in a 3U vertical rack space
- No single point of failure
- Many active components are hot-serviceable
- Scalable expansion using RAID Expansion Chassis
- Optional dual RAID controllers provide Fibre Channel failover
- Copper or Optical Fibre Channel Small Form-Factor Pluggable interface (SFP)

The PFR 600 Series 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 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.

PFR 600 features

The PFR 600 controllers provide enhanced performance of up to 2 Gb/s transfer rates using SCSI protocol. Interchangeable SFPs (Small Form-factor Pluggable) adapters allow you to configure your PFR 600 for operation in a copper or fiber-optic (optical) cabling environment. Generally, use optical SFPs and cables, which are rated at 2Gb/s, wherever possible, such as to connect a PFR 600 to a Profile XP Media Platform equipped with a Fibre Channel Disk II card, or to a Fibre Channel switch in an Open SAN installation. Use copper SFPs and cables, which are rated at 1 Gb/s, to connect a PFR 600 directly to an older Profile XP Media Platform that does not contain a Fibre Channel Disk II card.

The PFR 600 supports up to four PFR 600E RAID Expansion Chassis. It does not support connection to PFR 500E RAID Expansion Chassis. Always use optical SFPs and cables to connect the PFR 600 to PFR 600E RAID Expansion Chassis to ensure optimal performance of your RAID storage system.

Capacity and redundancy

The PFR 600 Series 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 600 Series currently uses 36GB, 73GB or 146GB drive capacities. With ten drives, one chassis holds up to 360GB, 730GB or 1.46TB depending on the disk drive option.

The RAID Expansion Chassis provides additional storage capacity. It is an identical chassis with two Loop Bypass Board installed. Up to four RAID Expansion Chassis can be connected to a single PFR 600 Series comprising a single disk-array storage system with a total of 60 drives and 2.16TB, 4.38TB or 8.88TB of storage depending on the disk drive option. The built-in chassis daisy-chaining capabilities provide for cost effective storage expansion as requirements grow.

PFR 600 Series components

The PFR 600 Series components are:

- The chassis with passive midplane board

- One or two RAID controllers (not present in expansion units)

- One or two Loop Bypass Boards

- As many as ten Fibre Channel disk drives per chassis

- Two power supplies

- Two fan modules

The 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 600 Series is powered up.

IMPORTANT: You must not hot swap operational devices such as disk drives without first disabling the target component using the Grass Valley Disk Utility.

An optional second RAID Controller Module in the PFR 600 Series, allows for continued access to the PFR 600 Series 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: Hot swapping disk drives may occasionally cause a slight interruption in record or play operations.

The following figure shows the RAID Storage Chassis components. Details on each component follow the figure.

Fan Module A

Chassis

Power Supply A

LBB B

LBB A

Fan Module B

SFP

Battery Backup
Unit (BBU)

Power Supply B
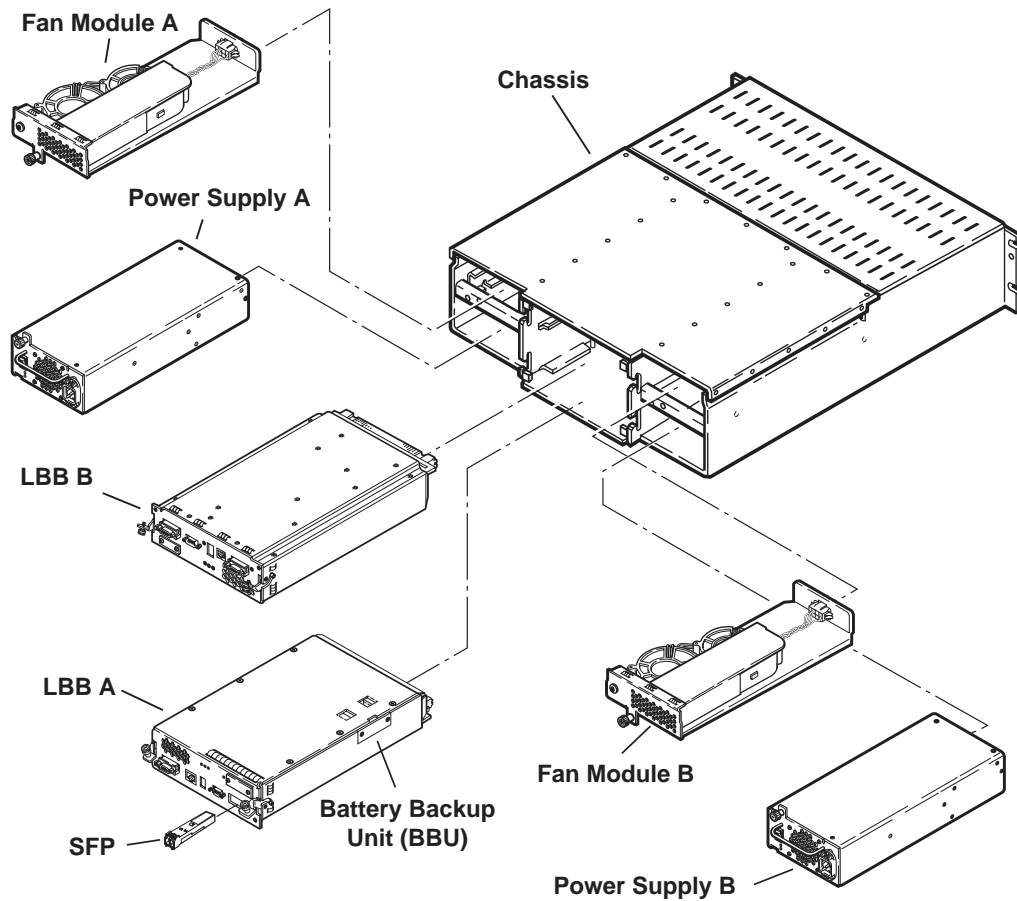
NOTE: Every PFR600 Series RAID controller includes a backup battery so that if electrical power is lost, data stored in cache memory will be saved. Data store cache is not used in the PFR600 Series, so the Battery Backup module is not used, even though it ships as part of the LBB module.

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 *Open SAN Installation Manual* for information on setting the chassis address switch depending how the PFR 600 Series RAID is used. See also, "Chassis address setting requirement" on page 28.

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 1 to 10; the chassis with an address set to 1 contains drives from 11 to 20; and so forth.

Disk Modules
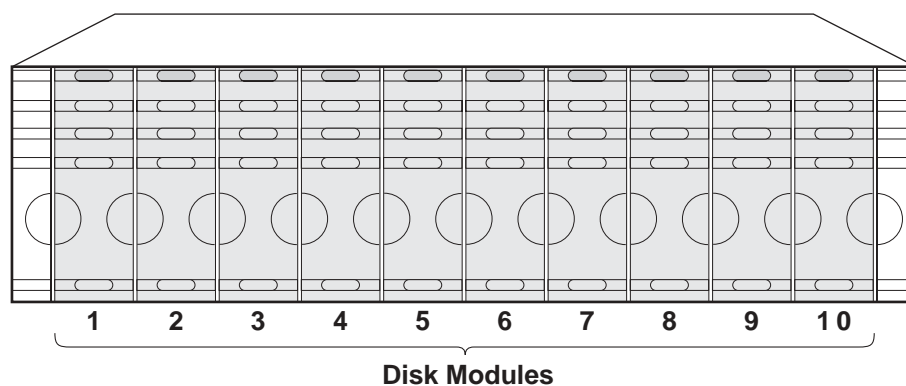
Midplane

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 28 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 RAID Storage Chassis is powered up. Replacement disk drives take 3-4 minutes to begin rebuild after being installed. (See "Removing and installing disk modules" on page 44.)

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 PFR600 Series RAID 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.*
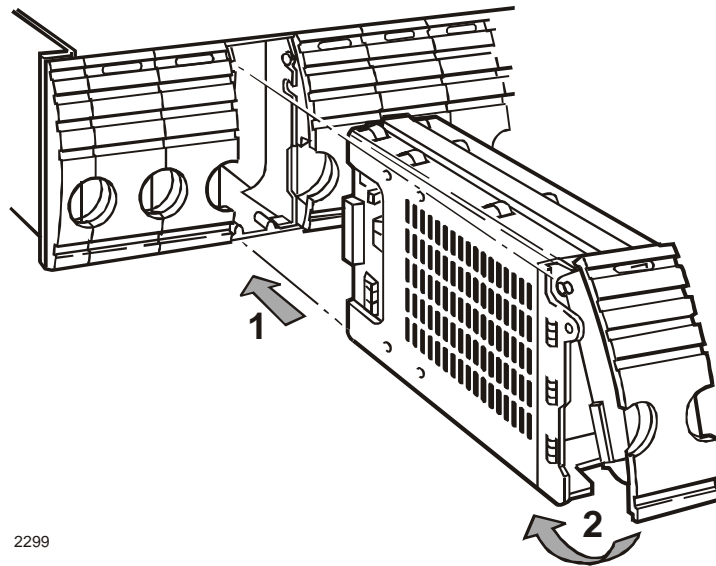
2299

PFR 600/E 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.

PFR 600 RAID Storage Chassis circuit board modules

The PFR 600 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 PFR 600 RAID Storage Chassis with the two RAID Controller Modules installed. RAID controllers can be installed in either position, top or bottom. The one in the bottom position is identified as Controller A, the one in the top position is identified as Controller B.
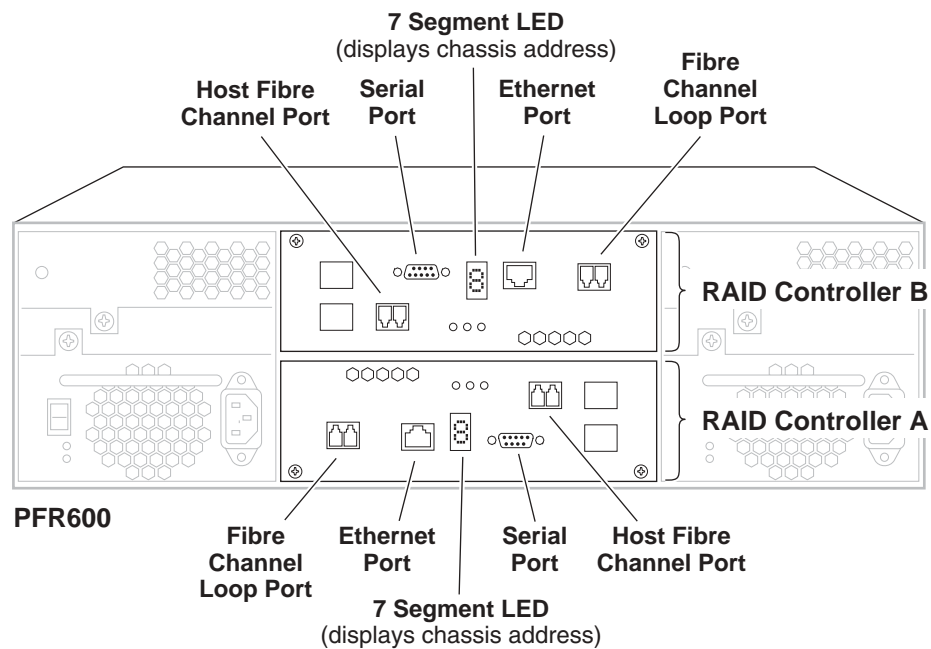
Each RAID Controller module includes a Loop Bypass Board (LBB). These boards provides internal Fibre Channel loops for the disk modules. In the event of an LBB module failure, the faulty loop is bypassed and all disk drives failover to the remaining LBB module.

The LBB in the PFR 600 RAID Controller module has two Fibre Channel ports: the Fibre Channel Host Port and the Fibre Channel Loop Port. Copper or optical SFP (Small Form-factor Pluggable) modules are used in the Host Fibre Channel ports to connect Fibre Channel cabling to a Profile XP Media Platform or to a Fibre Channel switch in an Open SAN fabric, respectively. Optical SFP modules are used in the Fibre Channel Loop ports to connect to a PFR 600E. This extends the Fibre Channel loop of the corresponding PFR 600 chassis. There is a port status LED for each Fibre Channel port. Refer to "Interpreting rear panel status LEDs" on page 42.
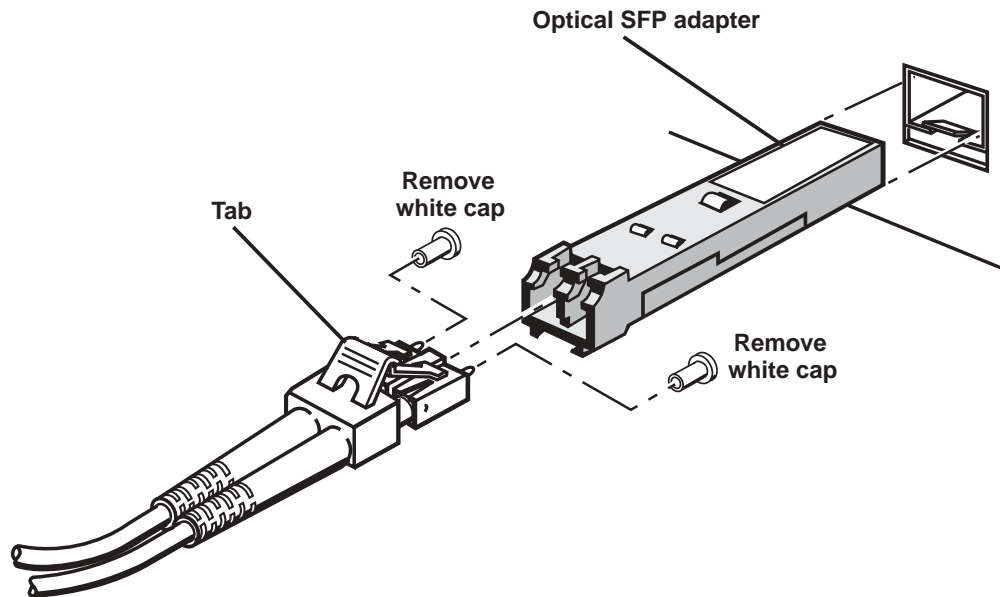
When the redundant Fiber Channel option is not installed in the PFR 600 RAID Storage Chassis, only one RAID Controller is installed along with one LBB module as shown in the following figure. The LBB module and the LBB contained in the RAID Controller module provide the two LBBs required in the PFR 600 Series Fibre Channel RAID Storage Chassis. The LBB and RAID Controller modules are clearly labeled on the rear panel of each canister.

7 Segment LED
(displays chassis address)

Serial Port **Ethernet Port** **Fibre Channel Loop Port**

Loop Bypass Board B

RAID Controller A

PFR600

Fibre Channel Loop Port **Ethernet Port** **Serial Port** **Host Fibre Channel Port**

7 Segment LED
(displays chassis address)
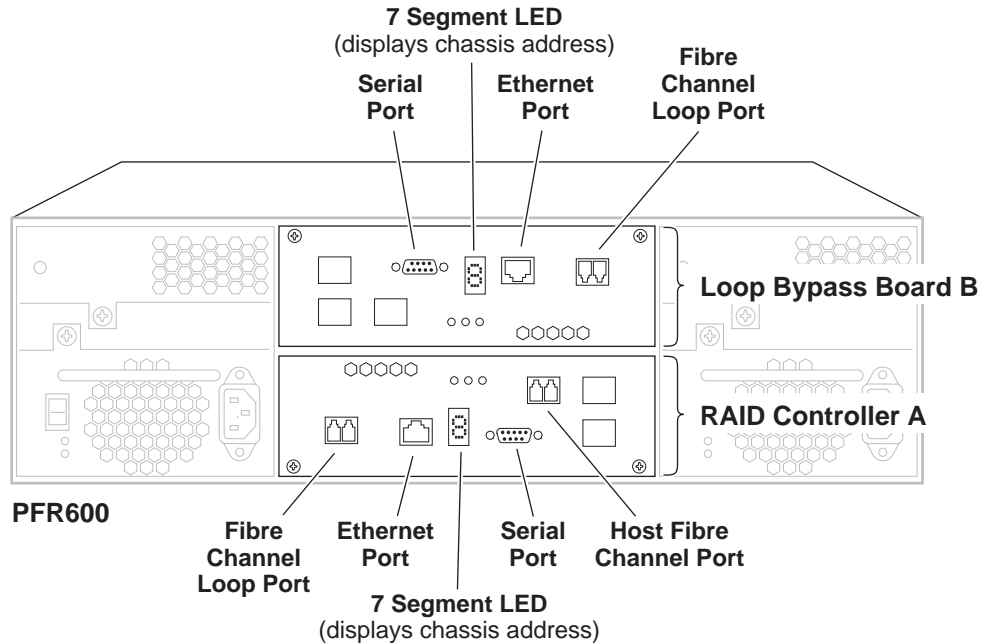
An RJ-type connector is provided for Ethernet network connection, which is used for SNMP monitoring and firmware downloads. A DB-9 serial port is provided for serial communications with a console program to configure the RAID Controller's IP address, subnet mask, SNMP domain, and other network settings. These settings are required to use the NetCentral monitoring software. Refer to your *PVS Series Installation Guide* or the *Open SAN Instruction Manual* for information how these connectors are used.

PFR600E RAID Expansion Chassis circuit board modules

The PFR600E RAID Expansion Chassis always has two LBB modules installed as shown in the following figure. The LBBs are identical, and can be used in either the top or the bottom position.

7 Segment LED
(displays chassis address)

Left
Fibre Channel   **Serial**   **Ethernet**   **Right**
Loop Port   **Port**   **Port**   **Fibre Channel**
Loop Port

Loop Bypass Board B

Loop Bypass Board A

PFR600E

Left   **Ethernet**   **Serial**   **Right**
Fibre Channel   **Port**   **Port**   **Fibre Channel**
Loop Port   **Loop Port**

7 Segment LED
(displays chassis address)
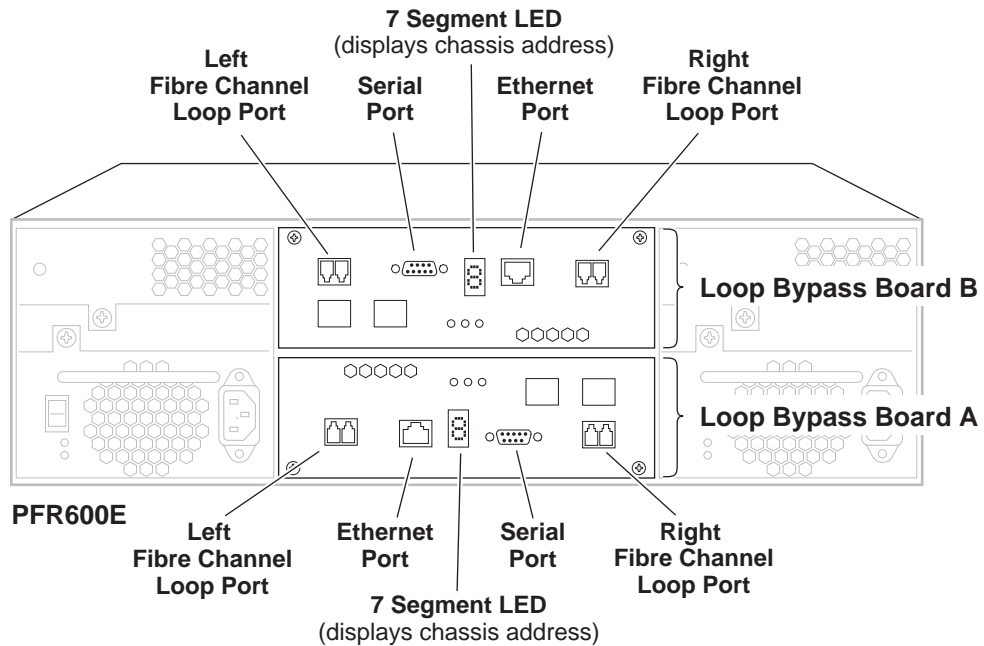
The LBB in the PFR600E has two Fibre Channel ports: the Left and Right Fibre Channel Loop Ports. 2Gb/s optical SFPs are used in these ports to connect Fibre Channel cabling to a PFR600 or PFR600E. This extends the Fibre Channel loop of the corresponding PFR600 chassis. There is a port status LED for each Fibre Channel port. Refer to "Interpreting rear panel status LEDs" on page 42.

A DB-9 serial port is provided for serial communications with the PFR600 through the supplied cable. Refer to your *PVS Series Installation Guide* or the *Open SAN Instruction Manual* for connection information.

NOTE: The PFR600E Expansion chassis and PFR600 Controller chassis must be powered on and off in the proper sequence. Refer to proper power procedures in Chapter 2, "PFR600 Series 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 PFR 600 Series RAID 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 PFR 600 Series RAID 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 42.

A retaining screw secures the power supply in place. You can add or remove one power supply in the RAID Storage Chassis while the RAID Storage Chassis is powered up.

Fan modules

There are two fan modules used to cool the components installed in the PFR 600 Series RAID 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 42.

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 RAID Storage Chassis minimum and maximum configurations are as follows.

PFR600 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 PFR600E RAID Expansion Chassis minimum and maximum configurations are as follows.

PFR600/E Configuration	Loop Bypass Board Module	Power Supplies/Fan modules	Disk Modules
minimum	2	2	5
maximum	2	2	10

IMPORTANT: Grass Valley 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 PFR600 and a PFR600E are connected, all the disk drives in both the PFR600 and the PFR600E must be of the same capacity.

Chapter **2**

PFR 600 Series Installation Information

This chapter describes information you'll need to install the PFR 600 Series Fibre Channel RAID Storage Chassis (PFR 600/E). Major topics are:

- Installation requirements
- Installing a PFR 600/E in an equipment rack
- PFR 600/E power-up and initialization
- PFR 600/E power-down

Installation requirements

This section describes the following requirements:

- "Site requirements" on page 27
- "Chassis address setting requirement" on page 28
- "Cabling requirements" on page 29
- "Binding disk modules into groups" on page 30

Site requirements

For proper PFR 600/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 53 for AC power requirements. The values indicate either the values for the power cord of a PFR 600/E with a single power supply, or the total values shared by the line cords of two power supplies in the same PFR 600/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 PFR 600s and PFR 600Es 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 PFR 600s and any connected PFR 600Es as indicated under "Environmental limits" on page 54.

Chassis address setting requirement

Each PFR600/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 PFR600 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** Open SAN Instruction Manual **for step-by-step instructions for setting the chassis address.***

Enclosure

LBB goes in the top slot (B)

LBB goes in the bottom slot (A)
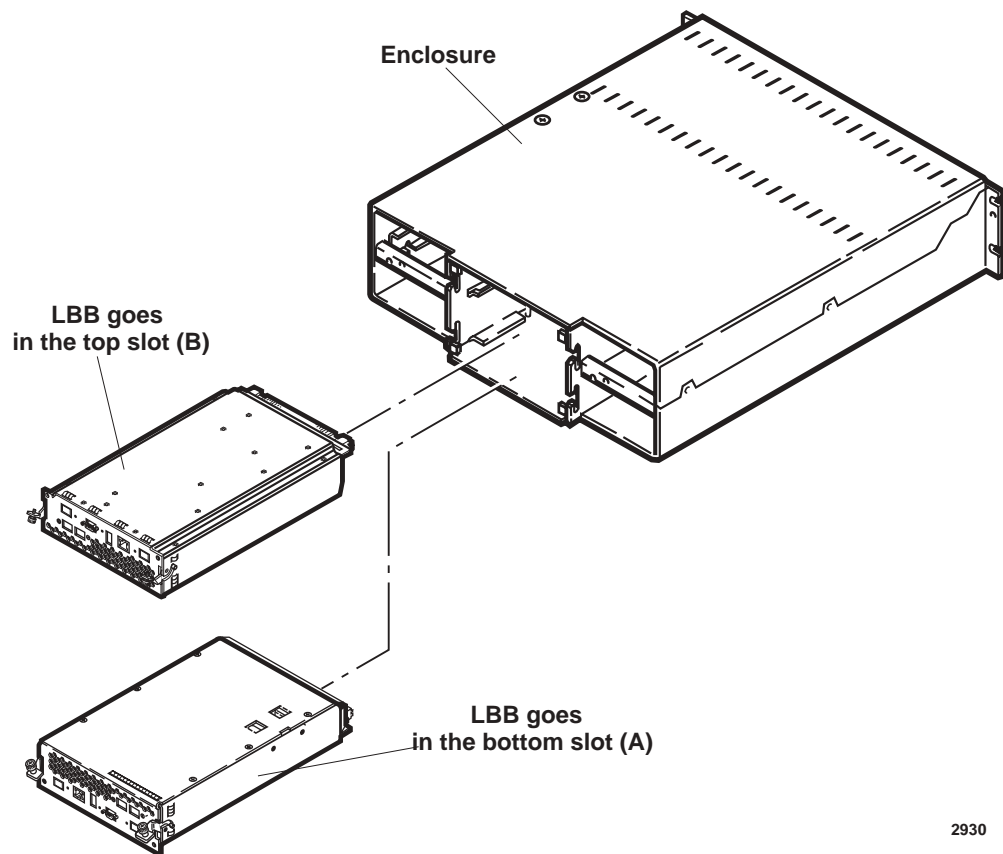
2930

The midplane is at the back of the slot that held the LBB canisters. On the midplane is a small, white rotary switch.
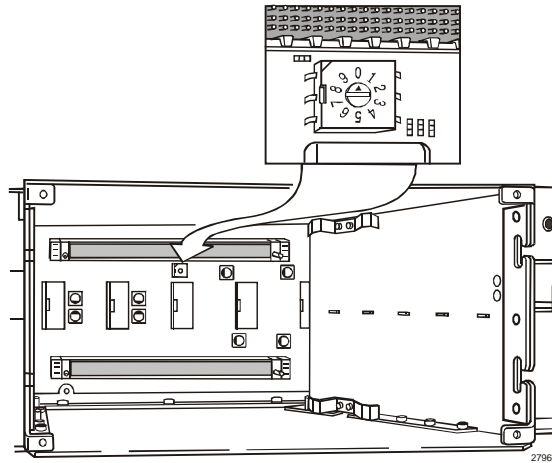
After the chassis addresses have been set and the chassis powered-up, the chassis address is displayed on the 7-segment display LED as shown.

7-Segment Display LED
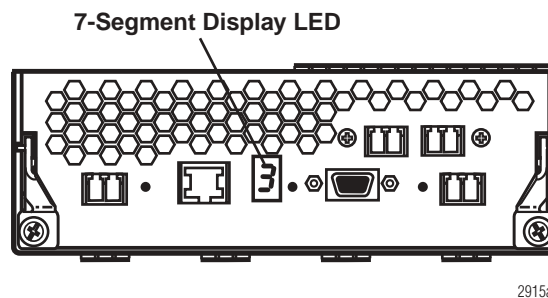
Cabling requirements

You should use the Fibre Channel cables shipped with your PFR 600/E when making connections.

Optical cables must meet the appropriate 2-Gbit FC-AL loop standards. You must use this type of cable to connect PFR 600E expansion chassis to the PFR 600 controller.

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 600 and PFR 600E interconnections should maintain LBB consistency. That is, one FC loop should connect the PFR 600's RAID Controller A and each PFR 600E's LBB A. The other FC loop should connect the PFR 600E's RAID Controller B and each PFR 600E'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 PFR600 and any PFR600Es, you must bind disk modules into LUNs using a GVG Disk Utility provided by Grass Valley. 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 an Open SAN	*Open SAN Instruction Manual*
Connected directly to a Profile XP Media Platform as local storage	*PVS Installation Guide* (for your Profile XP model) or the *Profile XP System Guide*

Installing a PFR600/E in an equipment rack

Use the information in this section to unpack the PFR600/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 PFR600/E chassis, cables, and installation kit.

⚠ *WARNING: A PFR600/E chassis is heavy. Two people should lift and move it.*

Box containing cables and manuals

Packaging

Chassis with shipping bar

8136-4
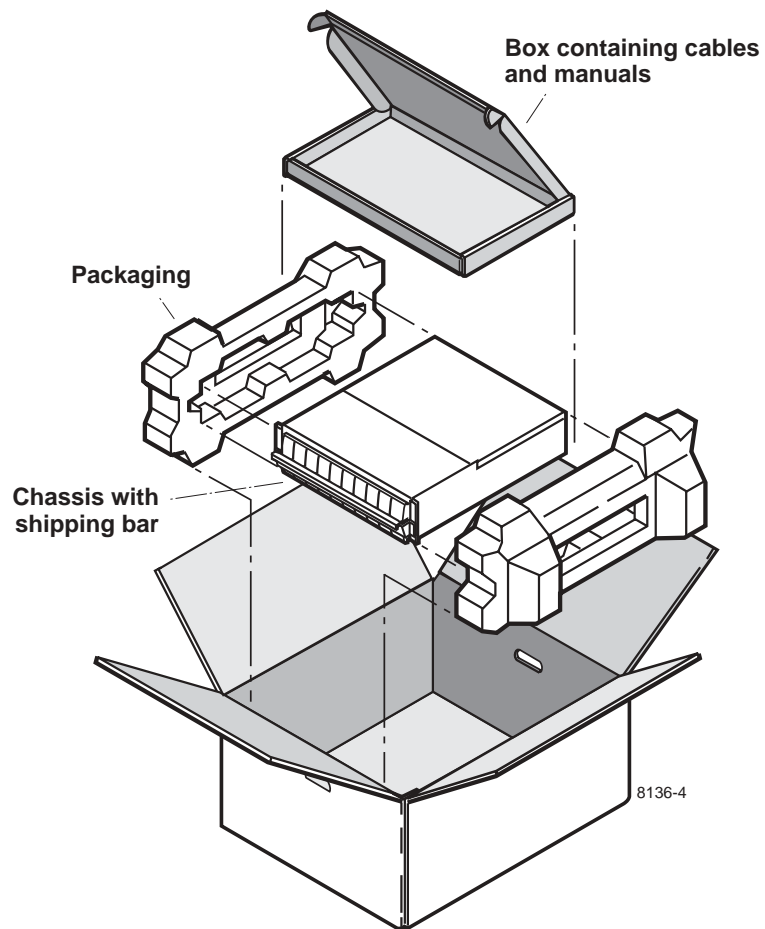
CAUTION: Save the chassis packaging. Use only PFR600 approved packaging to ship.

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 PFR 600/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.
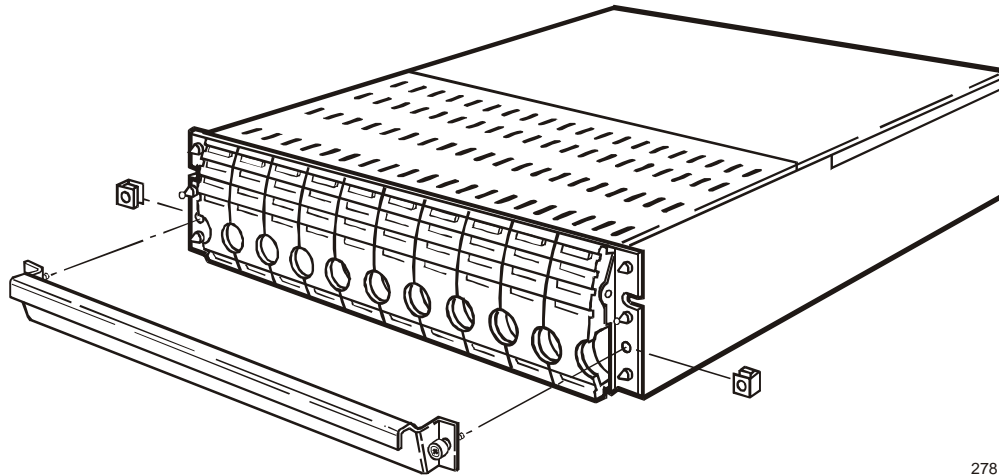
4. Place one cage nut on the bottom hole, and one cage nut on the second hole from the top on the back, such that the nuts are inside the front and the back of the chassis mount assembly.

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.

Back Channel Mount

Left Stationary Chassis Mount

Front Channel Mount

Cage Nuts (2 per side)

Locking Nits (3 per side)

Left Chassis Slide Rail

Cage Nuts (4 per side)

0626-15
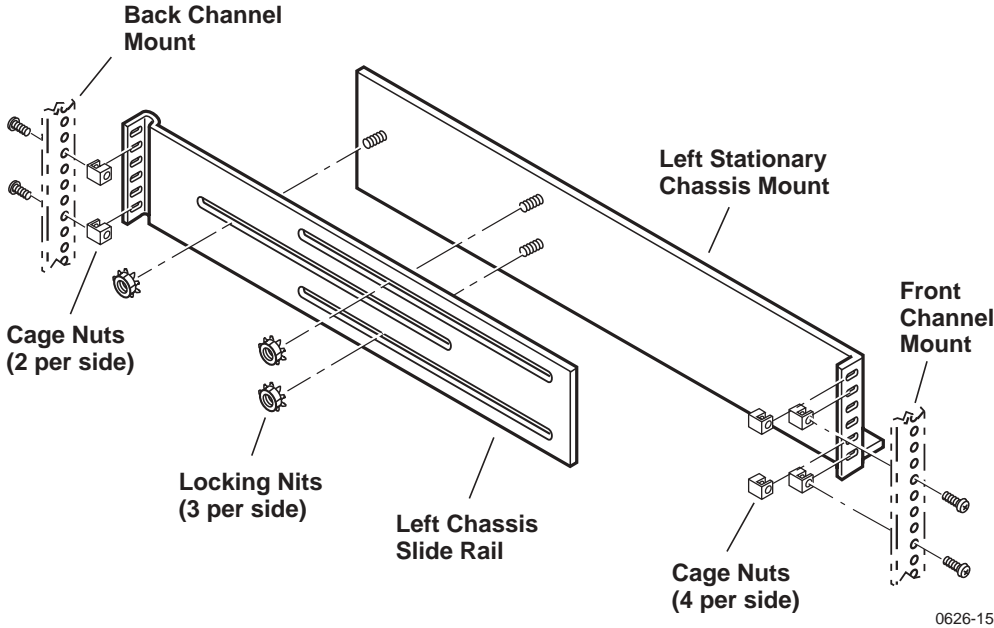
6. Repeat steps 1 through 5 for the right side.

Inserting the PFR600/E chassis in the rack

Every PFR600/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.

Mounting Screws

Drive Support Brackets

Support angle

Drive Support Bracket

3006
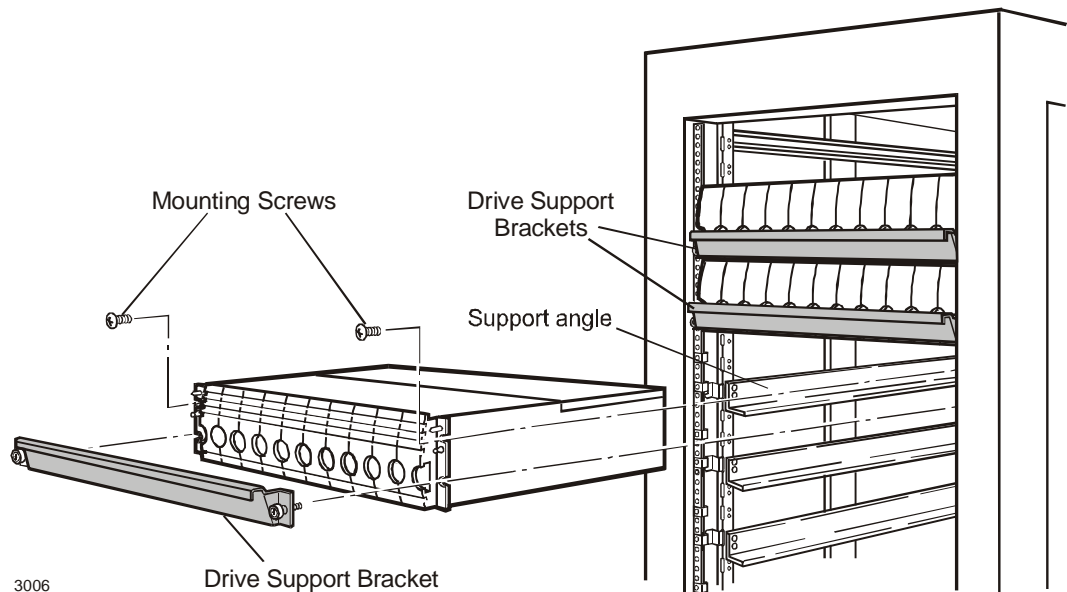
3. Repeat steps 1-2 to insert each PFR600/E chassis in the rack.

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.

Support angle
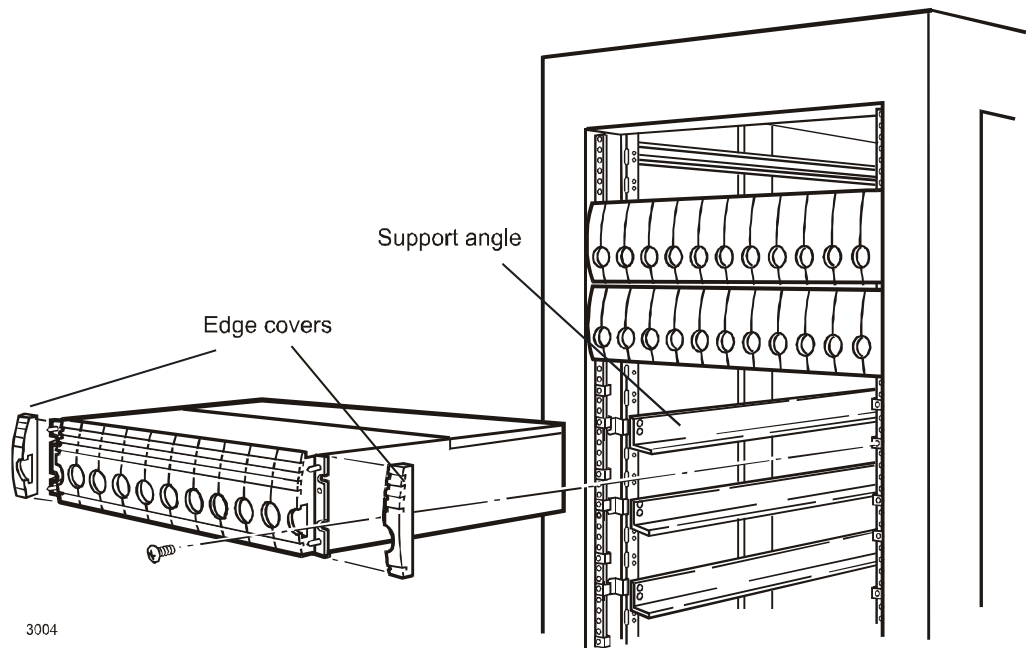
Edge covers

3004

3. Apply the edge covers that are packaged with the PFR 600/E.

4. Repeat steps 1-3 to install each PFR 600/E chassis in the rack.

PFR600/E power-up and initialization

This section gives information about connecting power and powering-on the PFR600/E system.

Connecting electrical cables

For each chassis, there are two electrical cables which should be connected to separate outside power sources, as shown.
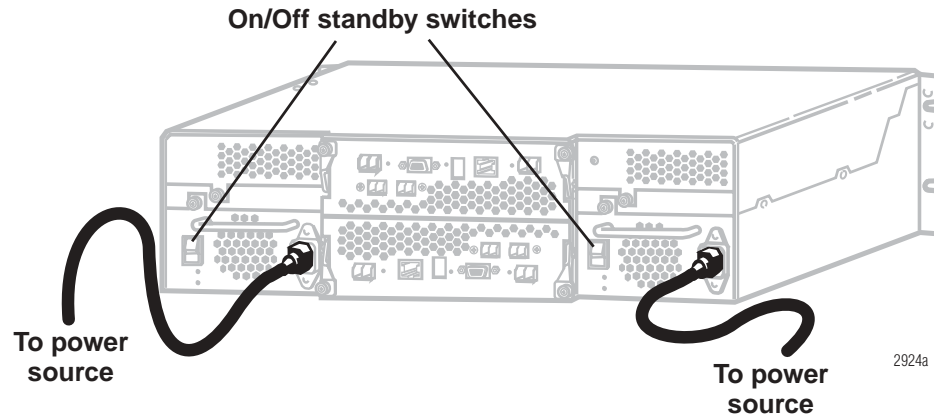
! *WARNING: Make sure the power cords meet local safety and electrical standards.*

! *CAUTION: The PFR600/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.*

To prevent the plug from inadvertently being unplugged, secure the electrical cable into the outlet by doing the following:

1. Insert the plug.

2. Press the small tabs together.

3. Slide the lock past the plug until the tabs snap into the plug housing.
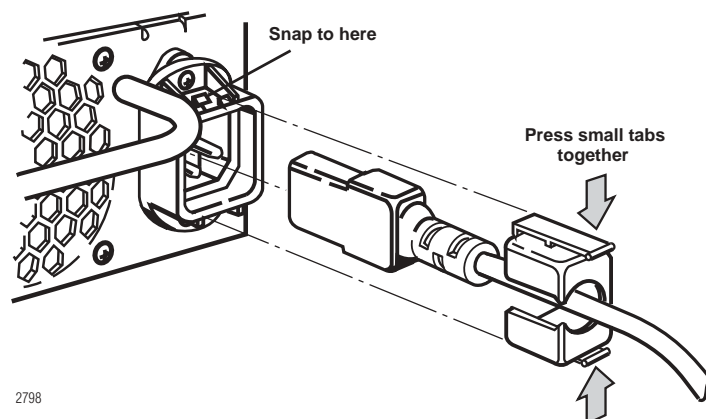
Powering-up the PFR 600/E system

1. Power-up the PFR 600E Expansion chassis prior to, or at the same time as the PFR 600 Controller chassis.

NOTE: You must always power-up the PFR 600E Expansion chassis prior to, or at the same time as the PFR 600 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 — approximately two minutes.

7-Segment Display LED
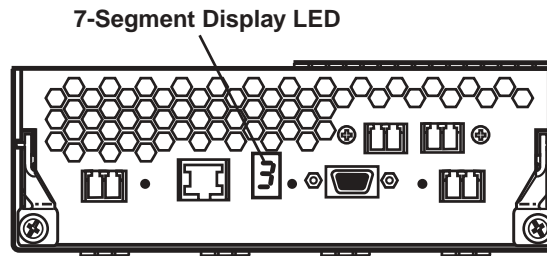
2915a

   - Wait until all disk access LEDs are steady green— approximately 3 minutes.

   - Refer to sections in Chapter 3, "Servicing the PFR 600 Series RAID" for information on interpreting status LED behavior.

NOTE: Refer to the Profile XP System Guide or Open SAN Instruction Manual for complete system power-up procedures.

PFR 600/E power-down

IMPORTANT: If your PFR 600/E system is part of an Open SAN, refer to the Open SAN Instruction Manual for instructions on shutting down the Open SAN before powering down a PFR 600/E.

To power-down the PFR 600/E correctly:

1. Stop all read/write activity to the PFR 600/E storage system.

2. Power-down the RAID storage system by powering-down the PFR 600 Controller chassis prior to, or at the same time as with the PFR 600E Expansion chassis.

>>> *CAUTION: You must always power down the PFR 600 RAID Controller chassis prior to, or at the same time as the PFR 600E Expansion Chassis.*

To turn on power, refer to .

Battery Backup recharge

Every PFR 600/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 PFR600 Series RAID

This chapter describes how to monitor PFR600 Series RAID status and replace Field Replaceable Units (FRU).

Topics include:

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 Open SAN systems.

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

- Verifying and loading RAID controller microcode

- Downloading disk drive firmware

- Forcing a replacement drive to rebuild

- Disabling operational components for removal

Monitoring PFR 600 Series RAID status using NetCentral

You can monitor PFR 600 Series RAID Storage systems using Grass Valley'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 600 Series RAID Controller module. As a result, the PFR 600 Series RAID appears in NetCentral as a standalone device rather than a subsystem of the Profile XP Media Platform.

Communication with NetCentral takes place over the RAID Controller Ethernet port. To monitor the PFR 600 Series RAID, 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 600 Series RAID 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 disk module LED behavior and rear panel 7-segment display for various conditions.

LEDs[a]	7-Segment Display	Meaning
All drives are green, non-blinking	chassis address	Drives are behaving normally— no disk access in progress[b]
All drives are green, rapid blinking	chassis address	Disk I/O in progress
One drive is blue	chassis address	Drive has been identified using the GVG Disk Utility.
	F	Drive is failed.
One drive is alternating blue/green, rapid blinking	chassis address	Disk I/O in progress and the drive has been identified using the GVG Disk Utility.
One drive is green/red (orange)		Drive itself has determined it is bad, or the midplane has failed.
One drive is blue/red (purple)		Drive itself has determined it is bad and the drive has been identified using the GVG Disk Utility.
All drives are blue/red (purple), slow blink		A failure affecting drives or midplane has occurred. Consult NetCentral for failure information.
One drive is white (red, green, and blue LEDs active)		The drive is off the Fibre Channel loop, possibly due to a drive or midplane failure, and the drive has been identified using the GVG Disk Utility, or the RAID array has gone critical.

[a.] 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.

[b.] 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 illustration to interpret rear panel LEDs.

FC loop status
    lit - loop is down
    off - loop is valid

Power supply - on

Fan light
red - fault

Reset button for LBB
(Use only when
advised by
Ciprico personnel)

FC loop status
    lit - loop is down
    off - loop is valid

Fan light
red - fault

Power supply
    standby

Power supply status:
    amber - fault
    green - good

Power supply status:
    amber - fault
    green - good

FC loop status:
    lit - loop is down
    off - loop is valid

FC loop status
    lit - loop is down
    off - loop is valid

Reset button for LBB
(Use only when advised
by Ciprico personnel)

Ethernet transmit

Ethernet receive

Flashing decimal point
heartbeat for ESI processor

Drive enclosure number
and event code display

2948d

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 "Chassis address setting requirement" on page 28.
A	Warning	Alternating with chassis address	Fibre Channel speed has changed. Power cycle of all connected RAID chassis is required.
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 does not support mixing disk drives of differing capacities within a RAID chassis connected to a Profile XP Media Platform or Open SAN. All disk drives in any RAID chassis must be of the same capacity. For example, if a PFR600 and a PFR600E are used, all the disk drives in both the PFR600 and the PFR600E 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 41 and "Monitoring PFR 600 Series RAID status using NetCentral" on page 40.

NOTE: If you wish to remove an operational disk module, use the Grass Valley Disk Utility to disable the disk before removing it.
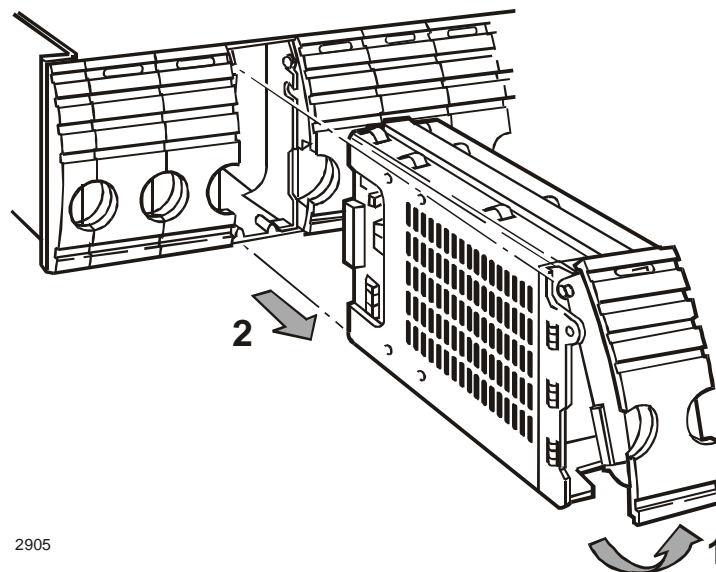
To remove the disk module:

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 1 to 10; the chassis displaying chassis address 1 contains drives from 11 to 20; and so forth.

NOTE: Use the Identify Disks command in the GVG Disk Utility to flash the LED on the drive to be removed.

2. Remove the drive support bracket, if installed (refer to "Installing the chassis with drive the support bracket" on page 34.)

3. Grasp the release lever with your thumb and index finger and pull outward to open the door.
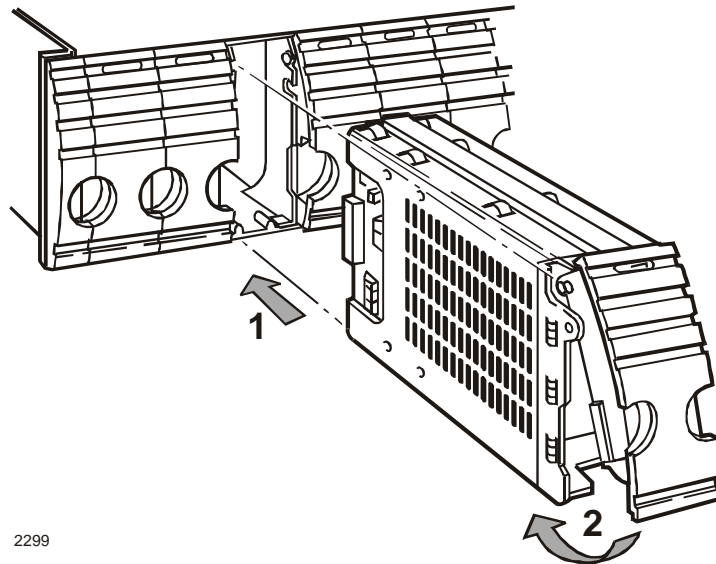

2905

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. Wait at least three minutes after removing the previous disk module.

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

2299

3. Press the release lever down and into place, as shown.

4. The disk spins up automatically.

5. 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 42 for disk module LED status during rebuild. Afterward, check disk module status using NetCentral or GVG Disk Utility.

6. Replace the drive support bracket, if used (refer to "Installing the chassis with drive the support bracket" on page 34.)

# 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.

NOTE: A PFR600 Series RAID must have at least one RAID Controller installed while it is powered up. Do not remove both RAID Controllers while the PFR600 Series RAID is powered up.

Removing the LBB or RAID Controller

To remove the LBB or RAID Controller:

1. Identify the module to be replaced using NetCentral or rear panel LED indicators. If you are removing an operational LBB or RAID controller, use the GVG Disk Utility to disable the desired module.

2. Remove the cables connected to the module. Note where the cables connect to the module.

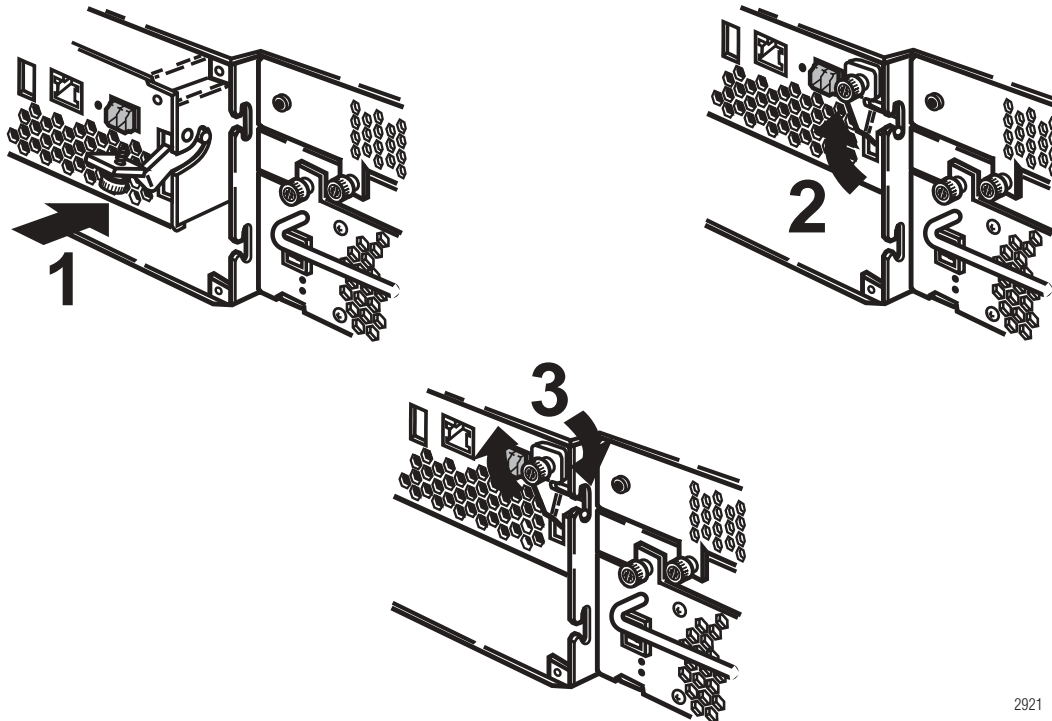3. Loosen captive screws as shown in the figure below.
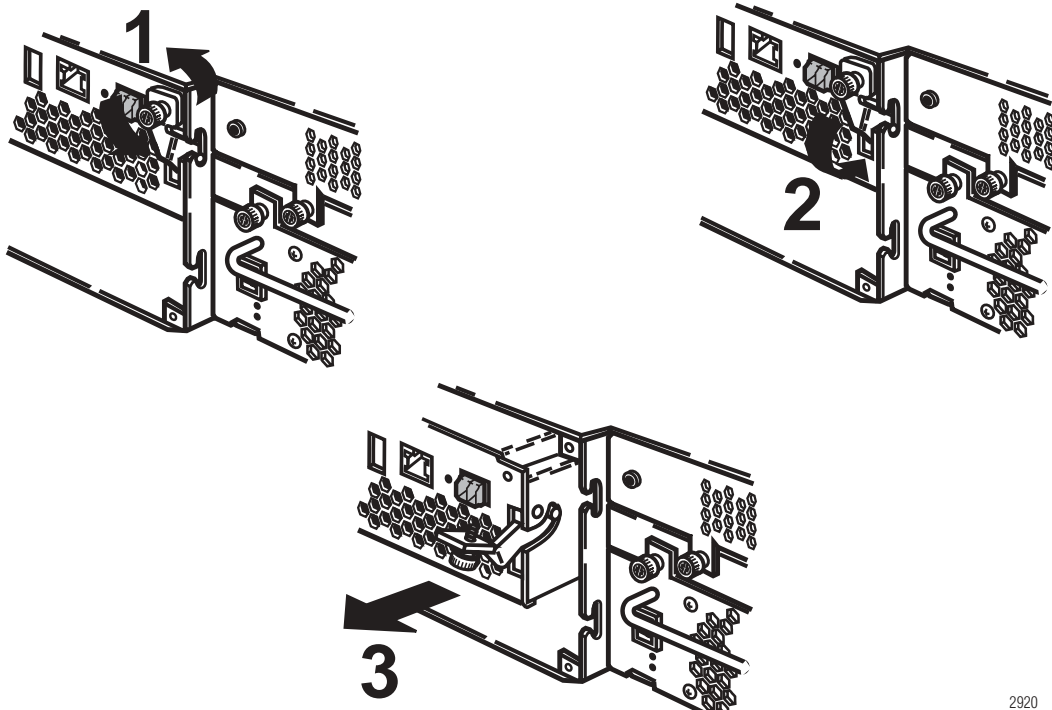
2920

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

To install the LBB or RAID Controller:

1. Insert the replacement module into the empty bay. Make sure the module is seated.


2921

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 42.

6. Ensure that the replacement drive firmware matches that of the other controller. 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.

7. If installing a RAID controller, configure the network and SNMP settings as described in the *PVS Installation Guide*.

8. Check module status using NetCentral or GVG Disk Utility. If required, update the firmware to match the version on the other RAID controller using GVG Disk Utility.

Replacing data ports

The PFR 600/E uses either 1Gb/s copper SFPs or 2GB/s optical SFPs as the Host Fibre Channel data ports, and 2Gb/s SFPs as the Fibre Channel Loop data ports.

To replace the data ports:

1. Remove cabling and remove the data port as shown.

2. Insert the replacement data port into the module as shown, then reconnect cabling.

3. Verify the Fibre Channel connection using the port Loop LED. Refer to
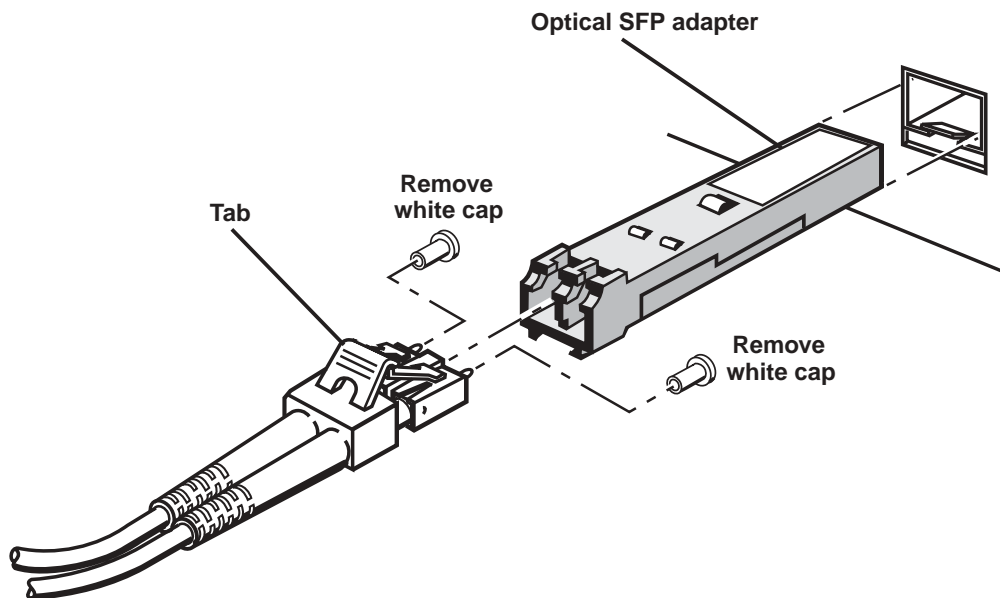
Replacing a power supply

⚠ *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.

On/Standby switch

FAULT
OUTPUT GOOD

2750
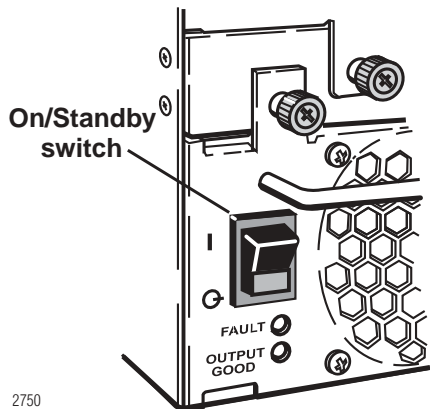
2. Remove the electrical cable from the power supply.

3. Loosen the captive screw on the power supply.

4. Pull the module out of the enclosure, as shown.

Captive screw

2918a
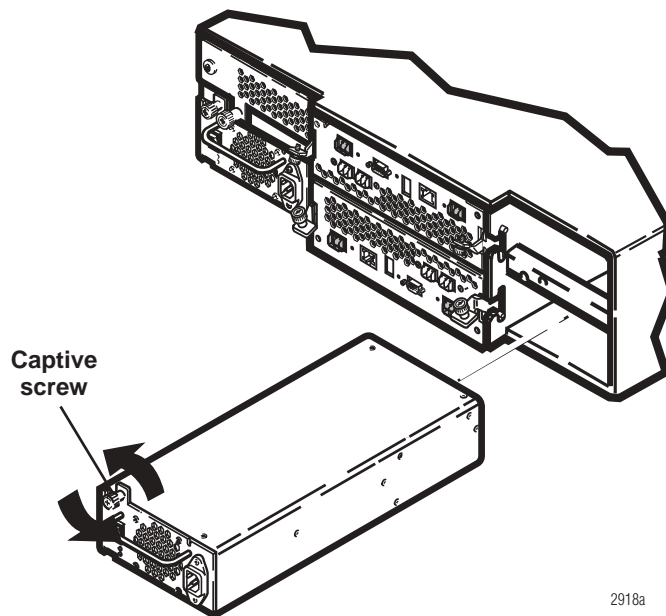
5. Insert the replacement power supply into the empty bay.

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 PFR600/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.

Captive screw

2919a
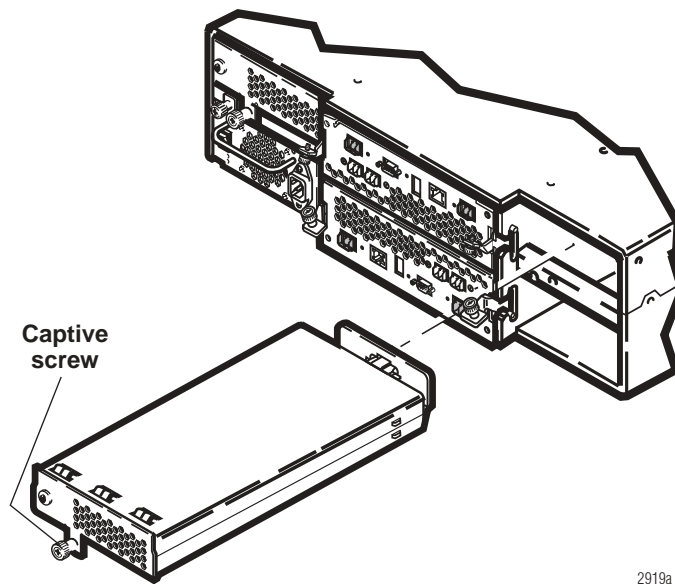
5. As soon as the module is reinstalled, the fans start spinning and the system fault indicators are cleared if no other FRUs are faulty.

Appendix **A**

Technical Specifications and Operating Limits

AC power requirements

Power Input
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

Item	Measurement
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)

Cable lengths

You should use the Fibre Channel cables shipped with your PFR 600/E 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 or 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.

Any optical cables you use must meet the appropriate standards for 2-Gb/s FC-AL loops. Such cables are duplex LC cables with lengths up to 300m on 50/125μm MMF, or up to 150m on 62.5/125μm MMF

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

A
AC power
    current draw 53
    overview 27
address switch, chassis 28

B
Battery Backup Unit 18, 38
binding disk modules 30
blinking disk module LEDs 41

C
cabling
    max lengths 29, 53
    requirements 29
cabling requirements 29, 53
Canadian Certified Power Cords 7
Canadian EMC Notice of Compliance 7
capacity 16
chassis address switch 28
chassis description 19
chassis dimensions 53
chassis weight 53
colors, disk module LEDs 41
components 17
    See FRUs (field replaceable units)
configurations 26
console program 23

D
depth, chassis 53
disk module
    description 20
    disk module LED colors 41
    identification 19
    installing 46
    removing 45
    replacing 44
disk module LED displays, interpreting 41
disk utilities 30
drive support bracket 34

E
ejector lever 47

Emission Control, compliance 7
EN55022 Class A Warning 7
error codes 43
Ethernet connector 23

F
fan module
    description 25
    replacing 51
    running in standby 25
    status LEDs 42, 43
FC-AL (Fibre Channel Arbitrated Loop)
    cabling requirements 29
FCC Emission Limits 7, 8
features 15
field replaceable units (see FRUs)
flashing disk module LEDs 41
FRUs (field-replaceable units)
    disk module
        description 20
        replacing 44
    fan module
        description 25
        replacing 51
    Loop Bypass Board
        description 24
        replacing 47
    power supply
        description 25
        replacing 50
    RAID Controller
        description 21
        replacing 47
    SFP
        description 22
        replacing 49

G
General Safety Summary 5

H
height, chassis 53
high availability features 17

I

Injury Precautions 5
installing
    disk module 46
    PFR 600/E 31

L

Laser Compliance
    FCC Emission Limits 7, 8
LBB
    see Loop Bypass Board
LEDs
    7-segment display codes 43
    disk modules 41
    rear panel 42, 43
Loop Bypass Board
    description 24
    replacing 47
    status LEDs 42, 43
loose cable 29

M

midplane board
    chassis address switch 28
    description 19

N

NetCentral 40

P

packaging 31
PFR 500/E
    chassis
        midplane 19
    chassis depth 53
    components 17
    configurations 26
    description 16
    disk module description 20
    fan modules 25
    high availability features 17
    installation requirements 27
    installing in rack 34
    monitoring status 40
    operating limits 54
    power supply, description 25

    powering down 38
    rear panel view 21, 24
    requirements
        cabling 29
        operating 54
    weight 53
power
    cord 36
    outlet 36
power supply
    description 25
    replacing 50
    status LEDs 42, 43
powering-up 37
Product Damage Precautions 5

R

rack mounting 31
RAID configuration 30
RAID Controller
    description 21
    replacing 47
    status LEDs 42, 43
remote monitoring 40
replacing
    disk module 44
    fan module 51
    Loop Bypass Board 47
    power supply 50
    RAID Controller 47
    SFP 49

S

safety ground 36
Safety Terms and Symbols 6
serial port 23
seven-segment display 29
SFP 23, 49
site requirements
    See also Appendix A
    see also Appendix A
size and weight 53
SNMP monitoring 40
standby switch 37, 50
status

monitoring PFR500/E 40
storage capacity 16
support, Grass Valley 13

V
voltage, PFR500/E requirements 53

W
weight, chassis 53
width, chassis 53