Pillar Axiom 600

Service Guide

ORACLE

PILLAR AXIOM

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Table of Contents

Chapter 3 Service the Pilot and Pilot FRUs

Chapter 4 Service the Slammer and Slammer FRUs

Appendix A Safety Statements

Appendix B Slammer and Brick LED Status

Appendix C Slammer LED Startup Progress Codes

Appendix D Pillar Axiom Component Power Consumption

List of Figures

List of Tables

Preface

Audience

This guide addresses service technicians, field engineers, and others who maintain, troubleshoot, and replace system components and field replaceable units (FRUs). You should have the necessary skills and experience in the following:

- Computer hardware and its operation

- ESD procedures

- Computers and computer parts

- A graphical user interface (GUI) in a Web browser

- An operating system command line interface

Important! If you have a Support Services contract, then an authorized Pillar personnel will perform all repairs. Refer to your service agreement to determine your service coverage. You can contact Pillar World Wide Customer Support Center for the sales phone number if you would like to get a Support Services contract.

Related references
- *Pillar Contacts*

Before You Read This Guide

Being familiar with certain other Oracle Pillar Axiom technical documentation helps you succeed in the use of this guide.

In addition to this guide, review the late-breaking information described in the *Pillar Axiom Customer Release Notes*. That information includes important information that was not available at the time this guide was published, including:

- Errata for technical documents (including this guide).

- Network requirements.

- System limits.

- Known issues.

- Various notations on the operation of the Oracle Pillar Axiom system.

Refer to the *Pillar Axiom 600 Hardware Installation Guide* for procedural and reference information to install the various components within an Oracle Pillar Axiom system, power it on, and perform the initial configuration.

There is also additional documentation in the *Pillar Axiom 600 SSF Cabling Reference* guide, which includes detailed information on the cabling of Bricks and Slammers in various configurations.

How This Guide Is Organized

This guide provides procedural and reference information to remove and insert the various field replaceable units (FRUs) within an Oracle Pillar Axiom system.

The guide is divided into five chapters and six appendices:

- Chapter 1 provides information on the Oracle Pillar Axiom system components, equipment and tools required by the customer, and safety precautions.

- Chapter 2 provides information on using the Guided Maintenance to identify the target FRUs, prepare the system for FRU replacement, perform the FRU replacement, and verify the FRU status.

- Chapter 3 provides information on servicing the Pilot and the Pilot FRUs such as bezels and control units (CUs).

- Chapter 4 provides information on servicing the Slammer and the Slammer FRUs such as bezels, batteries, motherboards, fans, network interface modules (NIMs), power supplies, private interconnect modules (PIMs), HBA cards and so on.

- Chapter 5 provides information on servicing the Brick and the Brick FRUs such as bezels, drives, enclosure services (ES) modules, fans, RAID controllers, and so on.

- Appendix A provides information on safety statements, warning notices in various languages, and caution statements.

- Appendix B provides information on Slammer and Brick LED statuses.

- Appendix C provides reference information on the Slammer LED startup progress codes.

- Appendix D provides reference information on the Oracle Pillar Axiom component power consumption.

- Appendix E provides reference information on how to return a defective FRU and obtain replacement parts.

- Appendix F provides reference information on the Oracle Pillar Axiom hardware specifications, system environment, regulatory compliances, warranty, packaging, and transporting information.

Related Documentation

Table 1 Additional information resources for all systems

Description	Title and part number
The definitions of terms found in the Oracle Pillar Axiom documentation.	*Pillar Axiom Glossary*
An introduction to the hardware and software architecture of an Oracle Pillar Axiom system.	*Pillar Axiom System Architecture Overview*
Instructions for installing hardware components like Bricks, Slammers, and the Pilot into Pillar and non-Pillar racks.	*Pillar Axiom 600 Hardware Installation Guide*
Cabling instructions for Bricks, Slammers and the Pilot within a Pillar rack.	*Pillar Axiom 600 SSF Cabling Reference*
Any late breaking information regarding the Oracle Pillar Axiom systems.	*Pillar Axiom Customer Release Notes*

Access Documentation

Technical documentation (including installation, service, cabling, integration, and administration guides) for Oracle's Pillar Axiom 600 storage system is available from several sources.

Pillar Axiom Storage Services Manager — Log in to your Pillar Axiom system. Navigate to the **Support** area in the Pillar Axiom Storage Services Manager and select the **Documentation** link.

Pillar Axiom HTTP access	For Pillar Axiom systems running release 5.0 (and higher) software, point your browser to `http://`*system-name-IP*`/documentation.php`, where *system-name-IP* is the name or the public IP address of your system.
Internet	Customer support portal (http://support-portal.pillardata.com/csportal/login.seam). Log in and click **Documents** in the left navigation pane.
Product CD-ROM	Insert the Technical Documentation CD-ROM (came with your Pillar Axiom system) into the CD player and open the `DocMenu` PDF. **Tip:** To search all technical documents on the CD-ROM, click **Search all PDFs** in the top right corner.

Typographical Conventions

Table 2 Typography to mark certain content

Convention	Meaning
italics	Within normal text, words in italics indicate: • A reference to a book title. • New terms and emphasized words. • Command variables.
`monospace`	Indicates one of the following, depending on the context: • The name of a file or the path to the file. • *Output* displayed by the system on the command line.
`monospace` (bold)	*Input* provided by an administrator on the command line.
>	Indicates a menu item or a navigation path in a graphical user interface (GUI). For example, "Click **Storage > Clone LUNs**" means to click the **Clone LUNs** link on the **Storage** page in the graphical user interface (GUI).

Table 2 Typography to mark certain content (continued)

Convention	Meaning
...	Used within an expression of a navigation path or within a cascading menu structure. The ellipsis indicates that one or more steps have been omitted from the path or menu structure. For example, in the **Groups > Volume Groups > Actions > ... > Data Protection > Create** menu structure, the **...** implies that one or more menu items have been omitted.

Pillar Contacts

Table 3 Contacts at Pillar Data Systems

For help with...	Contact...
Error messages, usage questions, and other support issues	US and Canada: 877-4PILLAR (1-877-474-5527) Europe: +800 PILLAR FS (+800 74 55 27 37) Asia Pacific: +1-408-518-4515 South Africa: +0 800 980 400 Have your system serial number ready. support@pillardata.com Pillar Customer Support (http://support-portal.pillardata.com/csportal/login.seam)
Training (custom or packaged)	Training and Education (http://www.pillardata.com/support-education/training/)
Professional services and inquiries	globalsolutions@pillardata.com Global Solutions (http://www.pillardata.com/support/professional-services/)
Sales and general contact information	Company contacts (http://www.pillardata.com/company/contact)
Documentation improvements and resources	docs@pillardata.com

Table 3 Contacts at Pillar Data Systems (continued)

For help with...	Contact...
	Technical documents (http://www.pillardata.com/techdocs) (Log in with your username and password, and select Documents.)

CHAPTER 1

About Pillar Axiom Service Procedures

Warnings and Cautions

Hazard signal words conform to the American National Standards Institute (ANSI) Z535.4-2002 meanings.

⚠ Caution	Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury.
⚠ Warning	Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.
⚠ Danger	Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

Important! To emphasize a point, to remind you of something, or to indicate potential problems in the outcome of the in-process task.

> **Important!** *A number of important warning and caution notices apply throughout this guide. Read them before servicing Pillar Axiom FRUs.*

Related references
- *Caution Notices*
- *Warning Notices*

Pillar Axiom Series Components

This guide explains how to replace the field-replaceable units (FRUs) contained in the following Pillar Axiom 600 Series components:

Table 4 Pillar Axiom 600 series components

Product name	Model and description
Brick storage enclosures	• BRX 1000S7—Brick,SATA,13 x 1TB,7200 RPM drives,RoHS • BRX 2000S7—Brick,SATA,13 x 2TB,7200 RPM drives,RoHS • BRX 500S7—Brick,SATA,13x500GB,7200 RPM drives,HSF • BRX 300FCV2—Brick,FC RAID (FCV2),12x300GB,15K RPM Drives,HSF • BRX 450FCV2—Brick,FC RAID (FCV2),12x450GB,15K RPM Drives,HSF • BRX 50SSD—Brick, SSD, 13 x 50GB drives • BRX 200SSD—Brick, SSD, 13 x 200GB drives
Filler panels	• 1U • 2U
Slammer storage controllers	• SLM 600 (Series 3)
Pilot management controllers	Pilot
Power distribution units (PDUs)	• PDU 500-1P20A—115 to 230V, 20A, 1 φ • PDU 500-1P30A—115 to 230V, 30A, 1 φ • PDU 500-3P30A—115V, 30A; (115/208) • PDU 500-3P16A—230V, 16A, IEC; (230/400)
Racks	• RACK500-42U—42U cabinet assembly with doors

Note: The following Pillar Axiom 600 components continue to be supported but are no longer available for new systems:

- BRX 500-160A7

- BRX 500-250A7

- BRX 500-73F15R

- BRX 500-73F15E

- BRX 500-400A7

- BRX 500-500A7

- BRX 500-750A7

- BRX 500-146F15R

- BRX 500-146F15E

- BRX 300-F15E

- BRX 450-F15E

- BRX 300F15R

- BRX 450F15R

- BRX 2000S5

- SLM 600 (Series 1, Series 2)

About Supported Hardware Components

Pillar Axiom 600 supports only Pillar-supplied parts.

⚠ **Caution**	Hardware that does not conform to Pillar specifications or is not a Pillar-supplied part voids the warranty and may compromise data integrity. For Pillar Axiom hardware specifications, refer to the *Pillar Axiom 600 Service Guide* for your system.

Note: When an internal component within a Pilot control unit (CU) fails, the entire CU must be replaced.

Required Tools

Use the following tools to service Pillar Axiom hardware.

Table 5 Required tools

Tool	Purpose	Illustration
1/4 inch (7 millimeters) flat-tip screwdriver	Adjust leveling feet.	
Adjustable wrench, 6 inches (15 centimeters)	Adjust leveling feet.	
#1 and #2 Phillips-head screwdrivers	Remove and secure Pillar Axiom hardware components.	
Socket wrench with a 1/2 inch (13 millimeters) socket	Connect two racks.	
Offset box wrench, 13/32 inch (10 millimeters)	Work with adjustable mounting rail assemblies.	
Torx® T20 screwdriver	Attach rail assemblies to the vertical channels and secure hardware components to the rails.	
Torx T30 screwdriver	Connect two racks.	
Diagonal cutters	Cut tie wraps.	

Note: We do not provide these tools for a service operation that is performed by non-Pillar employees.

About Electrostatic Discharge Precautions

⚠️ **Caution**

Before you handle a component, make sure that you have taken electrostatic discharge (ESD) precautions:

- The minimum requirement is an anti-static wrist strap connected to a hard ground. Pillar recommends that you remove components from their packaging and place them on an ESD-qualified table that is equipped with ground points for wrist straps.

- Static charges can build up rapidly on rolling carts. If you transport a hardware component by cart, ground the cart with a drag chain on an ESD floor. If there is no ESD cart available or ESD floor, ground yourself before you touch a component that has been transported on a cart.

Service the Pillar Axiom System

⚠ **Caution**	Do not run Slammer diagnostics on a live system. Doing so causes data corruption of logical volumes owned by the Slammer. Do not run Slammer diagnostics except by explicit advice from the Pillar World Wide Customer Support Center.

Important! For any time-sensitive information that may be related to the service procedures outlined in this guide, contact the Pillar World Wide Customer Support Center.

About Guided Maintenance Initiation

You manage the servicing of a Pillar Axiom system by means of the Guided Maintenance module of the Pillar Axiom Storage Services Manager (GUI).

⚠ **Caution**	Access by any other means is not supported and voids the warranty for your Pillar Axiom 600 system. Remote access (ssh, telnet, ftp, and others) may also compromise data integrity.

To maintain or restore reliability to a Pillar Axiom system, you sometimes need to replace a hardware component. To replace a hardware component, you must use Guided Maintenance (unless the Pillar World Wide Customer Support Center gives you explicit instructions not to do so). You access Guided Maintenance through the Pillar Axiom Storage Services Manager in one of three ways:

- In the Health section, click the type of hardware of interest and locate a particular FRU. To enter Guided Maintenance for that FRU, select the link.

- Click the system status icon on the far left side of the status bar, which takes you to the above Health section.

- In the Support section, click the Slammers or Bricks link in the navigation pane and locate a particular FRU. To enter Guided Maintenance for that FRU, select the link.

Although you can enter Guided Maintenance in any of those ways, procedures in this guide assume that you are using the Health page.

System Health screens in the GUI display the status of hardware and firmware components of the Pillar Axiom system. The overall system status icon on the

bottom of the screen is a summary of the hardware status and does not reflect the status of LUNs or filesystems.

A hardware problem will typically cause filesystems and LUNs to go offline or to a degraded state. Because this is not always the case, you should check the state of the filesystems and LUNs or any associated Administrator Actions that may be listed.

To initiate Guided Maintenance:

- Log in to the graphical user interface (GUI).

- Enter Guided Maintenance for the target FRU.

After you initiate Guided Maintenance, you can:

- Identify the target FRU to find the FRU that needs to be replaced.

- Prepare the system for FRU replacement.

- Remove the FRU.

- Fail back the target control unit (CU).

  Tip: Automatic failback of NAS Slammers is the default configuration. If this is not desired, automatic failback of NAS Slammer CUs can be disabled in the GUI (**System > Global Settings > Networking > Notification**). Automatic failback of SAN Slammer CUs is always enabled.

- Verify the status of the FRU.

Log In to the Graphical User Interface (GUI)

1 Start the browser software on your workstation.

2 Specify the public IP address of the Pilot as the address to open.

   Tip: If the IP has not been changed to a customer-specified address, use 10.0.0.2, which was set at the factory. If that IP address is not successful, try 10.0.0.3 and 10.0.0.4. If you still cannot log in, ping those addresses and contact the Pillar World Wide Customer Support Center.

3 When prompted, enter the Primary Administrator's login name and password.

   If this is the first time the Primary system administrator account is accessed, use `administrator` for the login name and `pillar` for the password. When logged in, you will be prompted to change the password. Choose an

appropriate password to protect the security of the server. Keep that password in a safe location.

Tip: The following tips can improve your experience using the GUI:

- Because the GUI uses popup windows, configure your browser to allow popups. Current versions of Internet Explorer block pop-ups by default.

- For Internet Explorer and Mozilla-based browsers, select the smallest text size you can view comfortably. Doing so helps you to see all menu items.

- For Internet Explorer, disable Script Debugging in **Tools > Internet Options > Advanced > Browsing**.

About Guided Maintenance for the Target FRU

The Summary page in the Health section displays the status of the Pilot and all Slammers and Bricks. For any component of interest (for example, one that has a critical status), you can inspect all of its FRUs by selecting the component. You can then enter Guided Maintenance for any of its FRUs.

When you enter Guided Maintenance, if the **Enable Automatic Failback of NAS Control Units** option has been selected, Guided Maintenance warns you of that fact on the introductory page. This option is found in the **System > Global Settings > Networking** tab in the Pillar Axiom Storage Services Manager and is described in *Pillar Axiom Administrator's Guide*.

When automatic recovery is enabled, Guided Maintenance will automatically fail back the target control unit (CU) of a NAS Slammer after you replace the FRU.

Tip: If you want to fail back the CU manually, de-select the **Enable Automatic Failback of NAS Control Units** option before you continue with Guided Maintenance. However, be sure to re-select this option when you have completed maintenance.

Note: SAN Slammers always have automatic recovery enabled.

Enter Guided Maintenance

1 Click the **Health** icon in the top context pane.

Figure 1 Pillar Axiom Health page
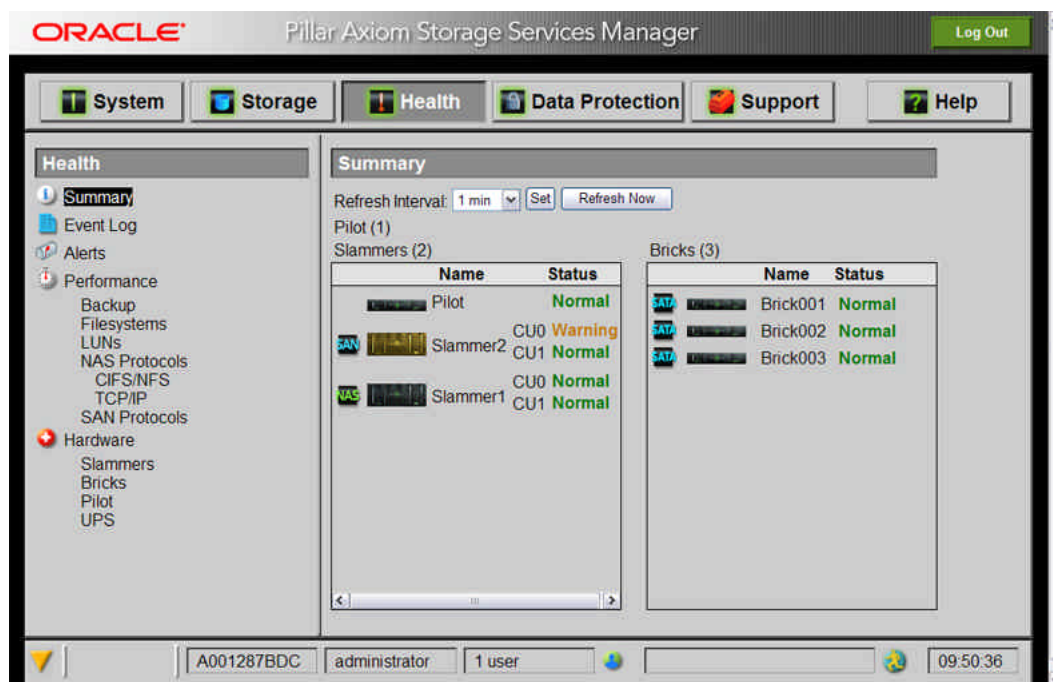
Important! Check the background tasks at the bottom of the screen. If any tasks are running, those tasks may interfere with Guided Maintenance. Wait for them to complete. If any of these tasks do not complete, before you enter Guided Maintenance, contact the Pillar World Wide Customer Support Center.

2 Review the hardware summary information that is displayed in the content pane.

3 Under **Hardware** in the navigation pane, click the component type of interest.

4 In the content pane, click the name of the component of interest to open its status page.

   This page shows detailed information about the FRUs.

5 Click the link for the FRU of interest.

6 Choose one of:

   ● To enter Guided Maintenance for that FRU, click **Replace Component**.

   ● To close the window and return to the component status page, click **Close**.

Important! Do not exit Guided Maintenance by closing the window if you selected the step to prepare the system for FRU Replacement in Guided Maintenance, because this may leave the LUNs or filesystems in Conservative (write-through cache) mode.

About Target FRU Identification

Using Guided Maintenance, you can identify which FRU in the system needs to be replaced. If you already know which FRU to replace, you may still want to perform this step to verify the identity of the target FRU. Though this step is not required, it is highly recommended.

Both **Identify** and **Reverse Identify** are available for Bricks and Slammers.

When identifying a target FRU, Guided Maintenance:

- Blinks the LEDs on that FRU and on the bezel of the chassis containing that FRU.

  Note: Guided Maintenance does not control the LEDs for power supplies, fans, and Slammer motherboards.

- Shuts off all other LEDs on the front and back of all other Bricks and Slammers.

To reverse identify the target FRU, Guided Maintenance, blinks all Brick and Slammer LEDs, except for the LEDs on the target FRU. Use this method if you are having trouble spotting the light patterns of **Identify**.

When identifying Pilots, Guided Maintenance lights the drive-activity LED on the target Pilot CU to a steady red.

Important! The drive-activity LED may be flickering quite rapidly at times, appearing nearly steady red. This is the case during event log synchronization or Call-Home activity. Look closely to distinguish whether the LED is steady or flickering. When in doubt, you can have Guided Maintenance reverse identify the Pilot CU, which lights the drive-activity LED to a steady red on the partner CU. If that is not sufficient, compare the Pilot serial numbers to the values on the Pilot Details page in the GUI.

For Bricks, Guided Maintenance blinks all LEDs to identify the FRU except for the following fault-related LEDs (which light solid amber instead):

- Fault LED on the bezel.

- Power LED that is adjacent to the triangular icon on the power supply.

- FLT LED on the RAID controller.

- Left LED on the Enclosure Services (ES) module.

- FLT LED on the spare drive.

Important! When using Guided Maintenance to identify a FRU, be sure to stand in front of the Pillar Axiom system to locate the target control unit (CU). The LEDs on the bezel will be blinking.

Important! Pillar Axiom systems ensure continuous data access during single points of failure. A second failure, including operator errors, may cause system failure. Use care and take full advantage of Guided Maintenance features.

Identify the Target FRU

Step 1 of Guided Maintenance is to identify the target FRU.

1 Click **Identify**.

Result:
Guided Maintenance turns off the LEDs on all other FRUs and beacons the target FRU LEDs.

Tip: Click **Reverse Identify** if the physical LEDs on the target component do not seem to be working. This beacons all FRUs in the system *except* for the target FRU.

Note: The Slammer LEDs may fail to beacon when you use **Reverse Identify** for a Brick.

2 After you identify the target FRU, click **Cancel Identify**.

3 To continue Guided Maintenance, click **Next**.

Result:
The **Prepare System** page displays.

About System Preparation for FRU Replacement

Before Guided Maintenance prompts you to replace a FRU, the Pillar Axiom system performs some preparatory steps that reallocate or move resources so that you can safely remove a FRU. For example, these steps:

- Allow the administrator to power down a Slammer control unit, if necessary, before replacing a network interface module.

- Fail over LUNs to the peer controller when a RAID controller is about to be replaced.

- Spin down a drive when it is about to be replaced.

During some replacement procedures, the Pillar Axiom system turns off access to components, halts components, or powers off components within the system. During Guided Maintenance, watch for specific Administrator Actions that tell you when to remove or replace a particular FRU.

⚠ **Caution**	When Guided Maintenance creates an Administrator Action that instructs you to remove the FRU, do so even if you are only testing fault injection and recovery. Otherwise, automatic recovery may be inhibited and data loss may result.

If the Guided Maintenance creates an Administrator Action that instructs you to replace a component, you may be able to recover from Guided Maintenance by cancelling that Administrator Action.

Note: You should not exit Guided Maintenance prematurely. Otherwise, you may leave that component out of service, which may impact redundancy and recovery in the event of another fault. If you exit Guided Maintenance prematurely, you may also leave LUNs and filesystems in Conservative mode.

Prepare the System for FRU Replacement

Step 2 of Guided Maintenance is to prepare the system for FRU replacement.

Note: If you close the Guided Maintenance window and cancel Guided Maintenance, you must also cancel the associated Administrator Action. Not all Administrator Actions generated by Guided Maintenance can be cancelled.

If you close Guided Maintenance, always check both the hardware and LUNs and filesystems to make sure that they return to the Normal, or Online state, rather than the Conservative state. If the LUNs and filesystems do not return to the Normal or Online state, contact the Pillar World Wide Customer Support Center for assistance.

When you cancel the Administrator Action for instances where Guided Maintenance allows it, the Pilot attempts to place the FRU back in Normal state, which then:

- Fails back the appropriate components.

- Updates the status of those components.

- Removes the Administrator Action.

1 On the Prepare System page, click **Prepare System**.

2 If prompted for additional information, enter the requested information.

3 When Guided Maintenance enables the **Next** button, click **Next**.

4 Choose one of the following:

- If system preparation fails, click **Prepare System** to attempt system preparation again.

  If system preparation fails again, Guided Maintenance reports the failure and provides an error description. If system preparation fails a second time, contact the Pillar World Wide Customer Support Center.

- If system preparation succeeds, watch for Administrator Actions on the GUI status bar that instruct you to remove and replace the FRU.

  Tip: The time when the most recent Administrator Action was generated is in the small box to the right of the Administrator Action area.

  When prompted, proceed with the appropriate FRU replacement procedure.

After the system preparation step is complete, the system generates Administrator Actions that indicate the FRU is ready for removal.

About Target FRU Replacement

Step 3 of Guided Maintenance is to replace the FRU. This step is manual. During this step, you remove an existing FRU and insert its replacement.

The following table lists shortcuts to the start of each major FRU replacement procedure that you can perform. Each hardware component section below contains all of the tasks and information required to successfully service a FRU.

Table 6 Pillar Axiom FRU replacement procedure information

To replace a FRU for this hardware component...	Find the appropriate concept below and perform the tasks that follow...
Pilot	About Pilot Bezel Replacement.
	About Pilot Control Unit Replacement.

Table 6 Pillar Axiom FRU replacement procedure information (continued)

To replace a FRU for this hardware component...	Find the appropriate concept below and perform the tasks that follow...
Slammer	About Slammer Bezel Replacement.
	About Slammer Battery Replacement.
	About Slammer Fan Module Replacement.
	About Slammer Motherboard Tray Replacement.
	About Slammer NIM and HBA Card Replacement.
	About SFP Module Replacement.
	About SFP Module Replacement.
	About Slammer Power Supply Replacement.
	About Slammer Private Interconnect Module Replacement.
Brick	About Brick Bezel Replacement.
	About Brick Drive Replacement.
	About Brick Power Supply-Fan Module Replacement.
	About Brick RAID Controller Removal.
	About Brick ES Module Replacement.
	About SATA Brick Spare Drive Replacement.

Important! If you need to replace FRUs on both control units (CUs) of a Slammer at the same time, contact the Pillar World Wide Customer Support Center for assistance.

Related tasks
- *Prepare the System for FRU Replacement*

About Replacement FRU Status Verification

Step 4 of Guided Maintenance is to verify the FRU replacement.

In all cases of FRU replacement (other than that for bezels), after you have replaced a FRU, Guided Maintenance displays the Verify page.

When all is well, Guided Maintenance reports a Normal status for the FRU.

Note: You may see a FRU status of Testing, Warning, or Verifying. For example, replacement batteries are tested for several minutes and displays Testing until the test completes.

To close the Verify page, click **Next**.

Fail Back the Control Unit

Step 5 of Guided Maintenance recovers the Slammer by failing back the target control unit (CU).

Note: This topic applies only if you are replacing a Slammer FRU, where the Pillar Axiom system must take the Slammer CU out of service temporarily during the replacement.

The Pillar Axiom system may burn firmware on the new FRU during the failback of the CU. The Slammer CU performs a diagnostic check.

If the diagnostic check passes, the Slammer CU:

* Downloads the Slammer software image from the Pilot.

* Updates the firmware on any required FRUs (except the motherboard).

* Requests the Pilot to initialize.

The process of performing a diagnostic check, downloading the Slammer software, and the request to the Pilot to initialize takes approximately 5-6 minutes.

If the replacement FRU is a SAN NIM, iSCSI NIM, or the PIM, the Slammer CU automatically updates the firmware for the FRUs, because the Slammer software image is already loaded, prior to requesting initialization from the Pilot.

If the replacement FRU is a motherboard assembly, the Pilot checks the memory and hardware configuration of the replacement motherboard.

If the memory and hardware configuration of the replacement motherboard does not match the motherboard of the other CU in the same Slammer, the replacement motherboard is disabled.

If the memory and hardware configuration of the replacement motherboard matches the motherboard of the other CU in the same Slammer, the Pilot attempts to bring the Slammer CU online by failing back the CU.

The Pilot checks the firmware on the replacement motherboard during the failback. If the firmware on the replacement motherboard needs to be updated, the Pilot downloads the firmware to the new motherboard as part of the failback process.

The download process takes a few minutes and causes the CU to be in failed over state again for approximately 5-7 minutes. The Pilot rechecks the memory and configuration, and then attempts to failback the CU. The completion percentage of the failback remains at zero if there is another task running.

The Pilot checks the firmware only after the failback of the CU. If the Pillar Axiom systems must burn firmware, the entire operation takes at least 15 to 20 minutes.

Important! Make sure you wait long enough for the failback operation to occur.

The failback may take some time, especially if there is an internal automatic Call-Home in progress. Failback can take up to an hour on a large Pillar Axiom system and does not start until the log collection is complete.

Make sure that the failback operation appears in the task bar and its completion percentage is not zero. Check the completion percentage frequently. If the completion percentage stays at zero, there is another internal, non-displayed, automatic task in progress that is delaying the failback operation.

- For SAN Slammers and for NAS Slammers that have **Enable Automatic Failback of NAS Control Units** selected, after Guided Maintenance verifies the FRU as Normal, Guided Maintenance automatically fails back the resources to the recovered CU.

- For NAS Slammers that do not have **Enable Automatic Failback of NAS Control Units** selected, after Guided Maintenance verifies the FRU as Normal, the CU waits for the administrator to click **Recover Control Unit**. At that time, Guided Maintenance fails back the resources to the recovered CU.

In some cases of FRU replacement on Slammers using Guided Maintenance, you must turn off the power. After you replace a FRU and have powered on the target CU, the Slammer CU rejoins the Pillar Axiom system.

The Slammer CU rejoins the Pillar Axiom system only if it is a SAN system or if **Enable Automatic Failback of NAS Control Units** is enabled and the component is not in disabled state.

The rejoin operation takes about five minutes for the CU to come up in a Normal state. However, not all FRU replacement tasks on Slammers using Guided Maintenance require power cycling. Some components in the Slammer can be replaced using Guided Maintenance without turning off power.

Note: You cannot recover the Brick or Slammer by Guided Maintenance if the component is disabled because Guided Maintenance does not clear the failure history. To clear the failure history when performing Guided Maintenance on any component that is in a disabled state, contact the Pillar World Wide Customer Support Center.

Important! After all Guided Maintenance is complete, it is critical that the administrator check the overall health status of the Pillar Axiom system to ensure that filesystems and LUNs have returned to Normal state.

File systems and LUNs stay in Conservative mode even after the completion of Guided Maintenance only if the replacement battery is not fully charged. Charging the replacement battery never takes longer than 18 hours. For any other instances, where the filesystems and LUNs are in Conservative, partial Offline, or Offline mode, contact the Pillar World Wide Customer Support Center for assistance.

Also, check the system health status to make sure it has returned to Normal state. Only a drive copyback or drive rebuild may leave the system in Warning status. For any other Guided Maintenance operation that leaves the Pillar Axiom system in Warning status, contact the Pillar World Wide Customer Support Center for assistance.

About System-Wide Service Procedures

This section provides system-wide procedures that you might need to perform while you service a Pillar Axiom system.

About Data Backups

Regular backups are prudent IT practice. When you service hardware components that directly affect user data paths, we highly recommend that you first back up all user data to external media.

Important! Extraordinary system hardware changes (such as replacing a Slammer) and software configuration changes (such as resetting the system to a factory-fresh state) and all other modifications not specifically mentioned in this document should only be attempted after consultation with the Pillar World Wide Customer Support Center. A backup of data should always be done prior to all but routine maintenance actions.

Full system backups to external media must be performed when you want to perform any of the following actions:

- Remove a Brick permanently from the Pillar Axiom system.

  Note: You need not always perform a complete data backup to remove Bricks from a Pillar Axiom system. However, prior to removal make sure that all necessary resources have been migrated from the Brick and the system configuration is not located on the Brick. For more information, contact the Pillar World Wide Customer Support Center.

- Clear the system configuration. This action requires an encrypted system key that the Pillar World Wide Customer Support Center can supply. This action removes all user and system data.

⚠ **Caution**	Before you clear the system configuration, consult with the Pillar World Wide Customer Support Center to avoid the risk of losing system configuration data.

To back up the system, refer to the *Pillar Axiom NDMP Integration Guide* and to the documentation for your NDMP-based backup application.

About Power Cycling

Contact the Pillar World Wide Customer Support Center before power cycling a Pillar Axiom system except in the event of an emergency, in which case, drop all power and then contact the Pillar World Wide Customer Support Center.

Contact the Pillar World Wide Customer Support Center before touching any power cables or switches. There are some situations where not power cycling the entire system is the correct action.

For failure testing, do not power cycle individual components without first contacting the Pillar World Wide Customer Support Center.

If you need to turn off the system, use the Shutdown capability in the Pillar Axiom Storage Services Manager. Because of the redundant architecture, you may not turn off the system by switching off components (including the power distribution units).

Note: If you expect to shut down the system for longer than 12 hours, remove the batteries from the Slammer after you power off the system. Reinstall the batteries before restarting the system.

⚠ **Caution**	Make sure the system has been placed in Shutdown status before powering it down or removing the batteries; otherwise data loss may result.

Important! Check the Read Only Administrator Action to make sure that the Pillar Axiom system was correctly shut down. Do not remove batteries if the Read Only Administrator Action indicates that the Pillar Axiom system is read only because the shutdown failed. This may cause data loss.

Important! Do not remove batteries if there are any Pinned Data Administrator Actions because it may cause data loss.

About Rack Door Removal

To make the replacement or addition of PDUs and component chassis easier, we suggest that you remove the front and back doors from the rack.

Figure 2 Sample 42U rack front door

Legend	1 Front door

Note: Your rack may look slightly different.

Front and back doors are hinged to the frame. These hinges can be of the following types:

Figure 3 Different types of rack door hinges
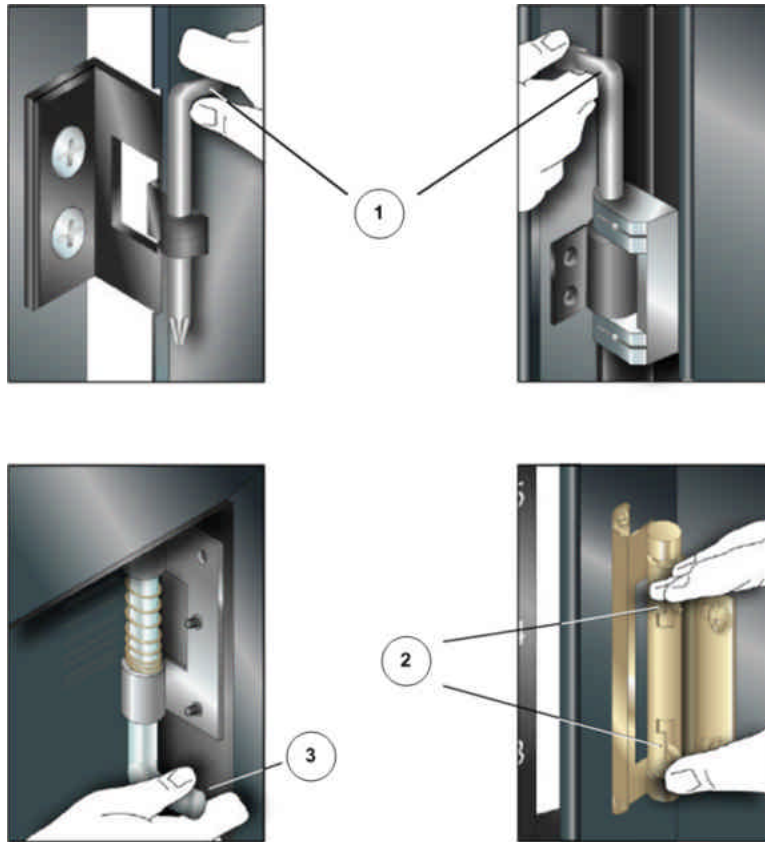
Legend	1 Pull up on the handle to unpin the hinge.
	2 Squeeze the ends together to release the hinge.
	3 Pull down on the handle to unpin the hinge.

Important! After servicing a Pillar Axiom system, replace the doors and keep them closed to maintain compliance with Federal Communications Commission (FCC) requirements.

Related tasks
- *Remove the Doors From a Rack*
- *Attach the Rack Doors*

Remove the Doors From a Rack

1   If locked, unlock the front and back doors.

2   Disconnect the ground strap from each door.

For Pillar racks, only the back door has a ground strap.

3   Based on the type of hinge, release all door hinges.

4   Remove the doors and set them aside.

Note: Use care to place the doors where they cannot fall on people, slide, or scratch the front-door plastic.

Related concepts
- *About Rack Door Removal*

About Rack Side Panel Removal

Removal of the side panels of a rack facilitates:

- Bolting racks together.

- Replacing PDUs, Pilot control units (CUs), Bricks, and Slammers.

- Expanding the system.

- The cabling of Bricks that reside in expansion racks.

Figure 4 Sample 42U side panels

Legend	1 Side panel, one each side
	2 Latches

Remove a Side Panel From a Rack

1   If locked, unlock the side panel.

2   Unlatch the side panel by one of the following methods:

- Push the release button.

- Lift the release handle(s).

3   Remove the side panel and set it aside.

Attach the Rack Doors

1   Based on the type of door hinge, reassemble the hinges.

2   Reattach the doors.

3   Reattach the ground straps at the bottom of the back door.

4   Lock the front and back doors to the rack (optional).

Related concepts
- *About Rack Door Removal*

Attach the Rack Side Panels

1   Hang the top of the panel on the top of the rack frame and latch the panel to close it.

   Important! Be sure not to pinch any cables that might have strayed from their proper moorings.

2   Secure the panel using the option below that is appropriate for your rack:

   - Engage the latch handle(s) and snap the panel into place.

   - Screw the panels to the rack frame at the top and bottom.

3   Lock both side panels (optional).

⚠ Caution	Replace all blanking plates to maintain proper cooling, whenever you remove a blanking plate to gain access to another component.

CHAPTER 3

Service the Pilot and Pilot FRUs

About Pilot Service Procedures

Each control unit (CU) within a Pilot management controller contains an operating system and support for a variety of applications, including:

- NAS and SAN replication management

- Graphical user interface (GUI)

- Command line interface (CLI)

- Network Data Management Protocol (NDMP)

- Storage Management Initiative-Specification (SMI-S, on 2 Gb CUs only)

- Simple Network Management Protocol (SNMP)

Pilot CU failure does not disrupt user data paths. User data paths are supported entirely by Slammers.

Even if both Pilot CUs fail, the Pillar Axiom system continues to operate. If both CUs fail, the system simply has no management interface. In this condition, the Pillar Axiom system cannot perform the following actions:

- Respond to GUI or CLI requests.

- Change configuration, including quotas.

- Recover a Slammer CU in the event of a software warmstart or failover.

- Notify administrators (through alerts) or the Pillar World Wide Customer Support Center (through Call-Home messages) of the problem.

- Accept new hardware into the system.

- Run backups.

- Perform automatic recovery and failback procedures such as failing over access if a Brick RAID CU crashes. or a Slammer warmstart.

- Perform automatic recovery and failback procedures such as a Slammer warmstart.

- Run automatically scheduled work such as scheduled snapshots.

- Manage, recover, or begin new replication cycles.

When a single Pilot CU fails, the system operation is unaffected. The system status is changed to Warning to indicate the failure. However, full management control, notification, and recovery remains available.

When the failed CU is replaced, the system automatically upgrades all software modules to match those on the remaining CU. The system then synchronizes all configuration information, and event logs. The new Pilot CU may stay in Warning until these actions complete.

When a single Pilot CU fails, any or all of the following notification methods occur:

- If email and the Call-Home feature are configured and enabled, a Call-Home message is sent to the Pillar World Wide Customer Support Center. A Technical Support Engineer initiates a service call.

- If email and alerts are configured and enabled, an alert is emailed to designated recipients.

- An event is written to the event log.

- Pillar Axiom Storage Services Manager displays a Failed status in the Health pages and on the status bar.

Note: No Pilot LEDs blink to indicate a failure.

There is no Guided Maintenance for Pilots. However, a Pilot CU has a drive LED on the front panel that Guided Maintenance can light to help you identify the target CU.

If the Pilot bezel fails, you replace the bezel. If a single Pilot CU fails, you replace the CU. You can replace the bezel and a failed CU while the Pillar Axiom system is operational. This is known as hot swapping.

| ⚠ **Caution** | After receiving a replacement 1U Pilot CU, do not power it on outside of the Pilot CU insertion procedure documented in the *Pillar Axiom 600 Service Guide*. If a Pilot Control Unit (CU) is powered on prematurely before all Ethernet and serial cables are securely attached, power off the Pilot immediately and contact the Pillar World Wide Customer Support Center. |

The following table lists the FRU replacement tasks for a Pilot.

Table 7 Pilot FRU replacement tasks

Component	Hot swap?	Tasks
Bezel	Yes	1 Remove a Pilot Bezel. 2 Attach a Pilot Bezel.
Control unit	Yes	1 Remove a Pilot Bezel. 2 Identify a Pilot Control Unit. 3 Remove a Pilot Control Unit (CU). 4 Insert a Pilot Control Unit (CU). 5 Attach a Pilot Bezel.

Related concepts

- *About Guided Maintenance Initiation*

Map of Pilot FRUs

The following figure illustrates the replaceable FRUs in a Pilot.

Figure 5 Schematic of replaceable Pilot FRUs
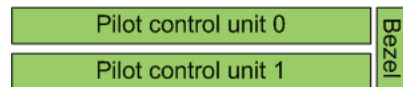
Note: This is the default assignment of FRU positions. However, it is possible that Pilot control unit (CU) 0 is the bottom CU. Ensure that you are replacing the correct FRU.

Related tasks

- *Identify the Target FRU*

Pilot FRU Part Numbers

The following table lists the field replaceable units (FRUs) that are in a Pillar Axiom Pilot.

Table 8 Pilot FRUs

Part number	FRU description
1450-00072-XX	Bezel
1450-00106-XX	Pilot control unit (CU), 512 MB
1450-00164-XX	Pilot CU, 2 GB, RoHS
1450-00170-XX	Pilot CU, 2 GB, MSI, non-RoHS
1450-00179-XX	Pilot CU, 2 GB, RoHS
1450–00259–XX	Pilot CU, 2 GB, HSF

About Pilot Bezel Replacement

Pilot bezels can be replaced while the Pilot is operational. Guided Maintenance is not used to remove a Pilot bezel.

LEDs on a Pilot bezel indicate only whether power is on for the two control units (CUs). The status of a CU's power is indicated by its status LED. There are no fault LEDs on a Pilot bezel.

Figure 6 Pilot bezel LEDs

Legend	
1 CU 0 LED	
2 CU 1 LED	

To replace a Pilot bezel, perform the tasks that are outlined in the following table.

Table 9 Pilot bezel replacement tasks

Task	Reason
1 Remove a Pilot Bezel.	To make room for the bezel replacement.
2 Attach a Pilot Bezel.	To reattach the bezel.

Remove a Pilot Bezel

1 Press the button on each ejector tab to unlock the tabs.

Figure 7 Pilot bezel ejector tabs
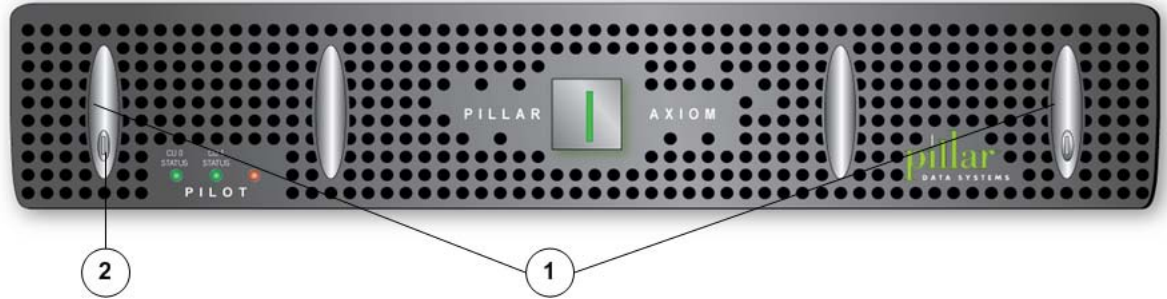
Legend	1 Ejector
	2 Button

2   Lift each ejector tab at the same time to disengage the Pilot bezel from the rack mounts.

3   Carefully rotate the top of the bezel outward and, as the latches disengage, lift the bezel slightly to disengage the bottom of the bezel.

4   Detach both USB cables from the bezel and set the bezel aside on an antistatic surface.

Attach a Pilot Bezel

Note: Ensure that there is no interference at the edges of the bezel so it seats properly.

1   Connect the USB cable from Pilot control unit (CU) 0 to the USB port on the back of the bezel that is marked Node 0.

2   Connect the USB cable from Pilot CU 1 to the USB port on the back of the bezel that is marked Node 1.

3   Tilt the top of the bezel slightly towards you and insert the bottom two hooks into the mounting tabs.

Important! The USB cables are attached to a swingable arm. Ensure that the arm swings freely and that the cables are not pinched.

4   Press the top corners of the bezel to engage the top two bezel hooks with the top rail tabs.

5   Press both ejector tabs until they lock in place.

About Pilot Control Unit Replacement

The administrator decides when to replace a Pilot control unit (CU), which is influenced by any or all of the following:

- Email

- Alerts

- Call-Home

- GUI Status

- Instructions from the Pillar World Wide Customer Support Center

Important! We recommend that you contact the Pillar World Wide Customer Support Center before you replace a Pilot CU. In the very rare circumstance where you need to replace both Pilot CUs, you MUST contact the Pillar World Wide Customer Support Center.

To replace a Pilot CU, perform the tasks that are outlined in the following table.

Table 10 Pilot CU replacement tasks

Task		Reason
1	Remove a Pilot Bezel.	To gain access to the Pilot control units (CUs).
2	Identify a Pilot Control Unit.	To locate the target Pilot CU.
3	Remove a Pilot Control Unit (CU).	To make room for the Pilot CU replacement.
4	Insert a Pilot Control Unit (CU).	To insert the Pilot CU replacement.
5	Attach a Pilot Bezel.	To reattach the bezel.

About Pilot Control Unit Identification

A Pilot control unit (CU) has several LEDs on the front panel that Guided Maintenance can light to help you identify the target CU.

The alignment of the LEDs in the front panel of the Pilot is different for the various versions of the Pilot.

Figure 8 LEDs on Pilot CU (1450–00170–XX) MSI, non-RoHS, front panel
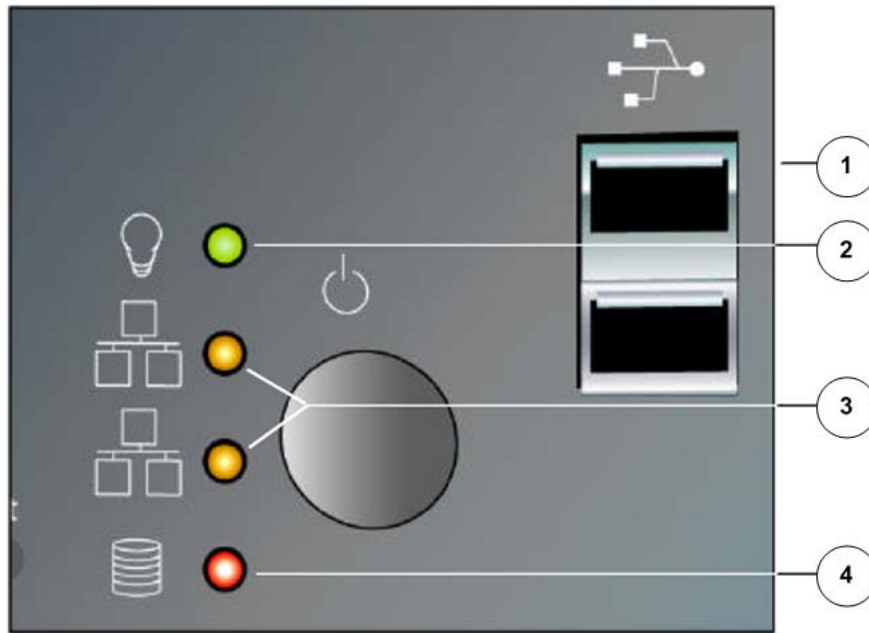
Legend

1 Front Panel	3 Private Ethernet activity
2 DC power LED	4 Drive LED

Figure 9 LEDs on a Pilot CU (1450–00164–XX) Intel, front panel

Legend

1 Private Ethernet activity	3 Front panel
2 DC power LED	4 Drive LED

Figure 10 LEDs on Pilot CU (1450–00259–XX) front panel
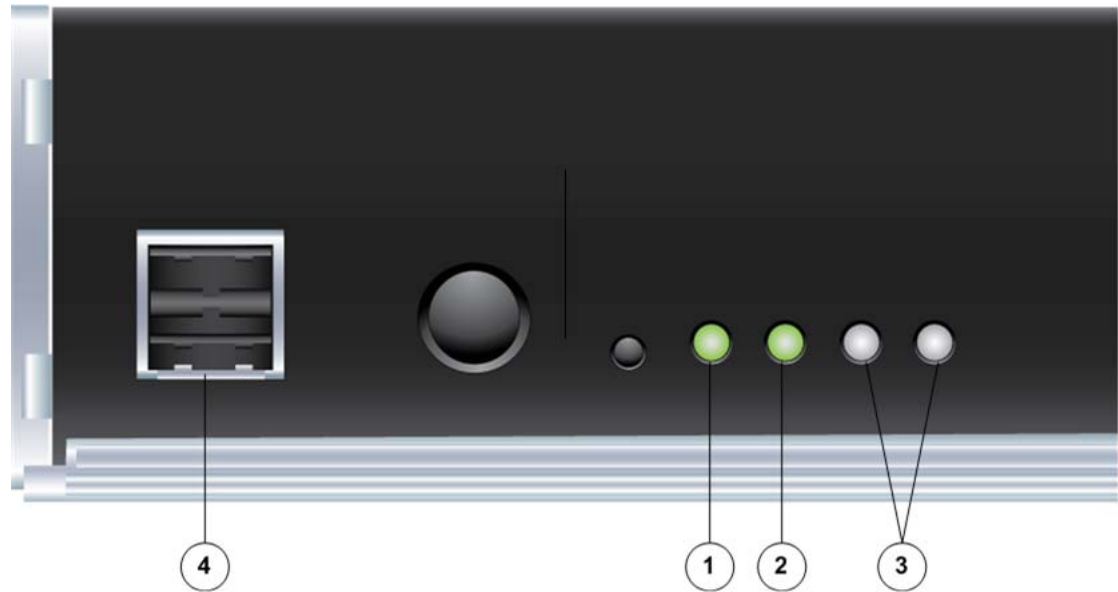
Legend	1 DC power LED
	2 Drive LED
	3 NIC LEDs
	4 USB port

Note: The front panels displayed in the above figures are representative of a Pilot CU. The alignment of the LEDs in the Pilot CU (1450–00179–XX) is slightly different that the Pilot CU (1450-0259-XX), as pictured above.

The alignment of the LEDs in the Pilot CU (1450–00179–XX) follows the order:

- Drive LED (HDD)

- NIC (Network Interface Card) LED to indicate Ethernet activity

- Power (PWR) LED

Note: Reverse Identify for a particular Pilot CU flashes the drive LED on the front panel of the other Pilot CU.

The GUI Health page may be used to display whether Pilot CU 0 or CU 1 is the active or standby Pilot. Normally, CU 0 is the top unit and CU 1 is the bottom unit.

Important! If you have difficulty telling the difference between an Identify operation and normal drive LED activity or are unable to identify clearly the correct Pilot CU, use the serial numbers displayed in the Pillar Axiom Storage Services Manager or contact the Pillar World Wide Customer Support Center.

The power LED indicates that power is being supplied to the Pilot CU. This LED should be on at all times while the Pilot CU has AC power.

Pilot Versions

There are several versions of Pilot control units (CUs) available. Figure 11 to Figure 14 illustrate the different versions of the Pilot:

Figure 11 Pilot CU (1450–00259–XX) (Back view)
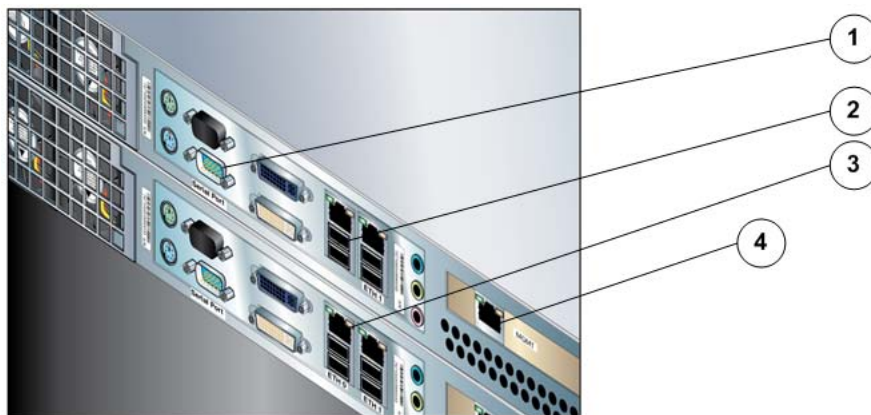
Legend	
1	Serial port
2	USB flash memory drive inserted into the lower USB port
3	Ethernet ports
4	Management port

Figure 12 Pilot CU (1450–00179–XX) (Back view)

Legend

1 Pilot power switch	4 Management port
2 Ethernet port (ETH1)	5 USB port
3 Ethernet port (ETH0)	

Figure 13 Pilot CU (1450–00164–XX) Intel
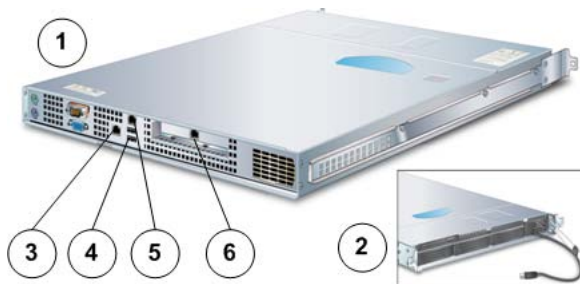
Legend

1 Back view of a Pilot CU	4 USB port
2 Front view of a Pilot CU	5 Ethernet port (ETH0)
3 Ethernet port (ETH1)	6 Management port

Figure 14 Pilot CU (1450–00170–XX) MSI, non-RoHS
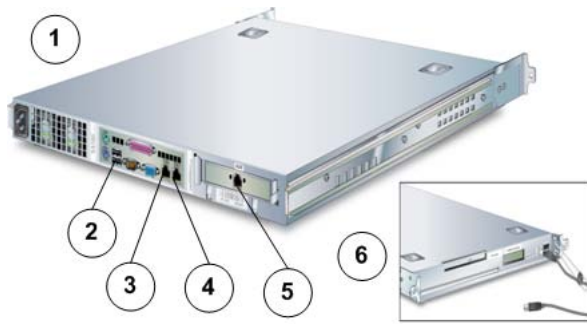
Legend

1 Back view of a Pilot CU	4 Ethernet port (ETH1)
2 USB port	5 Management port
3 Ethernet port (ETH0)	6 Front view of a Pilot CU

Figure 15 Pilot CU (1450-00268-XX and 1030-00005-XX)
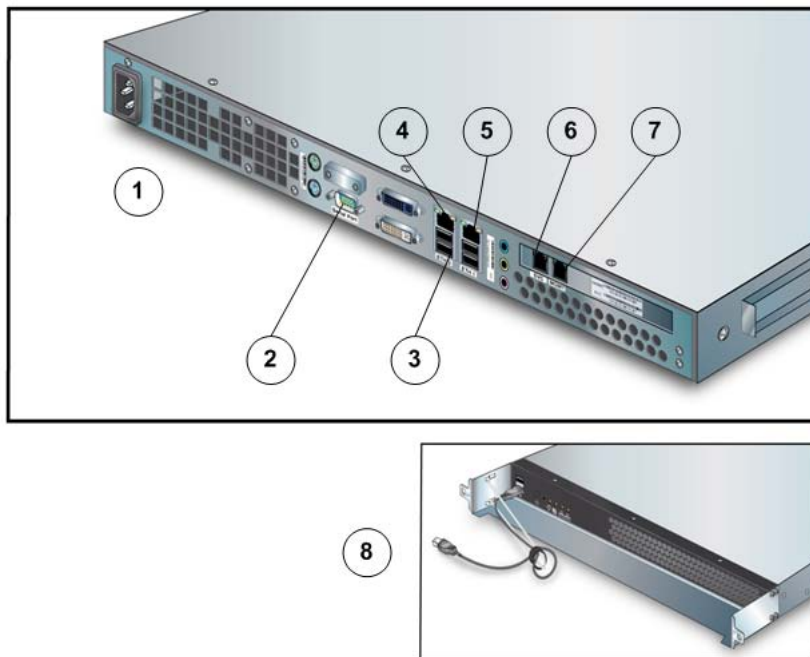
Legend

1 Back view of a Pilot CU	5 Ethernet port (ETH1)
2 Serial port	6 SVC Ethernet port for direct connection to the Pilot
3 USB port	7 Management port
4 Ethernet port (ETH0)	8 Front view of a Pilot CU

Identify a Pilot Control Unit

1 Remove the Pilot bezel.

2 Click the **Health** icon in the top context pane.

3 Click the Pilot link in the left navigation pane.

4 For the target Pilot control unit (CU), click **Identify**.

   Note: The drive LED on the target CU will light solid for one minute.

   Tip: If there is heavy drive activity on the Pilot CU, use both **Identify** and **Reverse Identify** to determine the correct CU.

   A very reliable method to identify the Pilot CU is to ping the unique address of each Pilot such as (10.0.0.3 and 10.0.0.4) and momentarily disconnect the management Ethernet connector out of the port to make sure you replace the correct CU. When the ping to the specific address stops, identify the correct Pilot CU.

   The IP addresses for CU 0 and CU 1 of the Pilot are available on the Global Settings Networking screen, which displays these IP addresses on the Modify Network Settings screen. If Call-Home is enabled, the Pillar World Wide Customer Support Center provides the IP addresses from the Call-Home logs.

5 Click **Finish**.

About Pilot Control Unit Removal

Before you remove a Pilot control unit (CU), label each cable that you detach from the CU:

- One power cord to the power supply.

- One serial null-modem cable to the serial port. This cable supports the heartbeat between the two Pilot CUs.

- Two Ethernet cables to the ETH 0 and ETH 1 ports. These cables support the private management network.

- One Ethernet cable to the MGMT port. This cable supports the management console on the public LAN.

Tip: The label should note where the cable needs to be reattached on the replacement CU.

Remove a Pilot Control Unit (CU)

Important! Remove power only from the Pilot CU that you want to replace.

When removing power from an active Pilot control unit (CU), the GUI shows a Warning state for that CU and one of the Slammer CUs. The Slammer CU shows a Warning state because it lost its connection to the Pilot CU that was taken offline.

This is a normal, expected state for the Slammer CU in that case. However, the Pilot CU must be brought back up as soon as possible to avoid any potential problems.

1 If you have not already done so, remove the Pilot bezel.

2 Use Guided Maintenance to identify the target Pilot CU.

3 Detach the power cable from the target CU.

4 In the back of the target CU, detach the Ethernet cables from ports ETH 0, ETH 1, and MGMT.

5 In the back of the target CU, detach the serial null-modem cable from the serial port.

6 In the front of the CU, remove the two screws (one on each side) that secure the CU ears to the rack rails.

7 Grasp the bezel adapter flange and pull gently to extract the CU.

Figure 16 Bezel adapter flange
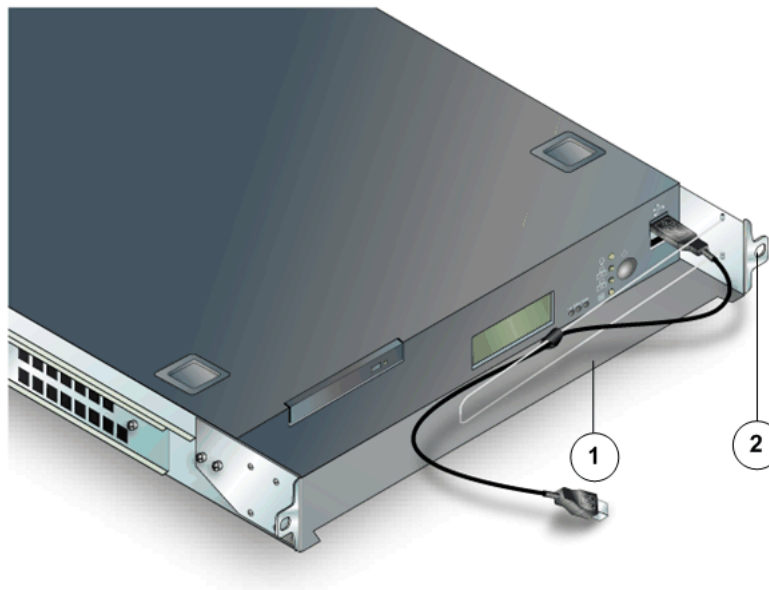
Legend	
	1 Bezel adapter flange
	2 Screw

8   Set the Pilot CU aside on an antistatic surface.

About Pilot Control Unit Insertion

When you replace a Pilot control unit (CU), the existing Pilot CU updates the replacement CU with this information:

- Linux operating system.

- Pillar Axiom software that includes current, previous, and staged software and firmware for all components.

- Pilot identity.

- Public and private IP configuration, including IP addresses and gateways.

Important! The above information update completes satisfactorily only if you have not powered on the replacement CU prior to cabling it to the serial link and the private management Ethernet and serial port of the surviving Pilot CU.

⚠ **Caution** After receiving a replacement 1U Pilot CU, do not power it on outside of the Pilot CU insertion procedure documented in the *Pillar Axiom 600 Service Guide*. If a Pilot Control Unit (CU) is powered on prematurely before all Ethernet and serial cables are securely attached, power off the Pilot immediately and contact the Pillar World Wide Customer Support Center.

When you cable the Pilot CU replacement, refer to the labels on the Ethernet cables to guide you.

For complete information on how to cable a Pilot CU into the system, refer to the *Pillar Axiom 600 SSF Cabling Reference*.

Insert a Pilot Control Unit (CU)

⚠ **Caution** Because a Pilot CU automatically powers on as soon as AC power is available, *do not* attach the AC power cord to the replacement CU until instructed to do so. If you power on the Pilot CU replacement before you perform these actions, the replacement CU will not be configured correctly. If this occurs, immediately unplug the AC power cord from the new Pilot and contact the Pillar World Wide Customer Support Center.

1   Place the Pilot CU into the empty set of Pilot rack rails.

Hold the Pilot CU horizontally to align and engage the support brackets on each side of the CU with the rack rails.

Figure 17 Pilot CU support brackets
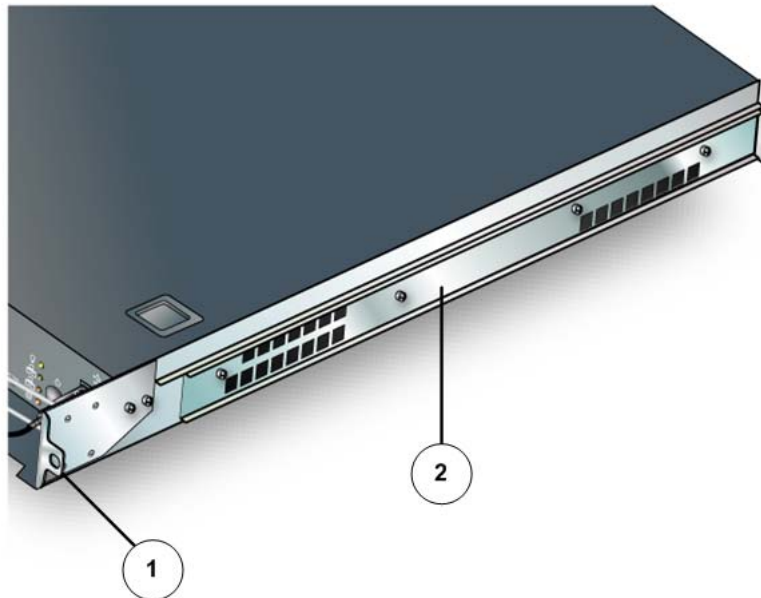
Legend

1 Bezel adapter bracket	
2 Support bracket	

2   Slide the Pilot CU all the way in until the ears on the bezel adapter bracket seat against the rack rail ears.

3   Insert the two 10-32 screws into the holes in the bezel adapter ears (one on each side) and secure the CU to the rack rails.

4   In the back of the CU, attach the serial null-modem cable to the serial port.

Figure 18 Pilot back view
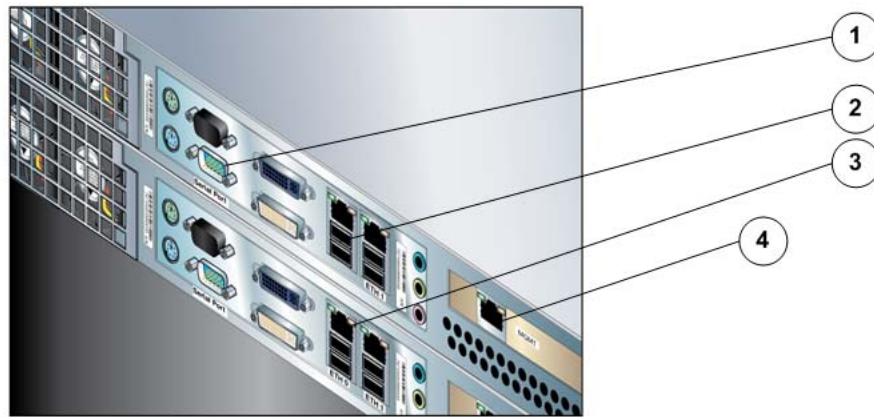
Legend

1 Serial port	
2 USB flash memory drive inserted into the lower USB port	
3 Ethernet slots	
4 Management port	

5   In the back of the Pilot CU replacement, attach the Ethernet cables to ports ETH 0, ETH 1, and MGMT.

6   Attach the AC power cable to the CU replacement.

7   On the front of the Pilot CU replacement, check whether the power LED is lit.

- If the power LED is lit, wait until the system disk LED blinks before continuing.

  Note: Contact the Pillar World Wide Customer Support Center if the system disk LED does not begin to blink within a few minutes.

- If the power LED is not lit, press and hold the power button on the front of the Pilot CU for two to five sec. Select one of the following options:

  ○   If the power LED lights, wait until the system disk LED blinks before continuing.

  Note: Contact the Pillar World Wide Customer Support Center if the system disk LED does not begin blinking within a few minutes.

  ○   If the power LED does not light, contact the Pillar World Wide Customer Support Center.

Note: The front and back network activity LEDs and internal LEDs (on some Pilots) may blink even though the power is off.

Note: It is normal for the new Pilot CU to restart up to three times while the system attempts to accept it. The entire restart process can take up to half an hour. If the new Pilot CU does not display a green LED light and is not in normal state within an hour, or if you experience any data access disruption, contact the Pillar World Wide Customer Support Center for assistance.

8   Add the Pilot bezel.

Note: Insert the USB cables into the front of each Pilot CU as marked. Ensure that the cable arm has no interference when attaching the bezel.

9   Log into the GUI, click the **Support** icon, and select Software Modules to verify that only one version of Pilot OS and Pilot Software displays.

Important! If you see two different version numbers for either software component, contact the Pillar World Wide Customer Support Center for recovery assistance.

Related concepts
- *About Pilot Control Unit Replacement*

Related references
- *Pilot Versions*

About Pilot Configuration Resets

Conditions might require certain Pilot configuration parameters to be reset. For example, you may have forgotten the login password for the Primary Administrator account or incorrectly set an IP address.

You can obtain special recovery files from the Pillar World Wide Customer Support Center and use them to reset the following parameters to their factory defaults:

- Primary Administrator password.

- Certain TCP/IP settings (such as IP address, netmask, and gateway) for the management console network.

- The internal identity of a Pilot control unit (CU). If the proper power-up sequence for a replacement Pilot CU was not followed, both CUs may contend as to which is CU 0, which requires the internal ID of one of them to be reset.

Parameter reset is accomplished by insertion of a universal serial bus (USB) key that contains the recovery files. The following figure shows a USB key connected to a Pilot USB port.

Important! Insert the USB key into one of the two USB ports on the back of the Pilot CU. Never insert a USB key into the USB ports on the front of the Pilot CU.

Figure 19 USB flash memory drive in a Pilot CU
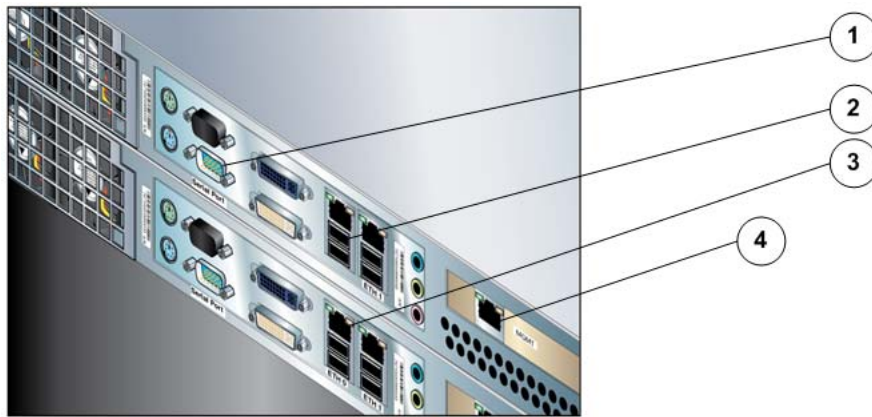
Legend	1 Serial port
	2 USB flash memory drive inserted into the lower USB port
	3 Ethernet slots
	4 Management port

Note: The displayed Pilot CUs are representative. The CUs that are installed in your system may differ slightly.

Pillar World Wide Customer Support Center provides a particular recovery file that the customer downloads into a USB key. This recovery file is specific for a particular configuration parameter and will reset that parameter to the factory default.

Recovery files are encrypted with the customer's system serial number and can be used only by that customer on a specific Pillar Axiom system.

The Universal Serial Bus (USB) flash memory drive can contain any combination of recovery files, all of which will be read by the Pilot's operating system. The USB key and its recovery files can be reapplied, if necessary.

After a recovery file is applied, the Pilot CU may restart.

Reset a Configuration Parameter

1   Call the Pillar World Wide Customer Support Center and describe the problem.

    Pillar World Wide Customer Support Center sends the appropriate text file to reset the configuration parameters.

2   Follow the instructions that you get from the Pillar World Wide Customer Support Center to write this text file to a USB key.

3   Insert the USB key into one of the USB ports on the back of one of the Pilot control units (CUs).

    Result:
    The operating system on the Pilot CU detects the USB key and runs a script that is based on the keyword that is encrypted in the recovery file. This script performs the corrective action, which takes a few seconds.

4   After the Pilot CU reports a Normal status, remove the USB key.

    Result:

    ● If the script resets the IP address of a Pilot CU, the script:

        ○ Sets the IP to 10.0.0.3 or 10.0.0.4.

        ○ Sets the shared public management IP to 10.0.0.2.

        ○ Sets the default gateway to 10.0.0.1.

    ● If the script resets the administrator account password, the script sets the password to `pillar`.

CHAPTER 4

Service the Slammer and Slammer FRUs

About Slammer Service Procedures

When a Slammer storage controller or one of its field replaceable units (FRUs) fails, any or all of the following notification methods occur:

- If the email and Call-Home features are configured and enabled, a Call-Home message is sent to Pillar World Wide Customer Support Center. A service call is automatically initiated.

- If email and alerts are configured and enabled, an alert is emailed to designated recipients.

- An event is written to the event log.

- Pillar Axiom Storage Services Manager displays a Failed, Warning, or Offline status in the Health pages.

- One or more FLT LEDs light steady amber (except for power supply LEDs, which are not controlled by the system).

A Slammer contains two control units (CUs). Each CU contains a number of FRUs, some of which you can replace while the CU is powered and running (this is known as hot swap). Others you can replace only after the CU has been powered down and power has been removed from the CU power supply inputs.

⚠ Caution	To avoid data loss, contact the Pillar World Wide Customer Support Center before you attempt to replace an entire Brick storage enclosure or Slammer storage controller. The Pillar World Wide Customer Support Center can help you determine whether a particular filesystem or LUN is physically on the Brick.

When you need to replace one of the Slammer FRUs that cannot be replaced while the CU is powered up, Guided Maintenance prepares the system and instructs you when to remove AC power and when to replace the FRU. While you replace a target FRU, the partner CU continues to support all user data paths.

If you need to turn off the system, use the Shutdown capability in the GUI. Because of the redundant architecture, you may not turn off the system by switching off components (including the power distribution units).

Important! On one-Slammer systems, FRU replacement on both control units (CUs) at the same time requires you to put the system into shutdown mode and power off the Slammer CUs. In such cases, you cannot use Guided Maintenance for FRU replacement. After you have completed the FRU upgrade you will then power on the Slammer. During this power on, both Pilot CUs will restart so they can reestablish their connections to the single Slammer.

Note: If you will be powering down the system for more than a day, remove the Slammer batteries so they do not discharge.

Important! If you need to power off a Slammer CU in a FRU replacement task, be sure to review the special notices before you power off the CU.

The following table provides information about each FRU and the effect that its replacement has on the CU. This table:

- Identifies the FRUs within a Slammer.

- Indicates whether AC power needs to be removed.

- Indicates the operating state of the target CU in the Slammer.

- Lists the replacement tasks for those FRUs.

Table 11 Slammer FRU replacement tasks

FRU	Hot swap?	Slammer state	Tasks
Battery	Yes	Target CU in Conservative mode	1 Identify the Target FRU. 2 Prepare the System for FRU Replacement. 3 Remove a Slammer Bezel. 4 Remove a Slammer Battery. 5 Insert a Slammer Battery. 6 Attach a Slammer Bezel.
Bezel	Yes	Normal	1 Remove a Slammer Bezel. 2 Attach a Slammer Bezel.
Fan module	Yes	Normal	1 Identify the Target FRU. 2 Prepare the System for FRU Replacement. 3 Remove a Slammer Bezel. 4 Remove a Slammer Fan FRU. 5 Insert a Slammer Fan FRU.

Table 11 Slammer FRU replacement tasks (continued)

FRU	Hot swap?	Slammer state	Tasks	
			6	Attach a Slammer Bezel.
Motherboard tray	No	N/A	1	Identify the Target FRU.
			2	Prepare the System for FRU Replacement.
			3	Remove a Slammer Bezel.
			4	Remove a Slammer Battery.
			5	Remove a Slammer Fan FRU.
			6	Remove a Slammer Motherboard Tray.
			7	Insert a Slammer Motherboard Tray.
			8	Insert a Slammer Fan FRU.
			9	Insert a Slammer Battery.
			10	Attach a Slammer Bezel.
Network interface module	No	Target CU is failed over	1	Identify the Target FRU.
			2	Prepare the System for FRU Replacement.
			3	Remove a Slammer NIM, PCIe HBA, and PCIe Riser.
			4	Remove a Slammer PCIX Card.
			5	Insert a Slammer PCIX Card.
			6	Insert a Slammer NIM, PCIe HBA, and PCIe Riser.
SFP module	Yes	N/A	1	Identify the Target FRU.
			2	Prepare the System for FRU Replacement.
			3	Remove an SFP Module.
			4	Insert an SFP Module.
Power supply	Yes	Target CU in Conservative mode	1	Identify the Target FRU.
			2	Prepare the System for FRU Replacement.
			3	Remove a Slammer Power Supply.
			4	Insert a Slammer Power Supply.

Table 11 Slammer FRU replacement tasks (continued)

FRU	Hot swap?	Slammer state	Tasks
Private interconnect module	No	Target CU is failed over	1 Identify the Target FRU. 2 Prepare the System for FRU Replacement. 3 Remove a Private Interconnect Module. 4 Insert a Slammer Private Interconnect Module.

⚠ **Caution**   If you are upgrading the network interface module (NIM) to a new model, you must take the Slammer completely offline and replace both NIM FRUs simultaneously.

Important! Replacement of FRUs, other than bezels, must be started through Guided Maintenance.

Related concepts
- *About Guided Maintenance Initiation*

Related tasks
- *Remove a Slammer Battery*

Map of Slammer FRUs

The following figure illustrates the set of replaceable FRUs in a Slammer. Ensure that you are replacing the correct FRU.

Figure 20 Schematic of replaceable Pillar Axiom Slammer FRUs
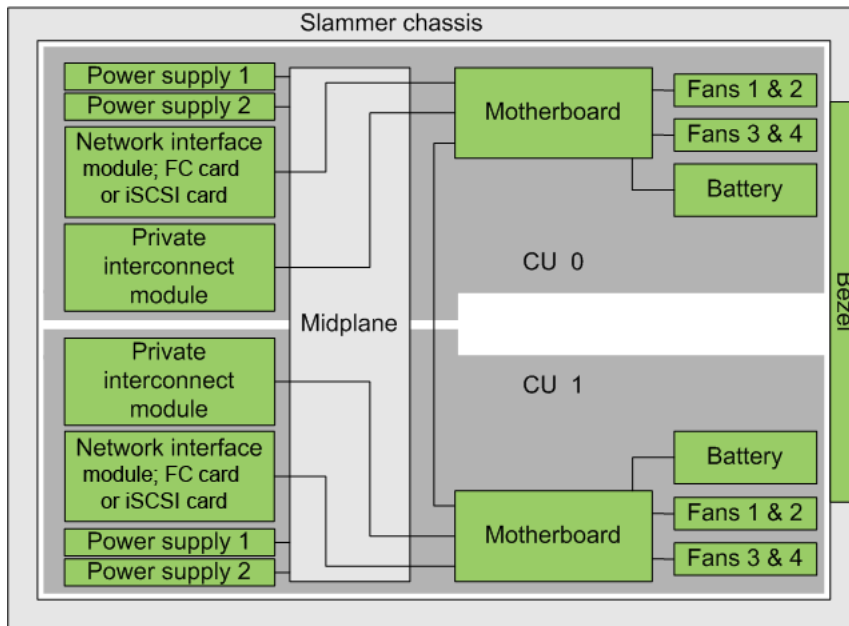
Related tasks

- *Identify the Target FRU*

Slammer FRU Part Numbers

The following table provides a list of the field replaceable units (FRUs) that are in a Slammer.

Table 12 Slammer FRU part numbers

Part number	FRU description
1450-00003-XX	Battery
1450-00001-XX	Bezel
1450-00035-XX	Chassis midplane
1450–00202–XX	Slammer chassis midplane, HEPS
1450-00005-XX	Fan module
2010-00002-XX	Fibre Channel PCI-X HBA

Table 12 Slammer FRU part numbers (continued)

Part number	FRU description
2011-00004-XX	iSCSI PCI-X HBA
2011–00021–XX	PCIe 8 Gb/s dual port, FC/HBA optical interface
2011-00024-XX	PCIe 10 Gb/s dual port, direct attach, RoHS
1450-00185-XX	Dual Core Motherboard Module (Series 1)
1450–00219–XX	Quad Core Motherboard Module with Flyover (Series 3)
1450–00199–XX	Quad Core Motherboard Module (Series 2)
1450-00168-XX	Network interface module (quad port, optical NIM)
1450-00169-XX	Network interface module (quad port, copper NIM)
1450–00257–XX	Network interface module with PCIe flyover, Generic
1450-00261-XX	Network interface module, Generic Hybrid PCIx PCIe Flyover, blank base, HSF
1450-00132-XX	SAN adapter module (4 Gb/s)
1450-00135-XX	SAN adapter module (iSCSI, copper)
3131-02607-XX	NAS SFP module (multimode, 1, 2 Gb/s)
3131-02727-XX	SAN SFP module (multimode, 1, 2, and 4 Gb/s)
3131-02860-XX	NAS 10 Gb/s SFP Plus module short range (SR)
1450-00011-XX	Power supply module (legacy)
1450–00201–XX	High efficiency power supply (HEPS)
1450-00138-XX	Private interconnect module (PIM) version 1
1450-00193-XX	Private interconnect module (PIM) version 2

The table below lists these Slammers and the field replaceable units (FRUs) associated with them, including their part numbers.

Table 13 Slammer series compatibility list of supported FRUs

Slammer series	Supported motherboard	Supported NIMs	Supported PIMs
Series 1: 1400-00052-2X	1450-00185–XX	1450-00132–XX 1450-00135–XX 1450-00168–XX 1450-00169–XX	1450-00138–XX 1450-00193–XX
Series 2: 1400-00058-2X and 1400-00058-3X	1450-00199–XX	1450-00132–XX 1450-00135–XX 1450-00168–XX 1450-00169–XX	1450-00138–XX 1450-00193–XX
Series 3: 1400-00076-3X and 1400–00080–3X	1450-00219–XX	1450–00132–XX 1450-00135–XX 1450-00168–XX 1450-00169–XX 1450-00257–XX 1450-00261-XX	1450-00193–XX

About Slammer Bezel Replacement

Slammer bezels can be replaced while the Slammer is operational. The following figure shows a Slammer bezel FRU.

Figure 21 Slammer bezel
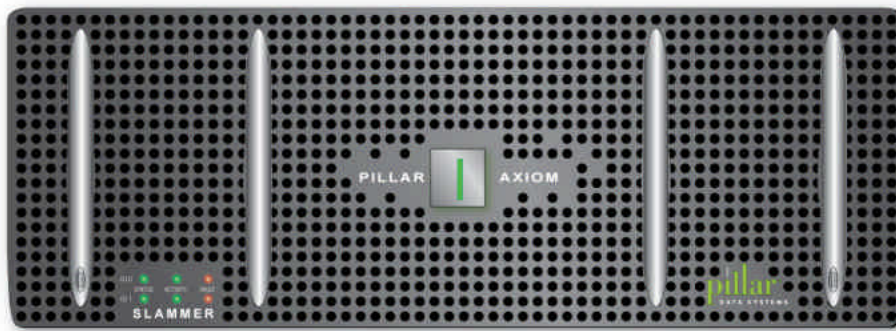
To replace a Slammer bezel, perform the tasks that are outlined in the following table.

Table 14 Slammer bezel replacement tasks

Task	Reason
1 Remove a Slammer Bezel.	To make room for the bezel replacement.
2 Attach a Slammer Bezel.	To add the bezel replacement.

Related concepts

- *About Slammer Bezel Removal*

About Slammer Bezel Removal

Guided Maintenance is not used to remove a Slammer bezel.

⚠ **Caution**	The Slammer bezel is an integral part of EMI shielding. The bezel can and should be reattached even when only one Slammer control unit (CU) is powered on. An example of this situation is when you remove the motherboard tray from the other CU for any length of time.

When a bezel is removed:

- The system generates an event indicating the removal.

- The system lights the FLT LED on the rear of the Slammer CU.

- The status of the Slammer is green (if bezel removal is the only issue).

Related concepts
- *About Slammer Bezel Replacement*

Related tasks
- *Remove a Slammer Bezel*
- *Attach a Slammer Bezel*

Remove a Slammer Bezel

1 Press the button on each ejector tab to unlock the tabs.

Figure 22 Slammer bezel ejector tabs
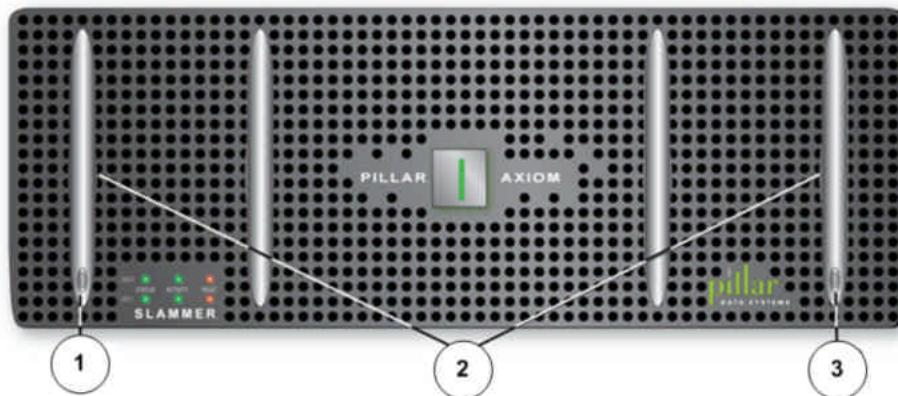
Legend	
1 Button	
2 Ejector	
3 Button	

2 Lift each ejector tab at the same time to disengage the Slammer bezel from the rack mounts.

3 Carefully rotate the top of the bezel outward and, as the latches disengage, lift the bezel slightly to disengage the bottom of the bezel.

4 Set the bezel aside.

Related concepts
- *About Slammer Bezel Removal*

Attach a Slammer Bezel

Note: Ensure that there is no interference at the top and bottom of the bezel so it seats properly.

1 Check the receptacle for the bezel power connector to ensure that it is free to move slightly to engage the power on the back of the bezel.

Figure 23 Receptacle for the Slammer bezel power connector

Legend	1 Fan FRU
	2 Bezel power connector receptacle

Note: A Slammer has two bezel power receptacles, one for each control unit.

2 If the receptacle is recessed into the holder, pull it forward slightly to engage the tabs so they rest on the front of the chassis.

3 Tilt the top of the bezel away from the Slammer chassis and insert the bottom hooks on the bezel into the holes in the chassis.

4   Tilt the top of the bezel toward the chassis until the bezel power connectors seat into the receptacles. Do not force the bezel into place.

Note: Be sure the power connecters are well seated. If the power and signal connector is not properly seated, the bezel fault LED will be lit.

5   Press the top corners of the bezel to engage the top two bezel hooks with the slots at the top of the chassis.

6   Press both ejector tabs (if open) until they lock in place.

Related concepts

- *About Slammer Bezel Removal*

About Slammer Battery Replacement

Each Slammer control unit (CU) has a single battery that provides backup power to two of the six memory module slots on the motherboard. The following figure shows a battery.

Figure 24 Slammer battery FRU
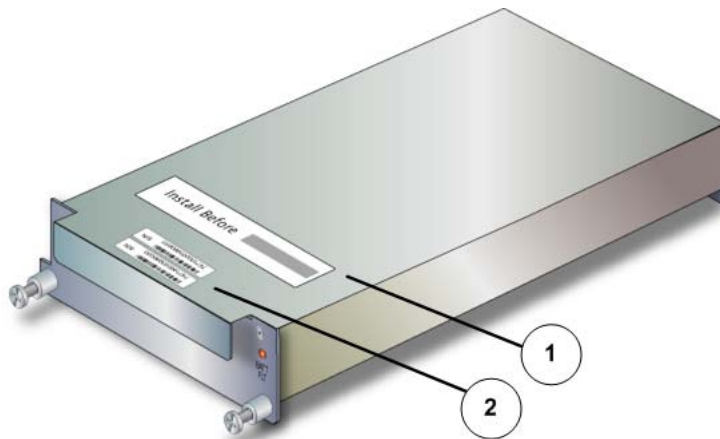
Legend	
1 Install Before date	
2 Serial number label	

The Slammer CU battery charger keeps the battery charged. During a power outage, a fully charged battery can provide power to the two memory slots for:

- 72 hours for systems with 6 GB of memory for each CU

- 48 hours for systems with 12 GB or 24 GB of memory for each CU

Important! If a power failure exceeds the above 72 or 48-hour limit, the battery could be overly discharged. In this case, you should replace the battery.

Note: If you will be intentionally powering down the system for more than a day (for example, as part of a maintenance operation), remove the Slammer batteries so they do not discharge.

Important! After recovery from a power failure and while the battery is charging, the system operates in Conservative (write-through cache) mode. The system stays in this mode until the battery charge reaches 80% of battery capacity, which may take up to 12 hours of normal power. If the battery is severely discharged, recharge time can take up to 18 hours. If the battery takes longer than 18 hours to reach a full charge, you should replace the battery.

If you need to turn off the system, use the Shutdown capability in the GUI. Because of the redundant architecture, you may not turn off the system by switching off components (including the power distribution units).

During a normal system shutdown, the data in Slammer memory is flushed to the storage pool, after which battery power is no longer needed to maintain data integrity.

Important! Here are rules you should follow when planning to service a Slammer:

- *Do* remove the batteries whenever you:

    ○ Shut down a Pillar Axiom system through the Pillar Axiom Storage Services Manager (GUI), and

    ○ Power down the system, and

    ○ Leave the system unattended for any length of time.

- *Do not* remove the batteries (instead, contact the Pillar World Wide Customer Support Center) in these situations:

    ○ The system fails to shut down.

    ○ Power is lost.

    ○ You turn off the power without first shutting the system down.

The following figure, which shows a Slammer face with the bezel removed, identifies the location of a Slammer battery.

Figure 25 Slammer battery location
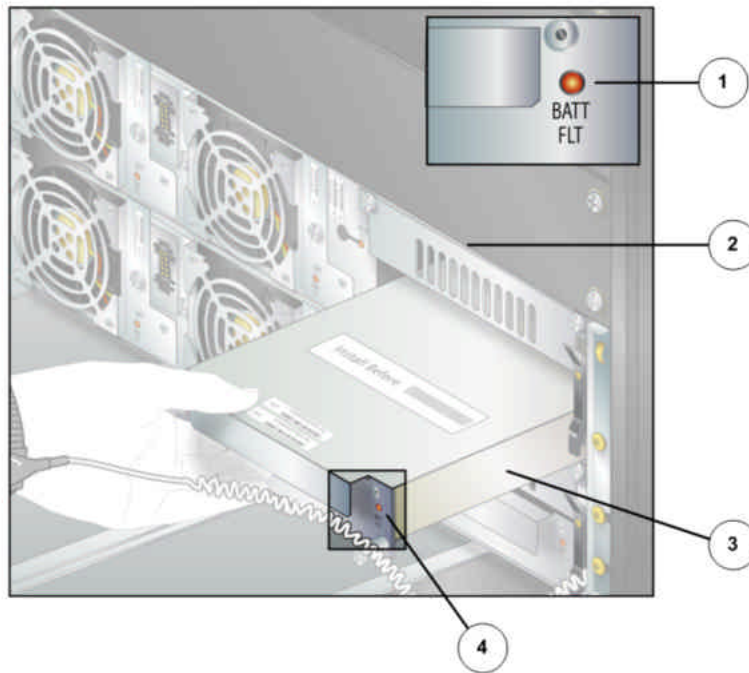
Legend

1 Battery fault LED	
2 Slammer front with bezel removed	
3 Battery	
4 Battery fault LED location	

Related concepts
- *About Slammer Battery Insertion*
- *About Slammer Battery Removal*

Related references
- *Battery Shelf Life*

Related tasks
- *Insert a Slammer Battery*

About Slammer Battery Removal

To help you identify the target control unit (CU) that has the FRU that needs to be replaced, Guided Maintenance beacons the bezel LEDs on the target CU. If you click **Reverse Identify** in the GUI, Guided Maintenance beacons all LEDs except for the target CU.

After you click **Prepare System**, Guided Maintenance prepares the system for replacement of the battery:

- Flushes cached data to the Bricks.

- Sets the status of the target CU to Warning.

- Places all filesystems and LUNs on the Slammer in Conservative mode.

- Disables the battery charger on the target CU.

After the system is prepared, Guided Maintenance displays a completion message and enables **Next**.

⚠ Caution	Slammer batteries are lead-acid based. To avoid possible explosion, do not burn. Replace only with the Pillar-approved parts. Recycle or discard the batteries as instructed by local regulations.

Related concepts
- *About Slammer Battery Replacement*

Remove a Slammer Battery

1 Within Guided Maintenance, click **Next** in the Prepare System page.

2 When Guided Maintenance prompts you to remove the battery, remove the two screws that secure the battery to the Slammer chassis.

Figure 26 Slammer battery screws
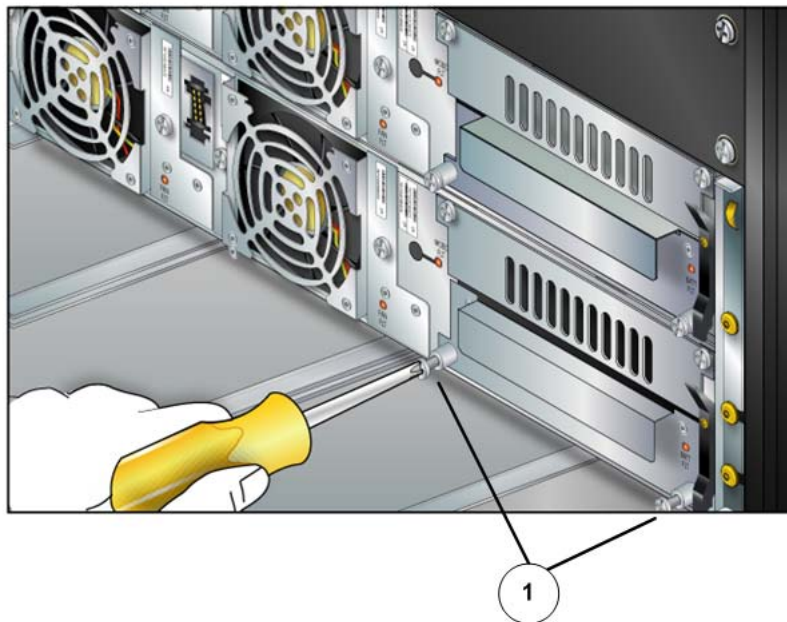
Legend

1 Screws

3   Slide the battery out of the chassis and set it aside.

Battery Shelf Life

Check the "Install Before Date" that is on the battery.

Table 15 Battery shelf life

If today is...	Do this...	Comments
On or before the "Install Before date"	Install the battery.	The battery has an operational charge. **Note:** If the replacement battery FRU stays in Warning state for more than one hour, call the Pillar World Wide Customer Support Center for recommendations on next steps.
After the "Install Before Date".	Call the Pillar World Wide Customer	Shipping a new battery and charging a battery (post installation date) requires the same amount of time. Charge the

Table 15 Battery shelf life (continued)

If today is...	Do this...	Comments
	Support Center to discuss whether ordering a replacement battery is required.	battery (post installation date) if you install it. Charging the battery may take several hours and leaves the Pillar Axiom system resources in Conservative state during the process of charging. **Note:** If you install this battery and if the battery is not in Normal state within 18 hours or your filesystems or LUNs are still in Conservative state, contact the Pillar World Wide Customer Support Center.

Battery Operational Life

Once you install the battery, as long as the Slammer is powered on, the internal battery charger provides a continuous trickle charge to maintain the battery throughout its operational life.

Table 16 Battery operational life

Ambient temperature	Operational life
77° F (25° C)	3-5 yr
68° F (20° C)	5 yr

About Slammer Battery Insertion

After the insertion of a battery into a Slammer control unit, the battery will show a Warning status in the Pillar Axiom Storage Services Manager GUI for a period of time.

How long the Warning status remains depends on the charge level of the battery. The time can be up to 18 hrs for a severely discharged battery.

If the battery takes longer than 18 hrs to reach a full charge, you should replace the battery. Contact the Pillar World Wide Customer Support Center for assistance in checking the state of the batteries or for a replacement.

Related concepts

* *About Slammer Battery Replacement*

Insert a Slammer Battery

1   Slide the replacement battery into the Slammer chassis.

2   Push the battery firmly into place to engage the battery with the motherboard assembly.

3   Tighten the two screws to secure the battery to the Slammer chassis.

4   On the Guided Maintenance page, click **Next**.

    The system initiates a battery test, which takes approximately 5 minutes to complete.

5   On the **Verify** page, click **Verify Status**.

    If Guided Maintenance displays a verification failed message, click **Try Again** and re-seat the FRU. If the second attempt is not successful, contact the Pillar World Wide Customer Support Center to continue Guided Maintenance for the FRU.

    Note: The length of time for the verification step to complete and the system to return a Normal status depends on the I/O load being carried by the system. For that reason, Pillar recommends that you lighten the I/O load as much as possible before replacing the FRU.

6   On a NAS Slammer, look for an Administrator Action.

    You may be instructed to restart the system, which makes this FRU and all other resources on the target Slammer control unit available.

    Note: On a SAN Slammer, the system automatically attempts to recover.

    Note: If the Verify page completes within 5 minutes, the Result page displays the message "The replacement battery is currently in a Warning state and may continue to be in a Warning state for up to 24 hours until adequately charged".

7   Click **Finish**.

8   Review the status of the replacement FRU to confirm that it has a Normal status.

9   Follow the appropriate procedure in this guide to reattach the bezel to the Slammer chassis.

Related tasks

•   *Attach a Slammer Bezel*

About Slammer Fan Module Replacement

Each Slammer control unit (CU) has two fan FRUs. The following figure shows a fan FRU, which is composed of a pair of fan assemblies. This means that each CU has four fan assemblies for cooling.

Figure 27 Slammer fan FRU
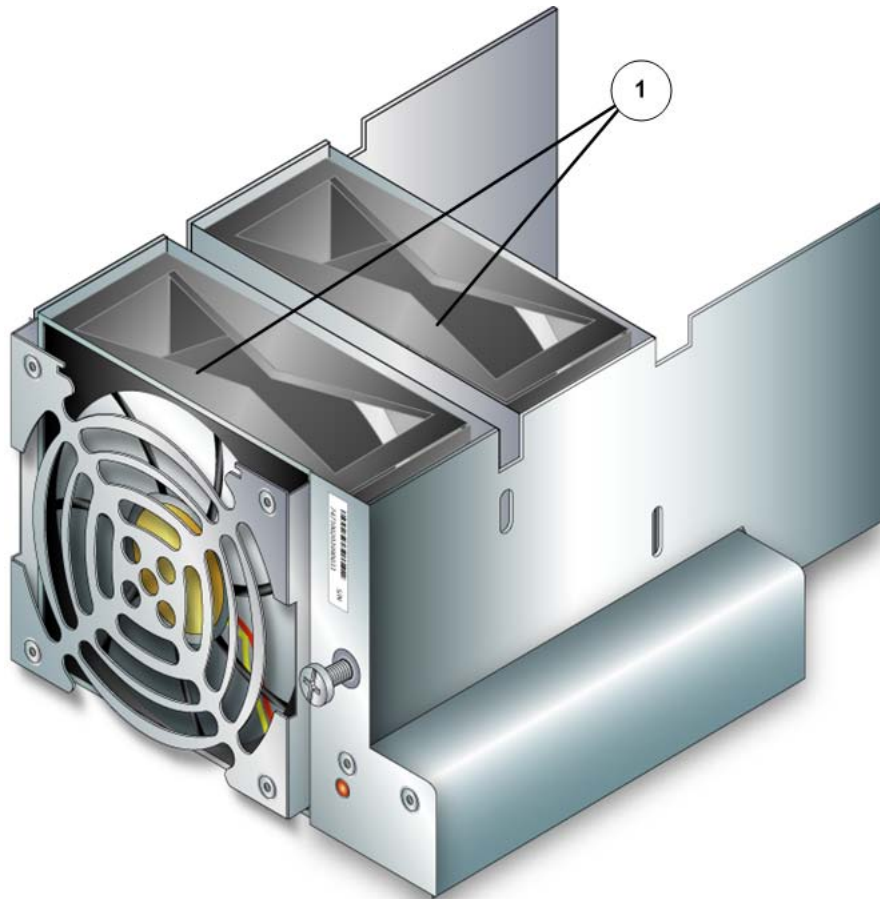
| **Legend** | 1 Fan assemblies (two for each fan FRU) |

Note: When the fan FRU status shows that the FRU has failed, either fan assembly within the FRU may have failed. It is possible that the visible assembly in front is good while the rear assembly has failed. It is also possible that the good fan in the rear may cause the failed front fan blades to continue to rotate.

The following figure shows a Slammer face with the bezel removed, identifies the location of the Slammer fans.

Figure 28 Slammer fan location
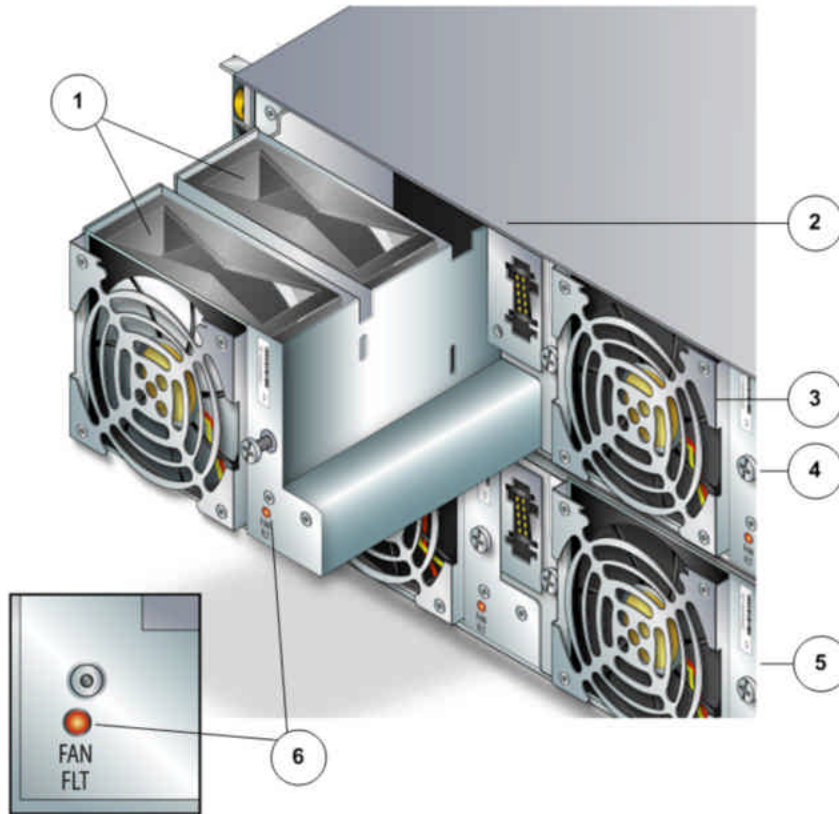
Legend		
1 Fan FRU #1, left side with CU 0 fans 1 and 2	4 CU 0	
2 Front of Slammer chassis with bezel removed	5 CU 1	
3 Fan FRU #2, right side with CU 0 fans 3 and 4	6 Fan fault LED	

Slammer Fan Replacement Tasks

To replace a Slammer fan, perform the tasks that are outlined in the following table.

Table 17 Slammer fan replacement tasks

Guided Maintenance	Task
Step 1 Identify	Identify the Target FRU.
Step 2 Prepare	Prepare the System for FRU Replacement.

Table 17 Slammer fan replacement tasks (continued)

Guided Maintenance	Task
Step 3 Replace	Replace the fan FRU: 1 Remove a Slammer Bezel. 2 Remove a Slammer Fan FRU. 3 Insert a Slammer Fan FRU. 4 Attach a Slammer Bezel.
Step 4 Verify Status	Performed as final step in fan replacement.

About Slammer Fan Module Removal

To help you identify the target control unit (CU) that has the FRU that needs to be replaced, Guided Maintenance beacons the bezel LEDs on the target CU. If you click **Reverse Identify** in the GUI, Guided Maintenance beacons all LEDs except for the target CU.

After you click **Prepare System** in the GUI, Guided Maintenance quiesces certain system components, allowing you to replace the fan module. After the system is prepared, Guided Maintenance displays a completion message and enables **Next**.

Important! When a fan module is stopped and removed, the internal temperature rises quickly and critical temperature alerts may begin to be issued. To avoid high-temperature buildup within the Slammer:

- Initiate Guided Maintenance only when you are able to replace the fan module immediately.

- Remove and replace the FRU within a five minute period.

- Replace one fan FRU at a time.

Important! To avoid electrical arcing when you remove the fan FRU, let it spin down before you replace it.

Remove a Slammer Fan FRU

1 Within Guided Maintenance, click **Next** in the Prepare System page.

2   When Guided Maintenance prompts you to remove the fan FRU *and after the fans in the FRU have spun down*, remove the two screws that secure the fan FRU to the Slammer chassis.

Figure 29 Slammer fan FRU screws
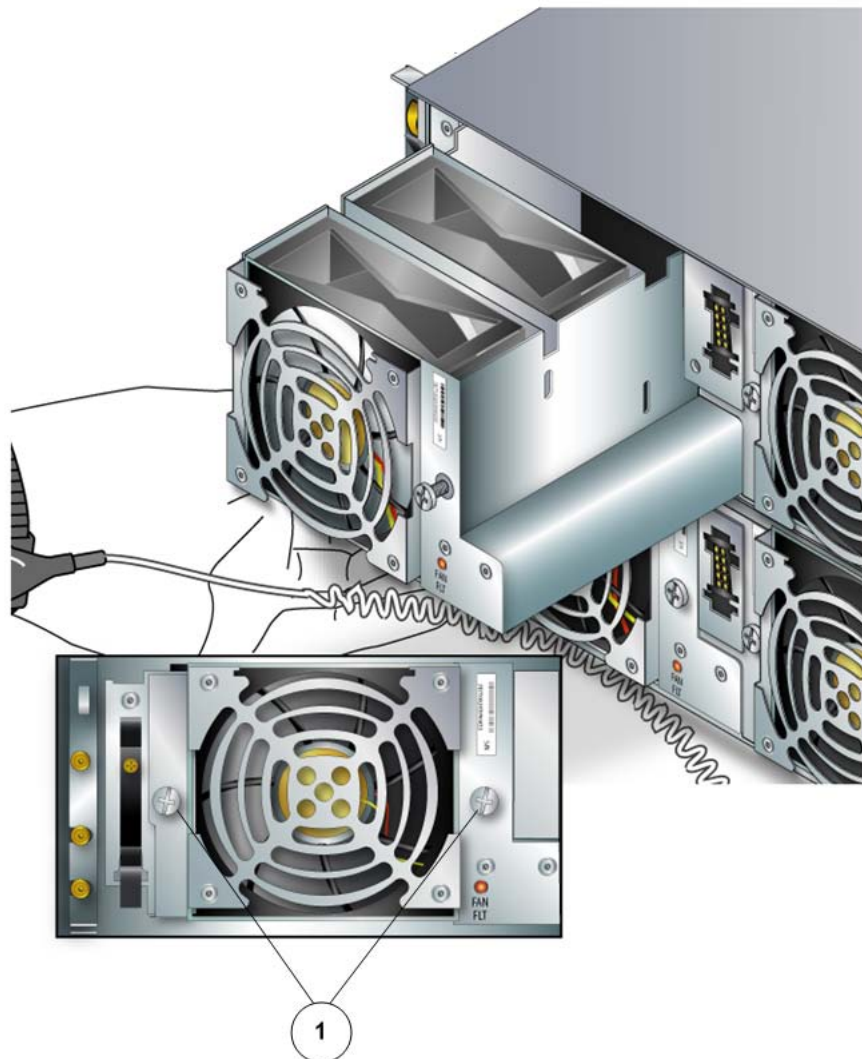
Legend
1 Screws

3   Slide the fan FRU out of the chassis and set it aside.

> ⚠ **Caution**   Immediately replace the component to maintain proper airflow and cooling. Over-temperature conditions will occur if the replacement FRU is not installed into the chassis. Over-temperature conditions can damage other components.

About Slammer Fan Module Insertion

After you insert this FRU into a Slammer control unit (CU), use Guided Maintenance to finish the procedure.

When the FRU replacement process is complete, the Pillar Axiom system reports the status of the FRU.

Important! To avoid high-temperature buildup within the Slammer:

- Make sure you replace one fan module at a time.

- When replacing multiple fan modules, make sure you complete each replacement within a five minute period.

Insert a Slammer Fan FRU

1 Slide the replacement fan FRU into the Slammer chassis and push it into place firmly to engage the fan FRU with the motherboard tray.

   Note: The system will automatically spin up the fan.

2 Tighten the two screws to secure the fan to the chassis.

3 On the Guided Maintenance page, click **Next**.

4 On the **Verify** page, click **Verify Status**.

   If Guided Maintenance displays a verification failed message, click **Try Again** and re-seat the FRU. If the second attempt is not successful, contact the Pillar World Wide Customer Support Center to continue Guided Maintenance for the FRU.

   Note: The length of time for the verification step to complete and the system to return a Normal status depends on the I/O load being carried by the system. For that reason, Pillar recommends that you lighten the I/O load as much as possible before replacing the FRU.

5 Review the status of the replacement FRU to confirm that it has a Normal status.

About Slammer Motherboard Tray Replacement

Motherboard replacement requires you to replace the entire motherboard tray. Motherboard replacement in a Slammer disrupts the normal operation of a Pillar Axiom system. To allow the replacement of the motherboard tray in a target control unit (CU), the system induces failover for the target CU to its partner CU.

Important! Even though failover transfers services and data paths to the partner CU, your network topology might make those services and data paths inaccessible. Before you start the replacement procedure, make sure that your network is configured to allow the data paths to switch over to the partner CU.

After you replace the motherboard tray and attach the power cords to the target CU, the Pillar Axiom system induces failback for the target CU.

The motherboard is attached to a motherboard tray, which can also hold a pair of fan modules and a battery. Together, these FRUs are called a motherboard assembly. The following figure shows a motherboard assembly with flyover in the Generation 2 or Generation 3 NIM:

Figure 30 Slammer motherboard tray with the PCIe flyover card
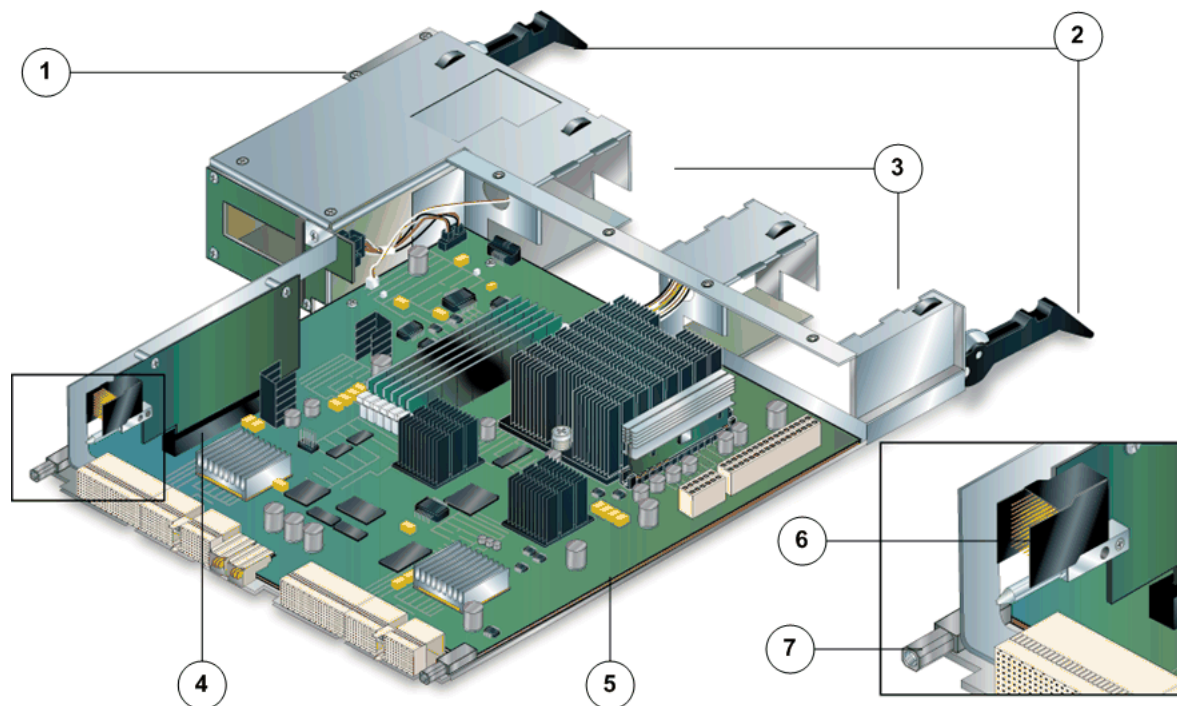
Legend		
1 Battery housing		5 Motherboard
2 Ejectors		6 Impact connector
3 Fan slots		7 Blind mate connector
4 PCIe connector and PCIe flyover card		

To replace a motherboard, you replace the motherboard tray.

Access the motherboard tray assembly from behind the bezel on the front of the Slammer, as shown in the following figure. This figure, which shows a Slammer face with the bezel removed, identifies the location of the assembly and its LED for CU 1.

Figure 31 Slammer with bezel removed and motherboard tray assembly location
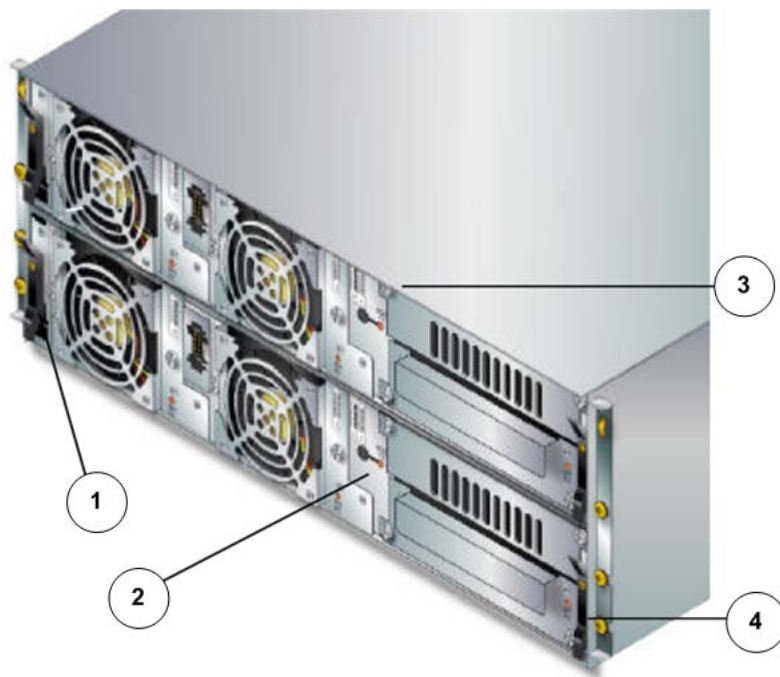
Legend

1 Motherboard tray ejector	
2 Motherboard fault LED	
3 Slammer front with bezel removed	
4 Motherboard tray ejector	

The following figure shows a motherboard tray ejector.

Figure 32 Module ejector

Legend

1 Screw	
2 Front	
3 Back	

The following figure shows the connection between the motherboard and the Generation 2 NIM or the Generation 3 NIM within the Slammer chassis. The motherboard connects to a small riser card on the NIM using a blind mate

connector. The PCIe card is inserted in this riser card to enable a PCIe interface between the motherboard and the NIM. The PCIe riser supports SAN 8 Gb/s FC HBA and NAS 10 Gb/s HBA.

Figure 33 Flyover connection between the motherboard and NIM
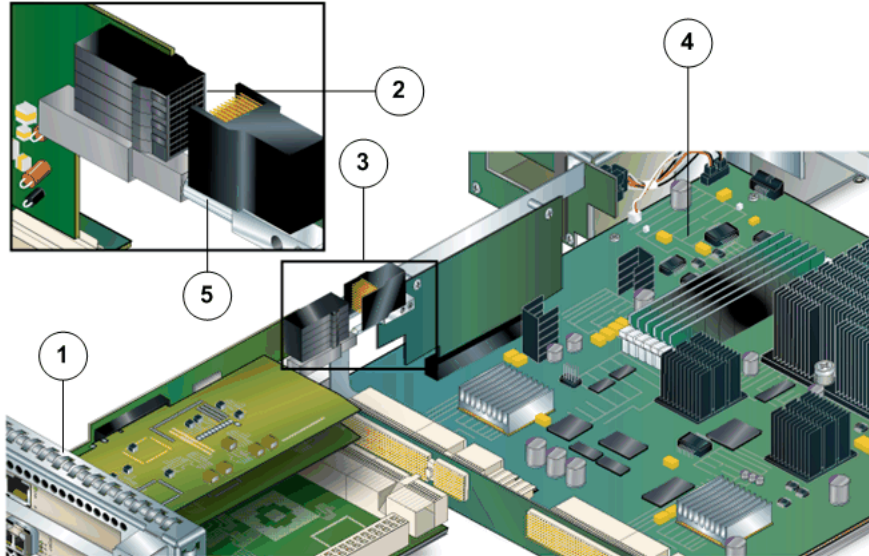
Legend	1 Network interface module	4 Motherboard
	2 Impact connector	5 Blind mate connector
	3 PCIe interface between the motherboard and the NIM	

Note: There are different versions of motherboard FRUs available for Slammers. The motherboard installed in your system may be different from the one shown above.

Slammer Motherboard Replacement Tasks

Other indications such as alerts, events, Call-Home, and log files may indicate a need to replace a motherboard assembly.

After you replace this FRU, Guided Maintenance restarts the target control unit (CU).

Important! You may instead receive an Administrator Alert to restart the system.

To replace a Slammer motherboard tray, perform the tasks that are outlined in the table below.

Table 18 Motherboard tray replacement tasks

Guided Maintenance	Task
Step 1 Identify	Identify the Target FRU.
Step 2 Prepare	Prepare the System for FRU Replacement.
Step 3 Replace	Replace the motherboard FRU: 1 Remove a Slammer Bezel to gain access to the motherboard tray assembly. 2 Remove a Slammer Battery to ease the removal of the motherboard tray and to remove power from the battery-backed memory modules. 3 Remove a Slammer Fan FRU to ease the removal of the motherboard tray. 4 Remove a Slammer Motherboard Tray to make room for the replacement tray. 5 Insert a Slammer Motherboard Tray to insert the replacement motherboard tray. 6 Insert a Slammer Fan FRU to insert the fan into the replacement motherboard tray. 7 Insert a Slammer Battery to insert the battery into the replacement motherboard tray. 8 Attach a Slammer Bezel to reattach the bezel.
Step 4 Verify Status	Performed as part of motherboard replacement.
Step 5 Recover Control Unit	Performed as the final step in motherboard tray replacement.

About Slammer Motherboard Tray Removal

To help you identify the target control unit (CU) that has the FRU that needs to be replaced, Guided Maintenance beacons the bezel LEDs on the target CU. If you click **Reverse Identify** in the GUI, Guided Maintenance beacons all LEDs except for the target CU.

After you click **Prepare System** in the GUI, Guided Maintenance prepares the system for replacement of that FRU. Guided Maintenance:

- Fails over the target CU to its partner CU.

- Stops services on the target CU and flushes battery-backed memory.

- Tells you to remove the AC power cord from the target CU.

After the system is prepared, Guided Maintenance displays a completion message and enables **Next**.

Remove a Slammer Motherboard Tray

1 Follow the appropriate procedure in this guide to remove the bezel from the Slammer chassis.

2 Within Guided Maintenance, click **Next** in the Prepare System page.

3 When Guided Maintenance prompts you, remove the power cords from both of the power supplies of the target Slammer control unit (CU).

   Important! Do not remove the power cords from the partner CU. That CU supports all the user data paths for this Slammer.

4 Follow the appropriate procedure in this guide to remove both fans from the target motherboard tray.

5 Follow the appropriate procedure in this guide to remove the battery from the target motherboard tray.

6 Loosen and disengage the two screws that secure the motherboard tray ejectors to the target Slammer chassis.

7 Press both ejectors down firmly to disengage the motherboard tray from the chassis midplane.

8 Slide the motherboard tray out of the chassis and set it aside.

Related tasks
- *Remove a Slammer Bezel*
- *Remove a Slammer Fan FRU*
- *Remove a Slammer Battery*

About Slammer Motherboard Tray Insertion

After you insert this FRU to a Slammer control unit (CU), use Guided Maintenance to complete the replacement process. After you add the FRU and reattach the power cords, Guided Maintenance fails back the target CU from its partner CU.

Note: When the target CU fails back, if the Slammer is a NAS Slammer and CIFS is enabled, user data paths will pause for up to 30 sec.

Important! If Guided Maintenance encounters a problem during failback, you must contact the Pillar World Wide Customer Support Center to continue Guided Maintenance for this FRU.

Watch for an Administrator Alert, which may instruct you to restart the system.

When the FRU replacement process is complete, the Pillar Axiom system reports the status of the FRU.

Insert a Slammer Motherboard Tray

Important! When you replace this FRU, slowly and evenly slide the replacement into place. If the FRU has ejectors or locking tabs, use them for final connector seating.

1 Slide the motherboard tray into the Slammer chassis and push it firmly into place to engage the tray with the chassis midplane.

2 Lift both ejectors up and press firmly to engage the motherboard tray with the chassis midplane.

3 Engage and tighten the two screws that lock the ejectors to the chassis.

4 Follow the appropriate procedure in this guide to reinsert the battery into the motherboard tray and secure the screws tightly.

5 Follow the appropriate procedure in this guide to reinsert both fans into the motherboard tray and secure the screws tightly.

6 In the Guided Maintenance page, click **Next**.

7 When prompted, attach both power cords to both of the target CU power supplies.

   Important! After the target CU powers up, the system may need to update the firmware on the replacement motherboard. To allow this update to occur, wait for 10 minutes before continuing with the next step.

⚠ Caution	Clicking **Next** prematurely may result in having to recover the system manually or replace the motherboard.

8 In the Guided Maintenance page, click **Next**.

9   On the **Verify** page, click **Verify Status**.

If Guided Maintenance displays a verification failed message, click **Try Again** and re-seat the FRU. If the second attempt is not successful, contact the Pillar World Wide Customer Support Center to continue Guided Maintenance for the FRU.

Note: The length of time for the verification step to complete and the system to return a Normal status depends on the I/O load being carried by the system. For that reason, Pillar recommends that you lighten the I/O load as much as possible before replacing the FRU.

10   If prompted, to fail back the control unit (CU), click **Recover Control Unit**.

Note: If the **Enable Automatic Failback of NAS Control Units** option is set as part of the global settings, **Recover Control Unit** is not displayed.

Result:
In any case, the CU fails back (recovers) from its partner.

11   On a NAS Slammer, look for an Administrator Action.

You may be instructed to restart the system, which makes this FRU and all other resources on the target Slammer CU available.

Note: On a SAN Slammer, the system automatically attempts to recover.

12   Click **Finish**.

13   Review the status of the replacement FRU to confirm that it has a Normal status.

14   Follow the appropriate procedure in this guide to reattach the bezel to the Slammer chassis.

Related tasks
- *Insert a Slammer Battery*
- *Insert a Slammer Fan FRU*
- *Attach a Slammer Bezel*

About Slammer NIM and HBA Card Replacement

Network interface module (NIM) replacement disrupts access over those cables that interface with this module. However, if this module is the only failure point and the system is cabled to the customer switches in the manner that we recommend, access to data is not disrupted during the procedure to replace the NIM.

To allow the replacement of this module in a target control unit (CU), you induce failover for the target CU to its partner CU by detaching the power cable to the target CU.

Important! Even though failover transfers services and data paths to the partner CU, your network topology might make those services and data paths inaccessible. Before you start the replacement procedure, make sure that your network is configured to allow the data paths to switch over to the partner CU.

After you replace the NIM and attach the power cords to the target CU, the Pillar Axiom system induces failback for the target CU.

There are three different generations of NIMs:

- Generation 1 NIM that has a PCIX riser

- Generation 2 NIM that has a PCIe riser

- Generation 3 NIM that has a PCIX and a PCIe riser

There are two kinds of HBA cards: PCIe and PCIX. The PCIe HBA cards are not add-in options. PCIe cards include the 8 Gb/s FC HBA and the 10 Gb/s Ethernet HBA. The PCIX cards are add-in options. PCIX cards include the 1 Gb/s iSCSI HBA and the 2 Gb/s FC HBA.

PCIe cards: Insert the 10 Gb/s PCIe HBA card in NAS NIMs and the 8 Gb/s FC card in SAN NIMs to enable high speed connectivity.

PCIX cards: Insert the 2 Gb/s FC card as an add in option for tape backup in NAS NIMs. The 1 Gb/s iSCSI is an add-in option for SAN NIMs to interface with iSCSI networks.

Note: The iSCSI PCIX HBA (1 Gb/s) and the FC PCIX HBA (2 Gb/s) are only supported on NIMs that have the PCIX riser like the Generation 1 NIM and the Generation 3 NIM. The PCIe FC HBA (8 Gb/s) and the PCIe HBA (10 Gb/s) are only supported on NIMs that support the PCIe riser like the Generation 2 NIM and the Generation 3 NIM.

The following figure shows an optical Generation 1 NIM. The copper version is the same except for the four network ports, which would be RJ-45 based. The Generation 1 NIM has a PCIX riser to insert PCIX HBAs (both FC and iSCSI).

Figure 34 Generation 1 network interface module (optical) FRU
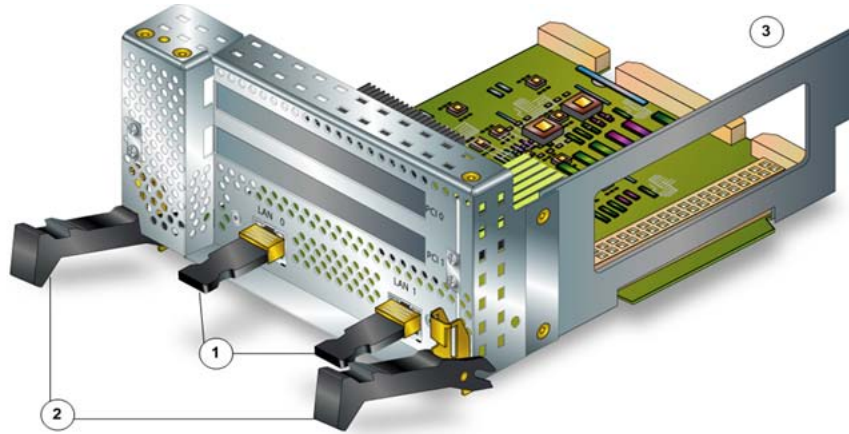
Legend	1 Network ports
	2 Ejector
	3 PCIX riser card location

The legacy four-port 1 Gb/s NAS (copper or optical) Generation 1 NIM supports the 2 Gb/s PCIX Fiber Channel (FC) HBA card for tape backup, which is an add-in option. The legacy 4 Gb/s SAN Generation 1 (optical) NIM supports the 1 Gb/s iSCSI PCIX, which is an add-in option.

The following figure shows a Generation 2 NIM that has a PCIe riser to insert PCIe HBA cards. The Generation 2 NIM has two PCIe slots, which connect through the NIM to the PCIe interface of the motherboard using a flyover bridge. You can insert either the 10 Gb/s PCIe Ethernet HBA or the 8 Gb/s PCIe FC HBA in these PCIe slots to support high speed connectivity.

Figure 35 Generation 2 network interface module FRU with flyover
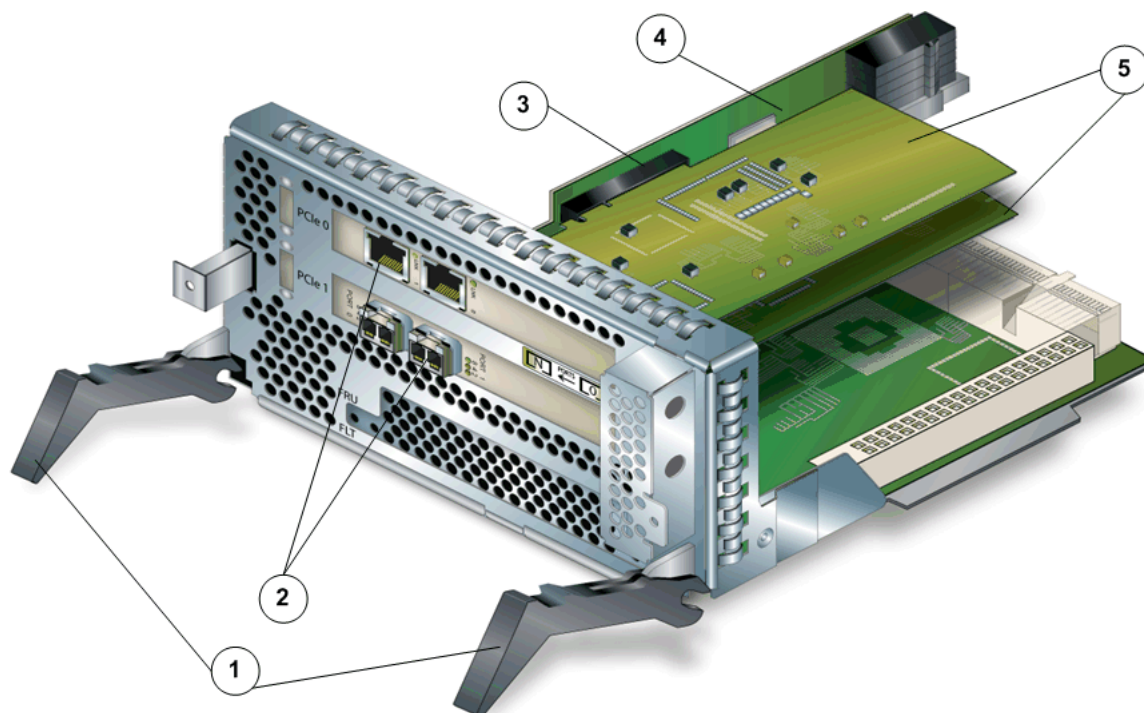
Legend		
1 Ejectors	4 PCIe interface (NIM flyover)
2 Network ports	5 HBA cards
3 PCIe slots	

A Generation 2 NAS NIM supports the 10 Gb/s Ethernet PCIe HBA card. A Generation 2 SAN NIM supports the 8 Gb/s PCIe FC HBA card.

Note: The 8 Gb/s FC HBA has its own unique World Wide Name (WWN). This WWN must be used to update any FC switch configuration data.

Note: For the Generation 2 NIM (for both the top and bottom slot), the port numbering is from right to left. The port at extreme right is port 0 and port 1 is the next port to the left of port 0.

The following figure shows a Generation 3 NIM. The Generation 3 NIM has a PCIe riser on one side to insert a PCIe HBA card and a PCIX riser on the other side to insert a PCIX HBA card. The Generation 3 NIM extends iSCSI support to the 8 Gb/s FC feature and 2 Gb/s FC tape backup to the 10 Gb/s Ethernet feature. The Generation 3 NIM supports the following combinations of HBA cards:

- NAS Slammers: 10 Gb/s PCIe Ethernet HBA with an optional 2 Gb/s PCIX FC tape backup HBA.

- SAN Slammers: 8 Gb/s PCIe FC HBA with an optional 1 Gb/s PCIX iSCSI HBA.

Note: The 8 Gb/s FC HBA has its own unique World Wide Name (WWN). This WWN must be used to update any FC switch configuration data.

Note: For the Generation 3 NIM's top PCIe slot, the port numbering is from right to left. The port at the extreme right is port 0 and port 1 is the next port to the left of port 0. For the Generation 3 NIM's bottom PCIX slot, the port numbering is from left to right. The port at the extreme left is port 0 and port 1 is the next port to the right of port 0.

Figure 36 Generation 3 network interface module FRU with flyover
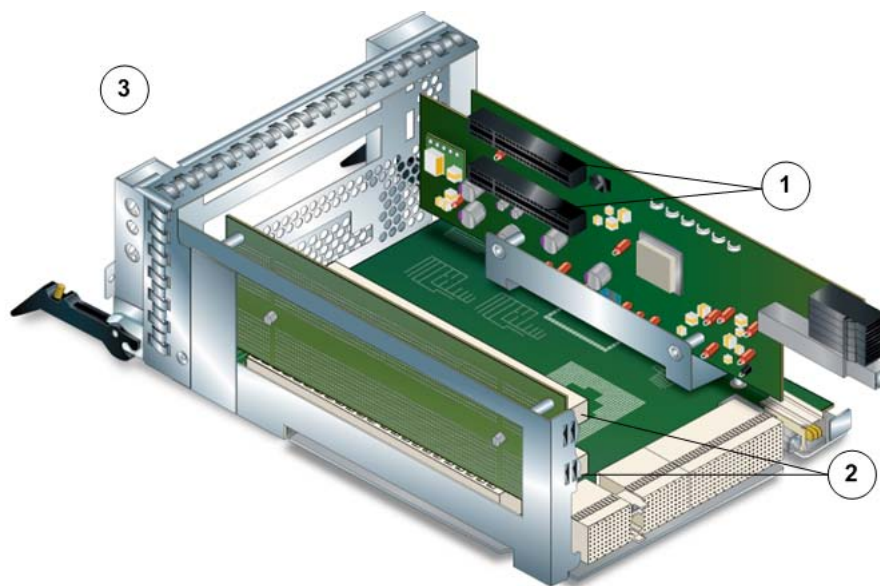
Legend	
	1 PCIe slots
	2 PCIX slots
	3 Generation 3 NIM

The Generation 2 flyover NIM only supports PCIe add-in cards like the 8 Gb/s FC and the 10 Gb/s Ethernet. The Generation 3 PCIe/PCIX NIM has separate PCIe and PCIX risers with slots to insert FC or iSCSI HBAs, depending on whether it is a SAN or a NAS NIM.

A SAN Generation 3 NIM may contain an 8 Gb/s PCIe FC card and an optional add-in 1 Gb/s PCIX iSCSI card. A NAS Generation 3 NIM may contain a 10 Gb/s PCIe Ethernet card and an optional 2 Gb/s PCIX FC card (for tape backup). The optional PCIX add-in cards are installed in the bottom slot of the PCIX riser in the Generation 3 NIM.

The following figure indicates the 10 Gb/s Ethernet PCIe card in a Generation 3 NIM.

Figure 37 Generation 3 NIM with 10 Gb/s Ethernet HBA card
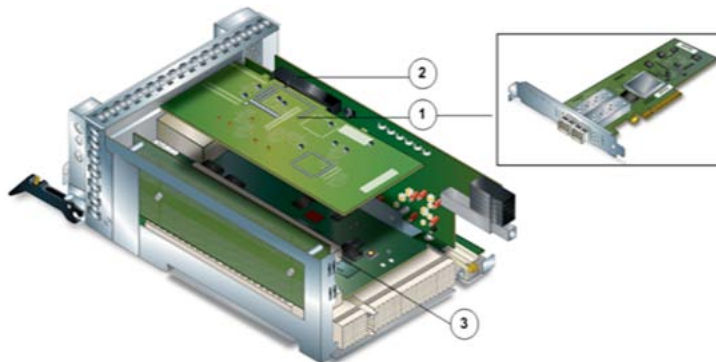
Legend

1	10 Gb/s Ethernet HBA card
2	PCIe slots on a PCIe riser to insert PCIe cards
3	PCIX slots on a PCIX riser to insert PCIX cards

Note: There are different generations of NIMs available for Slammers. The NIM installed on your Slammer may vary slightly from the ones shown above.

Note: When replacing a NIM that contains an optional HBA, if you want to continue using that HBA, remove it from the old NIM and insert it into the new one.

Note: When replacing a Generation 3 NIM that contains an HBA, the PCIe riser must be removed before removing the optional PCIX HBA from the old NIM.

> ⚠️ **Caution** If you are upgrading the Slammer NIM to a new NIM model, you must take the Slammer completely offline and replace both NIM FRUs simultaneously.

Access NIMs from the back of the Slammer chassis. Each CU has its own NIM.

The following figure identifies the location of a legacy Generation 1 NIM in a Slammer chassis and Fault LED for CU 1.

Figure 38 Generation 1 network interface module (optical) location
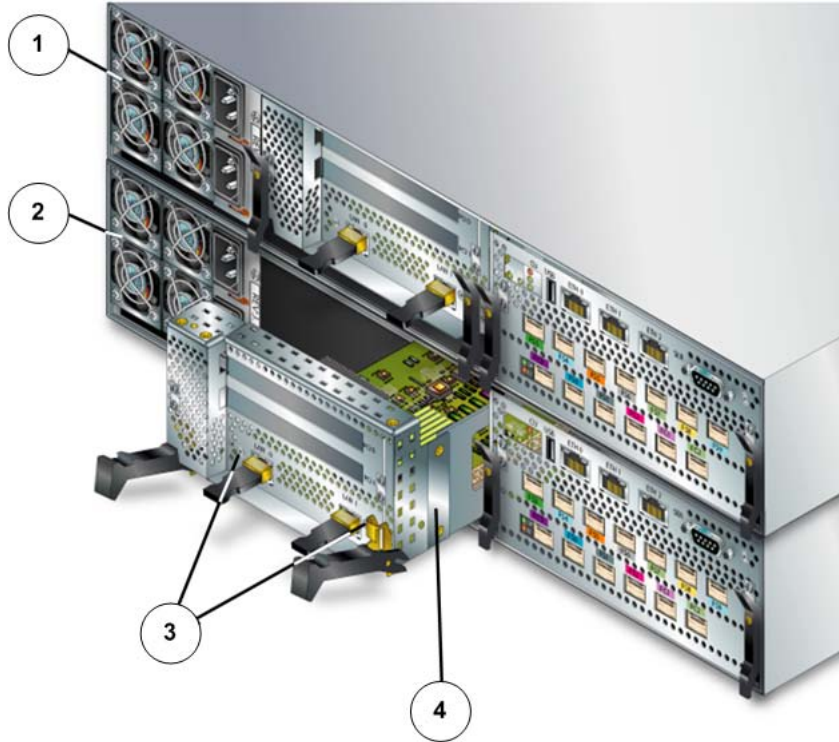
Legend	
	1 CU 0
	2 CU 1
	3 Fault LEDs for the 2-port NIM
	4 Generation 1 network interface module

The following figure identifies the location of a Generation 2 or Generation 3 NIM in a Slammer chassis and Fault LED for CU 1.

Figure 39 Generation 2 and Generation 3 network interface module location
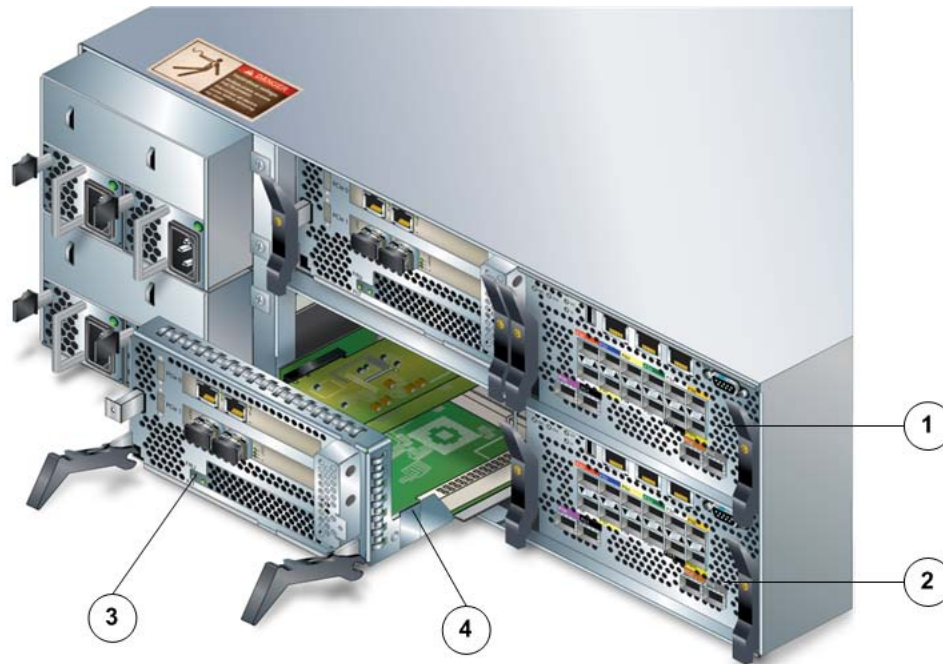
Legend	
1 CU0	
2 CU1	
3 Fault LED	
4 Network interface module	

The NIMs in both control units (CUs) of a Slammer must be either NAS-specific or SAN-specific. For a NAS Slammer, GbE copper-based and GbE optical-based CUs may coexist. Contact the Pillar World Wide Customer Support Center if you want to mix copper and optical CUs within the same Slammer.

Related concepts

- *About PCIX HBA Replacement*

Related references

- *10 Gb/s Ethernet HBA LED Status*
- *8 Gb/s Fiber Channel (FC) HBA LED Status*

Network Interface Module LED Status

Table 19 Slammer network interface module LED status

LED identifier and color	Meaning
Amber	Network interface module in this control unit (CU) has failed.
Off	No failure is indicated.

Slammer NIM Replacement Tasks

To replace a Slammer network interface module (NIM) or HBA cards, perform the tasks that are outlined in the following table.

⚠ **Caution**	If you are upgrading the Slammer NIM to a new NIM model, you must take the Slammer completely offline and replace both NIM FRUs simultaneously.

Table 20 Network interface module replacement tasks

Guided Maintenance	Task
Step 1 Identify	Identify the Target FRU.
Step 2 Prepare	Prepare the System for FRU Replacement.
Step 3 Replace	Replace the network interface module (NIM) FRU: 1 Remove a Slammer NIM, PCIe HBA, and PCIe Riser. 2 Remove a Slammer PCIX Card (optional). 3 Insert a Slammer PCIX Card (optional). 4 Insert a Slammer NIM, PCIe HBA, and PCIe Riser.
Step 4 Verify Status	Performed as part of the NIM replacement.
Step 5 Recover Control Unit	Performed as the final step in NIM replacement.

About Slammer NIM and PCIe HBA Removal

To help you identify the target control unit (CU) that has the FRU that needs to be replaced, Guided Maintenance beacons the bezel LEDs on the target CU. If you click **Reverse Identify** in the GUI, Guided Maintenance beacons all LEDs except for the target CU. **Reverse Identify** may make the FRU easier to find.

After you click **Prepare System** in the GUI, Guided Maintenance, fails over the target CU to its partner CU.

After the system is prepared, Guided Maintenance displays a completion message and enables **Next**.

Related tasks

- *Remove a Slammer NIM, PCIe HBA, and PCIe Riser*

Remove a Slammer NIM, PCIe HBA, and PCIe Riser

⚠ **Caution**	If you are upgrading the Slammer network interface module (NIM) to a new NIM model, you must take the Slammer completely offline and replace both NIM FRUs simultaneously.

1 Within Guided Maintenance, click **Next** in the Prepare System page.

2 When Guided Maintenance prompts you, remove the power cords from both of the power supplies for the target Slammer control unit (CU).

   Important! Do not remove the power cords from the partner CU. That CU supports all the user data paths for this Slammer.

3 Disconnect the following cables from the NIM:

   - All public cables from the network ports.

   - All cables, if any, from the cards in the PCI slots (optional).

   Tip: Make a notation that shows which cable connects to which port and to which PCI card.

4 Remove all SFP and/or SFP Plus modules.

5 Loosen and disengage the two screws that secure the NIM ejectors to the Slammer chassis.

Ejectors look like this:

Figure 40 Module ejector

Legend

1 Screw	
2 Front	
3 Back	

6 Press both ejectors down firmly to disengage the NIM from the chassis midplane.

7 Slide the NIM out of the chassis and set it aside.

8 If the NIM is a Generation 3 NIM or a Generation 2 NIM, or has an optional PCIX card installed, remove the PCIe and/or optional PCIX card following the appropriate procedure. Set the cards on an ESD qualified workbench.

    Note: PCIe cards are not optional. You must insert the PCIe cards in the Generation 2 NIM or the Generation 3 NIM to use the NIM. PCIX cards are add-in options. If you have a PCIe card or an optional PCIX HBA in your NIM that must be used with the replacement NIM, follow the appropriate procedure.

9 If you have not already done so, put on an antistatic wrist strap. Attach the clip to a non-painted metal surface on the Slammer chassis.

10 Remove the screw that secures the PCIe faceplate to the chassis of the NIM (Generation 2 and Generation 3 NIMs only) as shown in the following illustration:

Figure 41 Replacement card faceplate secured to the Slammer chassis
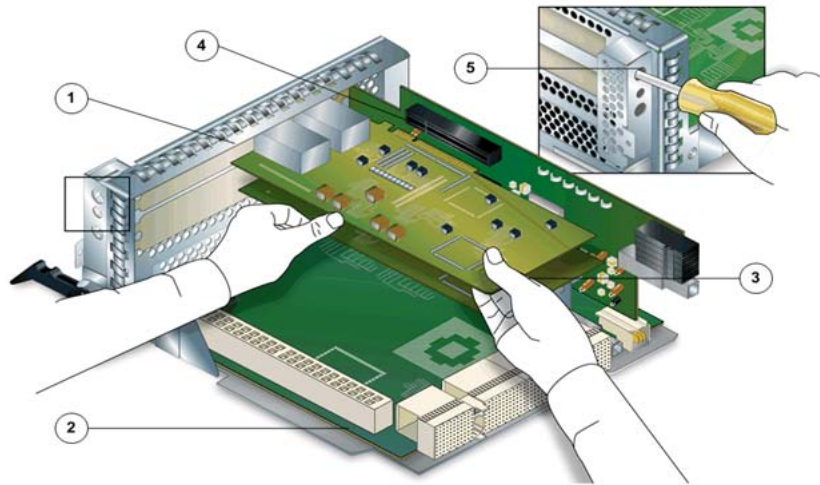
Legend	
	1 Faceplate
	2 Network interface module
	3 Fiber Channel HBA
	4 PCIe slots
	5 Screw hole

Note: This illustration indicates a typical SAN flyover NIM. The NIM inside your Slammer may look different from the one indicated in the illustration.

Tip: Use a small-shank magnetized Phillips screwdriver that can fit through the 1/8 in (3.175mm) chassis access hole. Put the FRU on its side to do this step.

11 Remove the PCIe card from the PCIe riser (in Generation 2 or Generation 3 NIMs only), using a back and forth wriggling motion. Set the card on an ESD qualified workbench.

Related concepts
- *About Slammer NIM and PCIe HBA Removal*

Related tasks
- *Remove a Slammer PCIX Card*

About Slammer NIM and PCIe HBA Insertion

After you insert the network interface module (NIM) into a Slammer control unit (CU), use Guided Maintenance to complete the replacement process. After you

add the FRU and reattach the power cords, the system automatically fails back the target CU from its partner CU.

Note: If you have a PCIe HBA or an optional PCIX HBA card that needs to be inserted into the replacement NIM, insert the HBA or interface card before continuing with this procedure. See the appropriate service procedure for inserting the HBA or interface card.

Note: When the target CU fails back, if CIFS is enabled on the Slammer, user data paths will pause for up to 30 sec.

Important! If Guided Maintenance encounters a problem during failback, you must contact the Pillar World Wide Customer Support Center to continue Guided Maintenance for this FRU.

Watch for an Administrator Alert, which may instruct you to restart the system.

Note: For NAS Slammers, a replacement NIM does not have to be of the same type as the one that you replaced. Optical and copper NAS NIMs can be interchanged. However, SAN and NAS NIMs cannot be interchanged.

When the FRU replacement process is complete, the Pillar Axiom system reports the status of the FRU.

Related concepts
- *About PCIX HBA Insertion*

Related tasks
- *Insert a Slammer NIM, PCIe HBA, and PCIe Riser*

Insert a Slammer NIM, PCIe HBA, and PCIe Riser

Important! When you replace this FRU, slowly and evenly slide the replacement into place. If the FRU has ejectors or locking tabs, use them for final connector seating.

Important! Before continuing with the procedure for inserting the Slammer network interface module (NIM) and PCIe HBAs, if you removed an optional PCIX card from the Generation 1 network interface module (NIM), insert the PCIX card into the riser card of the replacement NIM. Refer to the appropriate procedure in this guide for complete instructions on how to insert a PCIX card into a Generation 1 NIM or a Generation 3 NIM. If you removed a PCIe card from a Generation 2 NIM or Generation 3 NIM, install the PCIe card into the Generation 3 or Generation 2 NIM as indicated in the procedure below.

1   If you have not already done so, put on an antistatic wrist strap. Attach the clip to a non-painted metal surface on the Slammer chassis.

2   If you have not already done so, locate and remove the screw that secures the PCI card faceplates to the chassis of the NIM, and the PCI card faceplates for the top PCIe slot.

   Tip: Use a small-shank, magnetized Phillips screwdriver that can fit through the 1/8 in (3.175 mm) chassis access hole. Put the FRU on its side to do this step.

3   Using the top PCIe slot, insert the end tab on the card's faceplate into the raised guide slot in the sheet metal of the NIM.

   Important! You must remove the Small Form Factor Pluggable (SFP) Plus modules from the 8 Gb/s FC HBA or the 10 Gb/s Ethernet HBA prior to installation in the NIM.

4   Orient the card so that the notches in the bottom of the card align with the keys in the top PCIe slot.

   Important! Hold the card by the edges. Do not touch the metal contacts on the bottom of the card.

5   Push the connectors on the edge of the card into the PCIe slot by pushing firmly to seat the card. Apply firm pressure on each end of the card alternately until it clicks into place.

⚠ Caution	Support the riser card as necessary to prevent excessive flexure. Otherwise, the HBA card or the riser card may break.

6   Secure the card faceplate to the chassis of the NIM with a Phillips screwdriver.

   Tip: Use a small-shank, magnetized Phillips screwdriver that can fit through the 1/8 in (3.175 mm) chassis access hole. Put the FRU on its side to do this step.

7   Slide the replacement NIM into the Slammer chassis and push the module into place firmly.

8   Lift both ejectors up and press firmly to engage the NIM with the chassis midplane.

9   Engage and tighten the two screws that lock the ejector to the chassis.

10   If the PCIe HBA uses SFP Plus modules, insert the SFP Plus modules into the appropriate ports.

11   Reconnect the following cables to the NIM:

- All cables, if any, to the cards in the PCI slots (optional).

- For NAS Slammers, all public Ethernet cables to network ports.

- For SAN Slammers, all Fibre Channel (FC) cables to the network ports.

12 In the Guided Maintenance page, click **Next**.

13 When prompted, attach both power cords to both of the target power supplies, which causes the control unit (CU) to power up and fail back the CU from its partner.

14 In the Guided Maintenance page, click **Next**.

15 On the **Verify** page, click **Verify Status**.

If Guided Maintenance displays a verification failed message, click **Try Again** and re-seat the FRU. If the second attempt is not successful, contact the Pillar World Wide Customer Support Center to continue Guided Maintenance for the FRU.

Note: The length of time for the verification step to complete and the system to return a Normal status depends on the I/O load being carried by the system. For that reason, Pillar recommends that you lighten the I/O load as much as possible before replacing the FRU.

16 If prompted, to fail back the control unit (CU), click **Recover Control Unit**.

Note: If the **Enable Automatic Failback of NAS Control Units** option is set as part of the global settings, **Recover Control Unit** is not displayed.

Result:
In any case, the CU fails back (recovers) from its partner.

17 On a NAS Slammer, look for an Administrator Action.

You may be instructed to restart the system, which makes this FRU and all other resources on the target Slammer CU available.

Note: On a SAN Slammer, the system automatically attempts to recover.

18 Click **Finish**.

19 Review the status of the replacement FRU to confirm that it has a Normal status.

Related concepts
- *About Slammer NIM and PCIe HBA Insertion*

Related tasks
- *Insert a Slammer PCIX Card*

About PCIX HBA Replacement

The PCIX cards are an add-in option. PCIX HBAs include the 1 Gb/s iSCSI and the 2 Gb/s Fiber Channel (FC) cards. The 2 Gb/s PCIX FC card is an add in option for tape backup in NAS network interface modules (NIM). The 1 Gb/s iSCSI is an add-in option for SAN NIMs to interface SAN Slammers to iSCSI networks. PCIX HBA cards are only supported with NIMs that have a PCIX riser like the Generation 1 NIM and the Generation 3 NIM.

Following is a picture of an iSCSI HBA:

Figure 42 Sample iSCSI PCIX card
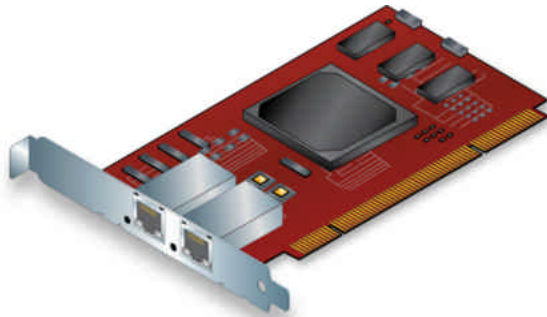
Note: The illustration below is representative of a PCIX FC card. The HBA card for your NIM may look different.

The following figure shows a sample 2 Gb/s PCIX FC card:

Figure 43 Sample FC card
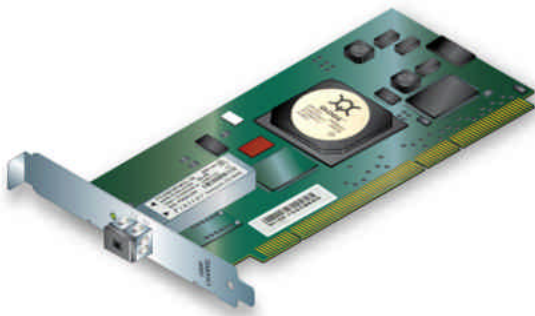
The following figure indicates the PCIX riser in a legacy Generation 1 NIM. The PCIX option card is installed in the top riser slot of the Generation 1 NIM.

Figure 44 Riser PCIX slots in a Generation 1 network interface module
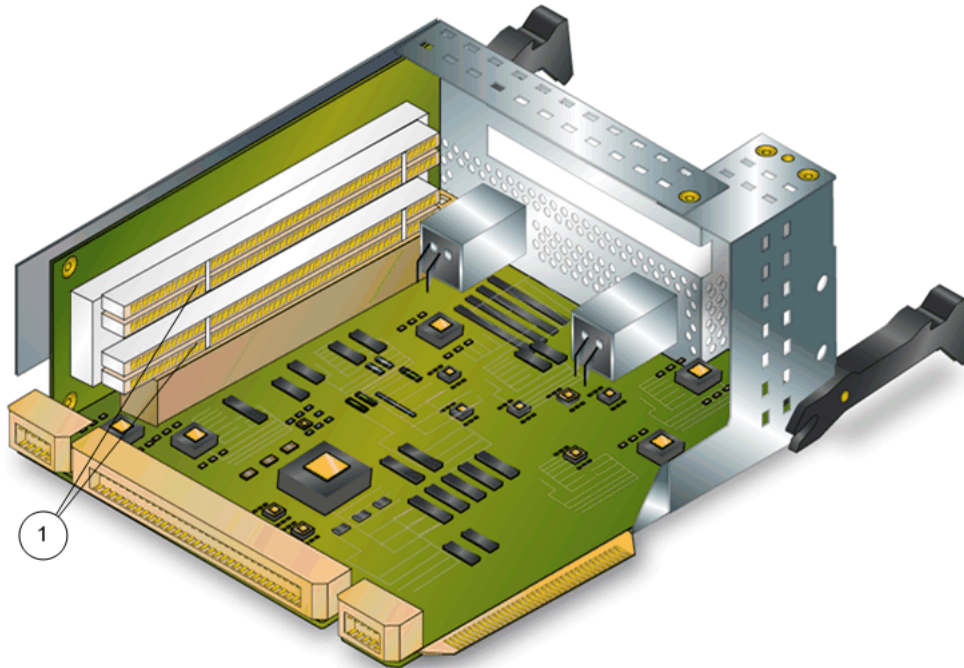
Legend	1 Riser card PCIX slots (2)

The following figure indicates the PCIe riser and the PCIX riser in a Generation 3 NIM. The Generation 3 NIM has a PCIe riser to insert PCIe HBA cards on one side and a PCIX riser to insert PCIX HBA cards on the other side. The top PCIe slot is for the PCIe HBA and the bottom PCIX slot is for the PCIX HBA.

Figure 45 PCIe riser and PCIX riser in a Generation 3 NIM
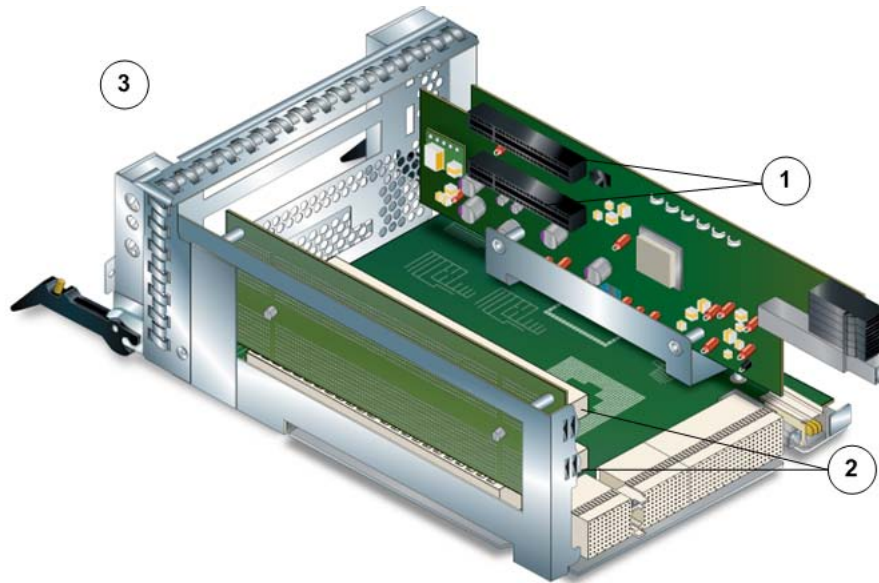
Legend	1 PCIe slots on a PCIe riser to insert PCIe cards
	2 PCIX slots on a PCIX riser to insert PCIX cards
	3 Generation 3 NIM

Note: These illustrations are representative. The NIM inside your Slammer may look different from the one indicated in the illustration.

Because the PCIX card is located in the riser card of a NIM, replacement requires the removal of the NIM. This removal disrupts the normal operation of a Pillar Axiom system.

To allow PCIX card replacement, the system induces failover for the target control unit (CU) to its partner CU when you detach the power cable from the target CU. After you complete the replacement procedure and attach the power cable, the Pillar Axiom system induces failback for the target CU.

Important! Even though failover transfers services and data paths to the partner CU, your network topology might make those services and data paths inaccessible. Before you start the replacement procedure, make sure that your network is configured to allow the data paths to switch over to the partner CU.

After you replace this FRU, attach the power plug to the new FRU and the target CU will power on automatically.

Important! You may instead receive an Administrator Action to restart the system.

To replace a PCIX card, perform the tasks that are outlined in the following table.

Table 21 PCIX card replacement tasks

Guided Maintenance step	Task
Step 1 Identify	Identify the Target FRU.
Step 2 Prepare	Prepare the System for FRU Replacement.
Step 3 Replace	Replace the iSCSI card FRU: 1 Remove a Slammer NIM, PCIe HBA, and PCIe Riser. 2 Remove a Slammer PCIX Card. 3 Insert a Slammer PCIX Card. 4 Insert a Slammer NIM, PCIe HBA, and PCIe Riser.
Step 4 Verify Status	Performed as the final step in PCIX card replacement.

Related concepts

- *About Slammer NIM and HBA Card Replacement*

About PCIX HBA Removal

To help you locate the network interface module (NIM) that contains the PCIX card that needs to be replaced, Guided Maintenance beacons the bezel LEDs to identify the Slammer control unit (CU).

After you click **Prepare System** in the GUI, Guided Maintenance fails over the target CU to its partner CU.

After the system is prepared, Guided Maintenance displays a completion message and enables **Next**.

Related tasks

- *Remove a Slammer PCIX Card*

Remove a Slammer PCIX Card

The following steps are for removing an optional PCIX card from a Generation 3 network interface module (NIM).

1 If you have not already done so, put on an antistatic wrist strap. Attach the clip to a non-painted metal surface on the Slammer chassis.

2   If a PCIe HBA is installed in the NIM, remove the PCIe HBA following the procedure for removing a PCIe HBA.

3   Remove the PCIe riser by loosening the screws that secure it to the bracket through the base board.

Figure 46 PCIe riser slot removed from the Generation 3 NIM
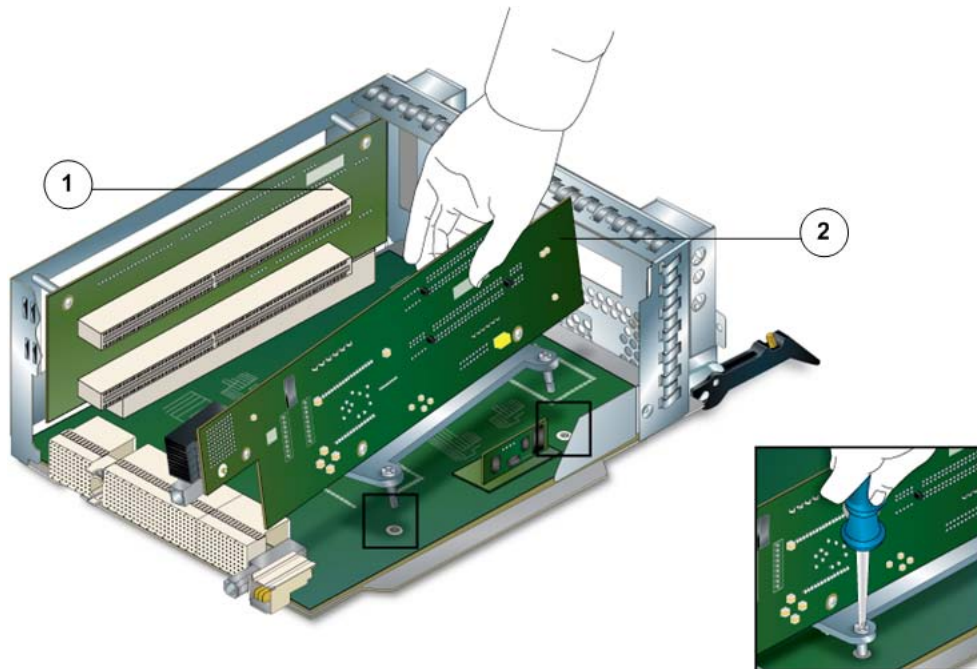
Legend	1 PCIX slots on a PCIX riser to insert PCIX cards
	2 PCIe slots on a PCIe riser to insert PCIe cards
	3 Generation 3 NIM

Tip: Do not remove the screws from the bracket.

4   Set the PCIe riser aside.

5   Remove the screw that secures the PCIX card faceplate to the chassis of the NIM.

Tip: Use a small-shank, magnetized Phillips screwdriver that can fit through the 1/8 in (3.175 mm) chassis access hole. Put the FRU on its side to do this step.

6   Firmly grasp the specified PCIX card to prevent excessive flexure and extract it from the PCI slot. Set the card aside.

> ⚠ **Caution** | Support the riser card as necessary to prevent excessive flexure. Otherwise, the HBA card and the riser card may break.

Related concepts
- *About PCIX HBA Removal*

Related tasks
- *Remove a Slammer NIM, PCIe HBA, and PCIe Riser*

About PCIX HBA Insertion

After you insert this FRU to a Slammer control unit (CU), use Guided Maintenance to complete the replacement process. After you add the FRU and reattach the power cords, Guided Maintenance fails back the target CU from its partner CU.

Important! If Guided Maintenance encounters a problem during failback, you must contact the Pillar World Wide Customer Support Center to continue Guided Maintenance for this FRU.

Watch for an Administrator Alert, which may instruct you to restart the system.

When the FRU replacement process is complete, the Pillar Axiom system reports the status of the network interface module (NIM).

Related concepts
- *About Slammer NIM and PCIe HBA Insertion*

Related tasks
- *Insert a Slammer PCIX Card*

Insert a Slammer PCIX Card

The following instructions are for inserting optional PCIX HBAs in the Generation 3 network interface module (NIM).

1. If you have not already done so, put on an antistatic wrist strap. Attach the clip to a non-painted metal surface on the Slammer chassis.

2. If a PCIe HBA is installed in the NIM, remove the PCIe HBA following the procedure for removing the PCIe HBA.

3. Remove the PCIe riser by loosening the screws that secure it to the bracket through the base board as shown in the following illustration.

Figure 47 Riser slots on the Generation 3 NIM
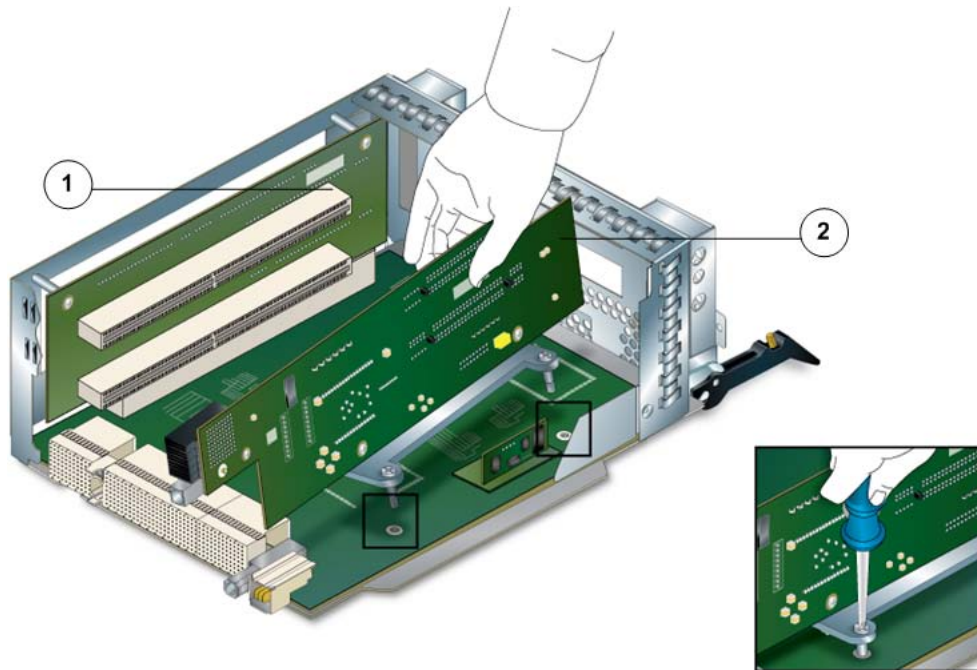
Legend	1 PCIX slots on a PCIX riser to insert PCIX cards
	2 PCIe slots on a PCIe riser to insert PCIe cards
	3 Generation 3 NIM

Tip: Do not remove the screws from the bracket.

4 Locate and remove the screw that secures the PCIX card faceplates to the chassis of the NIM and the PCIX card faceplates.

Tip: Use a small-shank, magnetized Phillips screwdriver that can fit through the 1/8 in (3.175 mm) chassis access hole. Put the FRU on its side to do this step.

5 Orient the card so that the notches in the bottom of the card align with the keys in the bottom PCIX slot.

Important! Hold the card by the edges. Do not touch the metal contacts on the bottom of the card.

6 Insert the end tab on the faceplate into the raised guide slot in the sheet metal of the NIM.

7   Push the connectors on the edge of the card into the PCIX slot by pushing firmly to seat the card. Apply firm pressure on each end of the card alternately until it clicks into place.

8   Screw the PCIX faceplate to the NIM.

   Tip: Use a small-shank, magnetized Phillips screwdriver that can fit through the 1/8 in (3.175 mm) chassis access hole.

9   Install the PCIe riser by tightening the screws that secure it to the bracket through the base board

10 Insert the PCIe HBA into the PCIe riser slot

⚠ Caution	Support the riser card as necessary to prevent excessive flexure. Otherwise, the HBA card and the riser card may break.

Figure 48 PCIe riser slots installed on the Generation 3 NIM
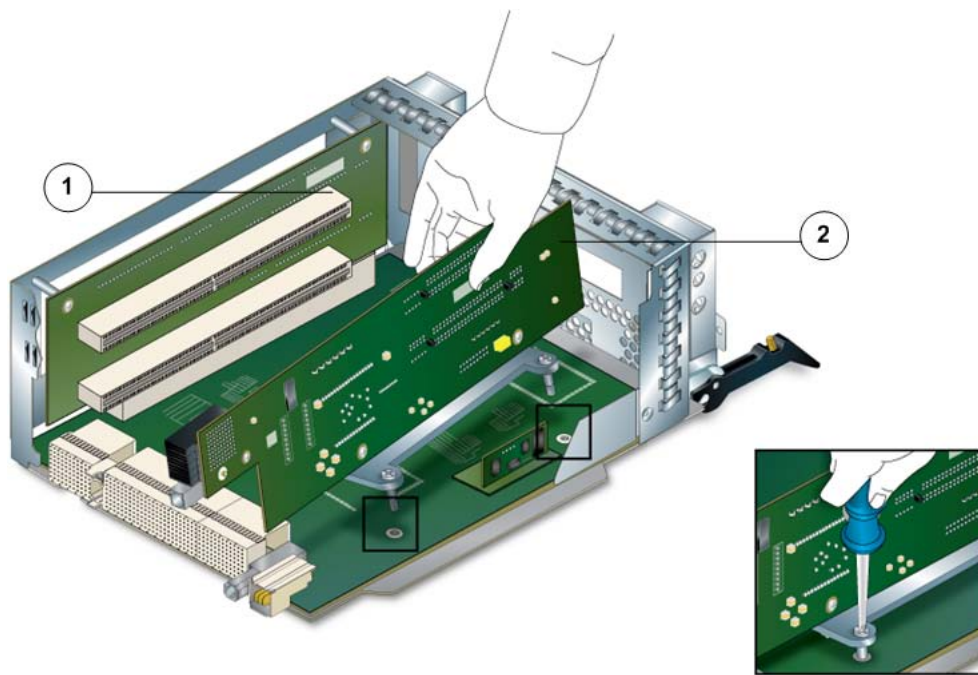
Legend	1 PCIX slots on a PCIX riser to insert PCIX cards
	2 PCIe slots on a PCIe riser to insert PCIe cards
	3 Generation 3 NIM

11 Secure the card faceplate to the chassis of the NIM with a Phillips screw.

    Tip: Use a small-shank, magnetized Phillips screwdriver that can fit through the 1/8 in (3.175 mm) chassis access hole. Put the FRU on its side to do this step.

12 Slide the replacement NIM into the Slammer chassis and push the module into place firmly.

13 Lift both ejectors up and press firmly to engage the NIM with the chassis midplane.

14 Engage and tighten the two screws that lock the ejector to the chassis.

15 Reconnect the following cables to the NIM:

    - All cables, if any, to the cards in the PCI slots (optional).

    - For NAS Slammers, all public Ethernet cables to network ports.

    - For SAN Slammers, all Fibre Channel (FC) cables to the network ports.

16 In the Guided Maintenance page, click **Next**.

17 When prompted, attach both power cords to both of the target power supplies, which causes the control unit (CU) to power up and fail back the CU from its partner.

18 In the Guided Maintenance page, click **Next**.

19 On the **Verify** page, click **Verify Status**.

    If Guided Maintenance displays a verification failed message, click **Try Again** and re-seat the FRU. If the second attempt is not successful, contact the Pillar World Wide Customer Support Center to continue Guided Maintenance for the FRU.

    Note: The length of time for the verification step to complete and the system to return a Normal status depends on the I/O load being carried by the system. For that reason, Pillar recommends that you lighten the I/O load as much as possible before replacing the FRU.

20 If prompted, to fail back the control unit (CU), click **Recover Control Unit**.

    Note: If the **Enable Automatic Failback of NAS Control Units** option is set as part of the global settings, **Recover Control Unit** is not displayed.

    Result:
    In any case, the CU fails back (recovers) from its partner.

21 On a NAS Slammer, look for an Administrator Action.

You may be instructed to restart the system, which makes this FRU and all other resources on the target Slammer CU available.

Note: On a SAN Slammer, the system automatically attempts to recover.

22 Click **Finish**.

23 Review the status of the replacement FRU to confirm that it has a Normal status.

**Related concepts**

- *About PCIX HBA Insertion*

Related tasks

- *Insert a Slammer NIM, PCIe HBA, and PCIe Riser*
- *Remove a Slammer NIM, PCIe HBA, and PCIe Riser*

About SFP Module Replacement

Small Form Factor Pluggable (SFP) module replacement disrupts access over the optical fiber that connects to this module. However, if this module is the only failure point and the system is cabled to the customer switches in the manner that we recommend, access to data is not disrupted during the procedure to replace the SFP module.

Optical fiber-based network interface modules (NIM) support the following types of connectors:

- NAS SFP modules

- SAN SFP modules

The following figure shows a typical SAN multi-mode SFP module:

Figure 49 SAN multi-mode SFP module FRU
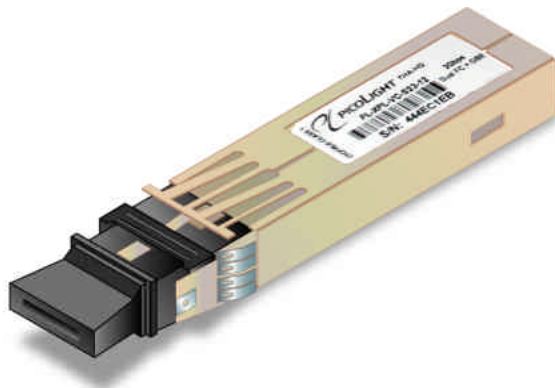
Note: The SFP module displayed above are representative. The SFP module installed in your system may differ.

SFP Plus connectors are used with the 10 Gb/s Ethernet connections in optical NAS Slammers, while the SFP connectors are used with optical 8 Gb/s Fibre Channel (FC). Passive copper cables, for copper 10 Gb/s NAS Slammers, are available with the SFP Plus module attached to each end of the cable.

The following figures show a 10 Gb/s Ethernet HBA used in NAS Slammers that works with an SFP Plus cable (copper) and an SFP Plus module (optical):

Figure 50 NAS 10 Gb/s Ethernet HBA card
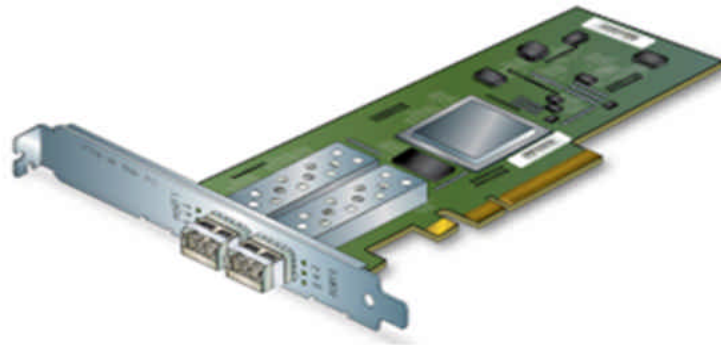
Figure 51 NAS SFP Plus cable (copper) and SFP Plus module (optical)
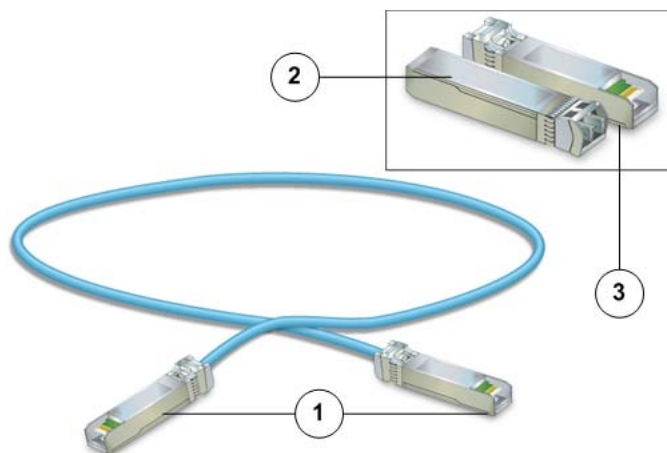
Legend	1 NAS 10 Gb/s SFP Plus connector with cable (copper)
	2 NAS 10 Gb/s SFP Plus module (optical-front)
	3 NAS 10 Gb/s SFP Plus connector (optical-back)

Note: The SFP plus modules displayed above are representative. The SFP Plus module installed in your system may differ.

Important! We recommend that you quiesce all hosts that use this data path before you replace an SFP module.

Important! Pillar Axiom 600 offers a set of qualified SFP modules for version 2 PIMs, version 2 SATA RAID controllers, and version 2 Fiber Channel (FC) RAID controllers.

> ⚠️ **Caution** — Use of any SFP or SFP Plus modules not provided by Pillar Axiom 600 can lead to performance and reliability issues when unqualified, low quality SFPs are used. Use of third party SFPs can also void the warranty of your Pillar Axiom system, if the third party SFP or SFP Plus module is determined to be the cause of any problems within the Pillar Axiom system.

> ⚠️ **Caution** — Use only vendor qualified SFP modules when connecting to switches or client HBAs.

> ⚠️ **Caution** — Make sure not to put an SFP module into an HBA that supports SFP Plus modules or viceversa. Care must be taken because all SFP and SFPPlus modules are of the same dimension.

Access SFP modules from the back of the Slammer chassis, as shown in the following figure. A Slammer control unit (CU) has a pair of SFP modules located within the CU NIM. This figure, which shows a network interface module in CU 0, identifies the location of the SFP modules.

Figure 52 Slammer SFP module location for NAS Slammer
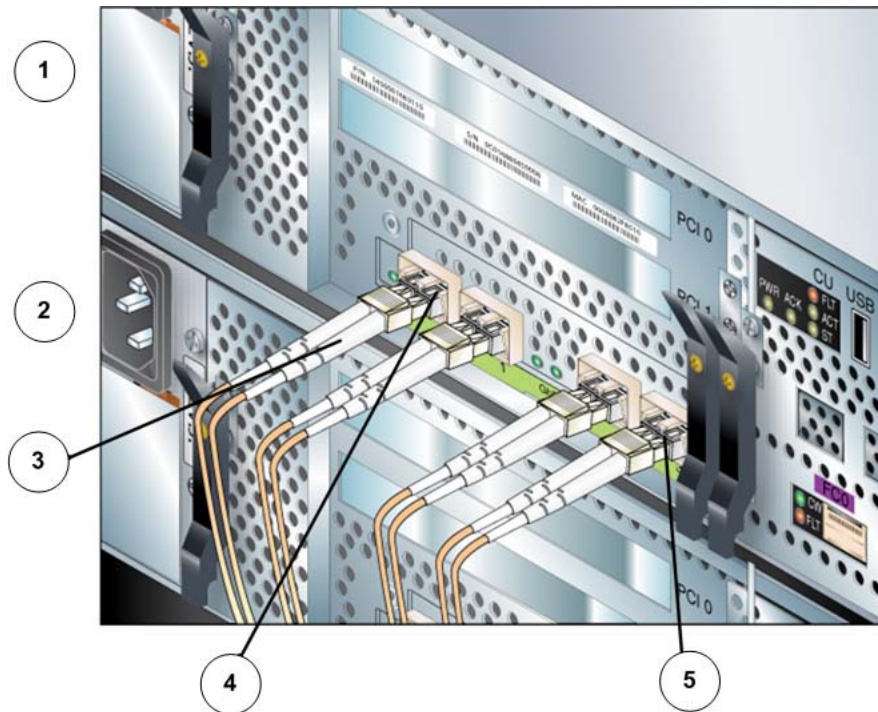
Legend	1 Slammer CU 0	4 SFP module port 0
	2 Slammer CU 1	5 SFP module port 3
	3 Fiber optic cable	

Figure 53 Optical network port LEDs
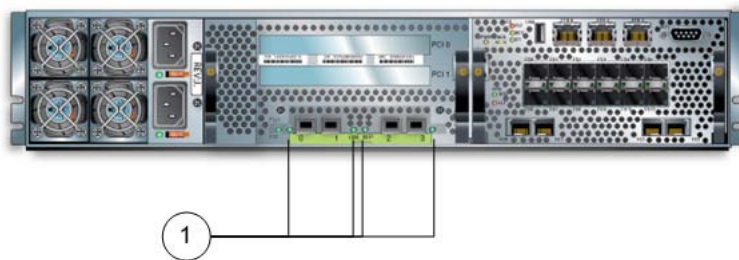
Legend	1 Network status LEDs

Table 22 NAS Slammer SFP optical network port status

LED identifier and color	Meaning
Amber (blink)	Traffic exists; if off, no traffic exists.
Green	Link is established; if off, no link exists.

Related references

- *10 Gb/s Ethernet HBA LED Status*
- *8 Gb/s Fiber Channel (FC) HBA LED Status*

Remove an SFP Module

There is no Guided Maintenance for SFP module replacement.

1   Quiesce all NAS or SAN host activity over this data path.

2   Ensure the fiber optic cable that is connected to the SFP module is labeled so you can correctly reconnect the cable later.

3   Press down on the locking tab on the top of the fiber optic cable with your thumb and gently detach the fiber optic cable from the SFP module.

4   Set the cable aside.

5   Pull the latch handle on the SFP module down until the latch stops.

6   Extract the SFP module.

Insert an SFP Module

There is no Guided Maintenance for inserting an SFP module.

1   If you have not already done so, put on an antistatic wrist strap.

2   Remove any dust covers from the SFP module.

3   Gently slide the SFP module into the appropriate optical port and press it inwards until the latching mechanism is fully seated in place with a clicking sound.

- Insert the notch on the SFP module face down into the FS ports located in the top row of the private interconnect module (PIM).

- Insert the notch on the SFP module face down into the FC ports located in the bottom row of the PIM.

- Insert the notch on the SFP face down in the FC ports located in the version 2 Brick RAID controllers.

- Insert the notch on the SFP module face up into the FS ports located in the bottom row of the PIM.

Figure 54 SFP module latch
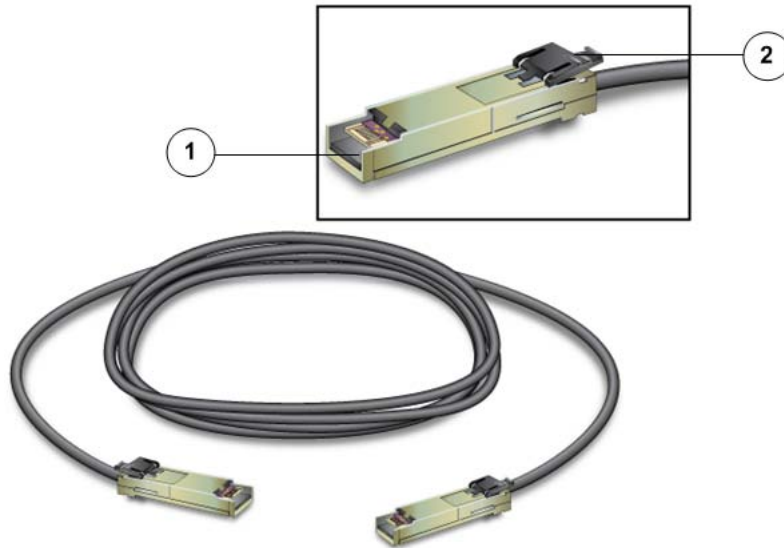
Legend	1 SFP notch
	2 SFP latch

Figure 55 SFP module insertion

Legend	1 SFP notch face down when inserted in the FS ports located in the top row of the PIM
	2 SFP notch face up when inserted in the FS ports located in the bottom row of the PIM

Important! Make sure the SFP transceiver or plug is fully inserted and engaged into the slot. Latch releases must be in the closed and latched position before inserting the SFP transceiver or plug into the SFP cannister.

4   With the locking tab on the fiber optic cable facing up, insert the fiber cable into the replacement SFP module.

5   Push the fiber cable firmly into place until the locking tab snaps shut.

6   Check that the LED next to the network port containing the SFP module shows green.

7   Inform NAS or SAN clients to reestablish their storage connections.

About Slammer Power Supply Replacement

The Pillar Axiom system supports two different power supplies.

- Legacy Power Supply

- HEPS (High Efficiency Power Supply)

Each Slammer control unit (CU) has a pair of power supplies.

Access power supplies from the back of the Slammer chassis, as shown in the following figure.

This figure, which shows a single CU, identifies the location of a legacy power supply and its LED.

Figure 56 Slammer CU legacy power supply location
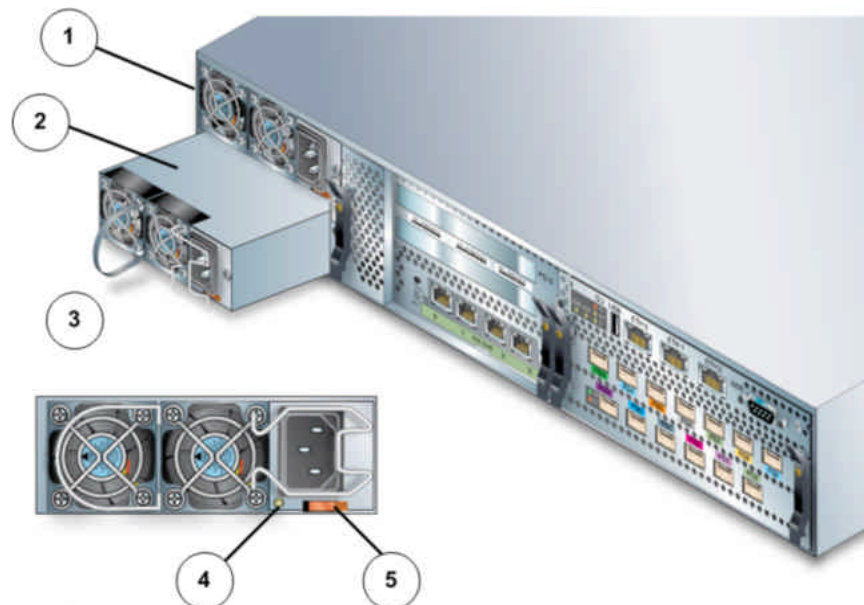
Legend

1 Power supply 1 on the top	
2 Power supply 2 at the bottom	
3 Pull loop	
4 Power supply LED	
5 Release tab	

The following figure identifies the location of a HEPS within the Slammer chassis and its LED. The HEPS is not flush with the Slammer chassis but extends out from the front.

Figure 57 Slammer CU HEPS power supply location
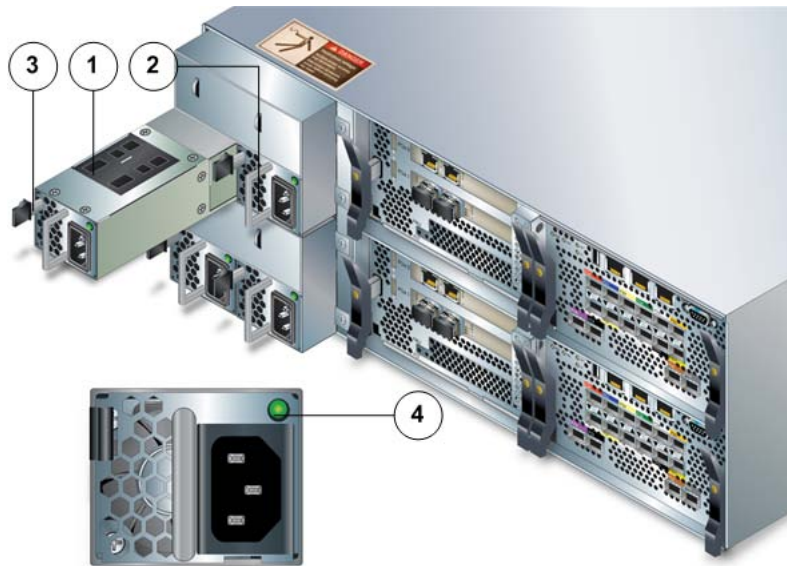
Legend	
	1 Power supply 1 on the left side for CU0
	2 Power supply 2 on the right side for CU0
	3 Release Tab
	4 Power supply LED

Note: The power supply in your Slammer chassis may be a little different from the ones indicated above.

Important! Remove the power cord before physically removing the HEPS power supply. Otherwise, the Pillar Axiom system does not detect that the HEPS power supply has been removed.

Related references
- *Slammer High Efficiency Power Supply (HEPS) LED Status*
- *Slammer Power Supply LED Status*

Related tasks
- *Insert a Slammer Power Supply*
- *Remove a Slammer FC Card*

Slammer Power Supply Replacement Tasks

To replace a Slammer power supply module, perform the tasks that are outlined in the following table.

Table 23 Power supply replacement tasks

Guided Maintenance	Task
Step 1 Identify	Identify the Target FRU.
Step 2 Prepare	Prepare the System for FRU Replacement.
Step 3 Replace	Replace the power supply FRU: 1 Remove a Slammer Power Supply. 2 Insert a Slammer Power Supply.
Step 4 Verify Status	Performed as the final step in power supply replacement.

About Slammer Power Supply Removal

To help you identify the FRU that needs to be replaced, Guided Maintenance beacons the bezel LEDs to identify the target control unit (CU). If you click **Reverse Identify** in the GUI, Guided Maintenance beacons all LEDs except for the bezel LEDs on the target CU.

After you click **Prepare System** in the GUI, Guided Maintenance prepares the system for replacement of that FRU. Guided Maintenance:

- Flushes cached data to the storage array.

- Places all filesystems or LUNs on the Slammer in Conservative mode.

After the system is prepared, Guided Maintenance displays a completion message and enables the **Next** button.

Remove a Slammer Power Supply

1 Within Guided Maintenance, click **Next** in the Prepare System page.

2 When Guided Maintenance prompts you, remove the power cord from the target power supply.

Important! Do not remove the power cord from the other power supply. The target control unit (CU) is operational in Conservative mode.

3   For a legacy power supply, slide the power supply's release tab to the left and pull the loop to disengage the power supply from the midplane.

4   Slide the power supply out of the Slammer chassis and set it aside.

⚠ Caution	Immediately replace the component to maintain proper airflow and cooling. Over-temperature conditions will occur if the replacement FRU is not installed into the chassis. Over-temperature conditions can damage other components.

⚠ Caution	When you remove a power supply, voltage is present from the partner power supply. Do not insert any instruments or tools into the open slot.

Important! Remove the power cord before physically removing the HEPS power supply. Otherwise, the Pillar Axiom system does not detect that the HEPS power supply has been removed.

About Slammer Power Supply Insertion

After you insert this FRU into a Slammer control unit (CU), use Guided Maintenance to finish the procedure.

As the final step, the Pillar Axiom system takes the target CU out of Conservative mode, places it in normal mode, and reports the status of the FRU.

Important! When you replace this FRU, slowly and evenly slide the replacement into place. If the FRU has ejectors or locking tabs, use them for final connector seating.

Insert a Slammer Power Supply

1   Slide the replacement power supply into the Slammer chassis and push it firmly into place to engage the power supply with the midplane.

Important! Be sure to install the legacy power supply so that the red release tab is in the lower right corner, as shown in the following figure.

Figure 58 Legacy power supply correctly positioned
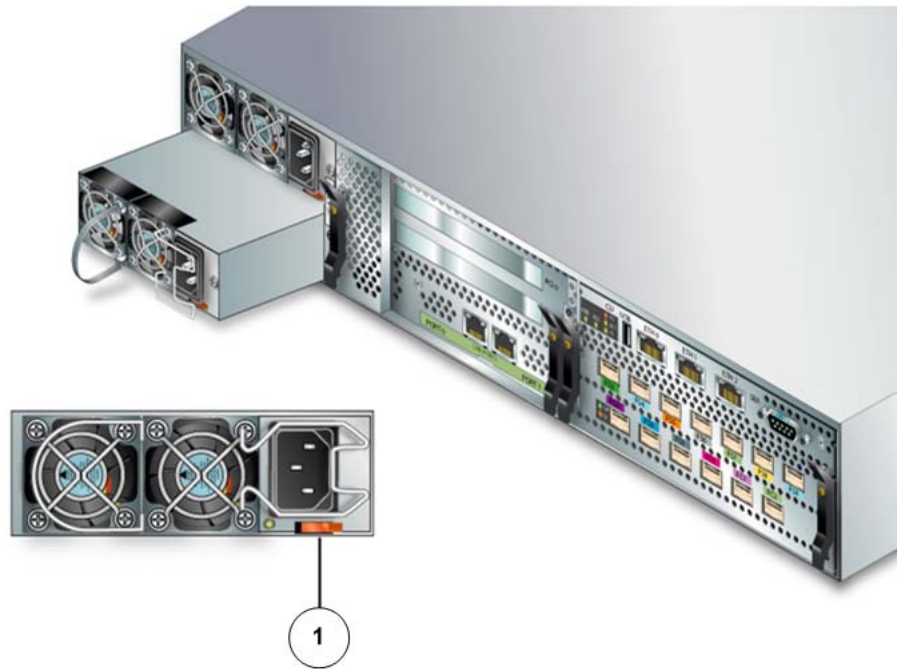
Legend

1 Release tab

When the power supply is seated correctly, the release tab will lock the power supply in place.

Figure 59 High Efficiency Power Supply (HEPS) power supply correctly positioned
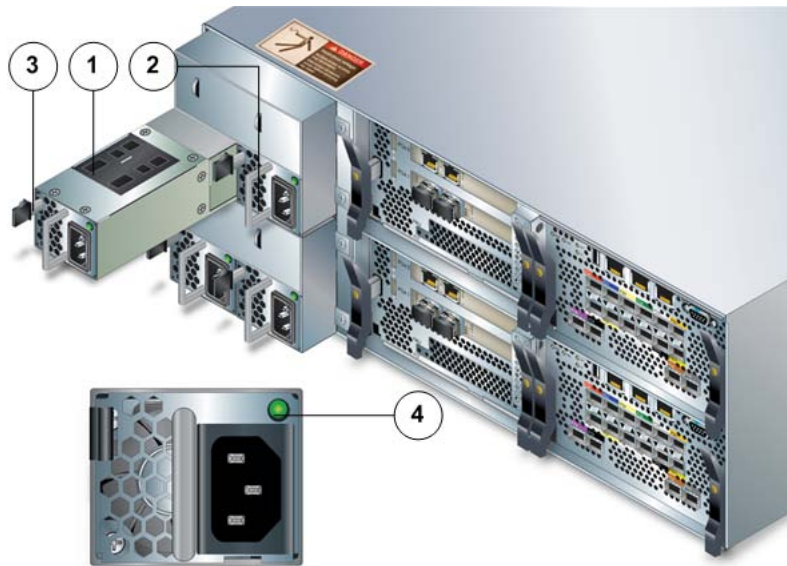
Legend	
	1 Power supply 1 on the left side of CU0
	2 Power supply 2 on the right side of CU0
	3 Release tab
	4 Power supply LED

> **Note:** Note that the power supply in your Slammer chassis may be a little different from the ones indicated above.

2 In the Guided Maintenance page, click **Next**.

3 When prompted, attach the power cord to the target power supply.

4 On the **Verify** page, click **Verify Status**.

   If Guided Maintenance displays a verification failed message, click **Try Again** and re-seat the FRU. If the second attempt is not successful, contact the Pillar World Wide Customer Support Center to continue Guided Maintenance for the FRU.

   > **Note:** The length of time for the verification step to complete and the system to return a Normal status depends on the I/O load being carried by the system. For that reason, Pillar recommends that you lighten the I/O load as much as possible before replacing the FRU.

5 Review the status of the replacement FRU to confirm that it has a Normal status.

Related concepts

- *About Slammer Power Supply Replacement*

About Slammer Private Interconnect Module Replacement

Private interconnect module (PIM) replacement disrupts access over those cables that interface with this module. However, if this module is the only failure point and the system is cabled in the manner that Pillar recommends, access to data is not disrupted during the PIM replacement procedure.

To allow the replacement of this module in a target control unit (CU), the system induces failover for the target CU to its partner CU.

Important! Even though failover transfers services and data paths to the partner CU, your network topology might make those services and data paths inaccessible. Before you start the replacement procedure, make sure that your network is configured to allow the data paths to switch over to the partner CU.

Tip: If your system has only one Slammer and you intend to replace both PIMs on that Slammer using the *same* version of PIM, you should replace them one at a time; otherwise, the Pilot restarts and all I/O paths are disrupted.

The types of connectors and cables for these PIM versions are listed as follows:

- 13-port (FC) PIM, referred to as version 1 supports HSSDC type connectors and cables. These cables allow a fabric speed of 2 Gb/s.

- 16-port (FC) PIM, referred to as version 2 supports small form-factor pluggable (SFP) type connectors. These SFPs can be 2 Gb/s copper cables or 4 Gb/s fibre cables, depending on what other components are installed on the Pillar Axiom 600 system.

Because version 1 and version 2 PIMs use different protocols, version 1 and version 2 PIMs cannot co-exist in the same Slammer chassis. In other words, you cannot use one version to replace the other. You can, however, replace all version 1 PIMs in the Slammer with version 2 PIMs, if you replace all version 1 PIMs at the same time.

Note: A multi-Slammer Pillar Axiom 600 system can contain a mix of version 1 and version 2 Slammers. However, a given Slammer cannot mix PIM versions.

Important! Pillar Axiom 600 offers a set of SFP modules for version 2 PIMs, version 2 SATA RAID controllers, and version 2 FC RAID controllers. When using optical connections, use only Pillar provided SFP modules for version 2 PIMs. When using copper connections, use only Pillar provided FC copper cables.

| ⚠ Caution	Use of any non-Pillar SFP modules or cables can lead to performance and reliability issues when unqualified SFPs are used. Use of third party SFPs can also void the warranty of your Pillar Axiom 600 system, if the third party SFP module is determined to be the cause of any problems within the Pillar Axiom 600 system.

After you replace the PIM and attach the power cable, the Pillar Axiom 600 system induces failback for the target CU.

Access PIMs from the back of the Slammer chassis, as shown in the following figure. Each CU has its own PIM FRU. The figure below identifies the location of this FRU and status LEDs for CU 1. The PIM shown is the version 2 PIM and the legacy power supply.

Figure 60 Private interconnect module location (with PIM version 2)
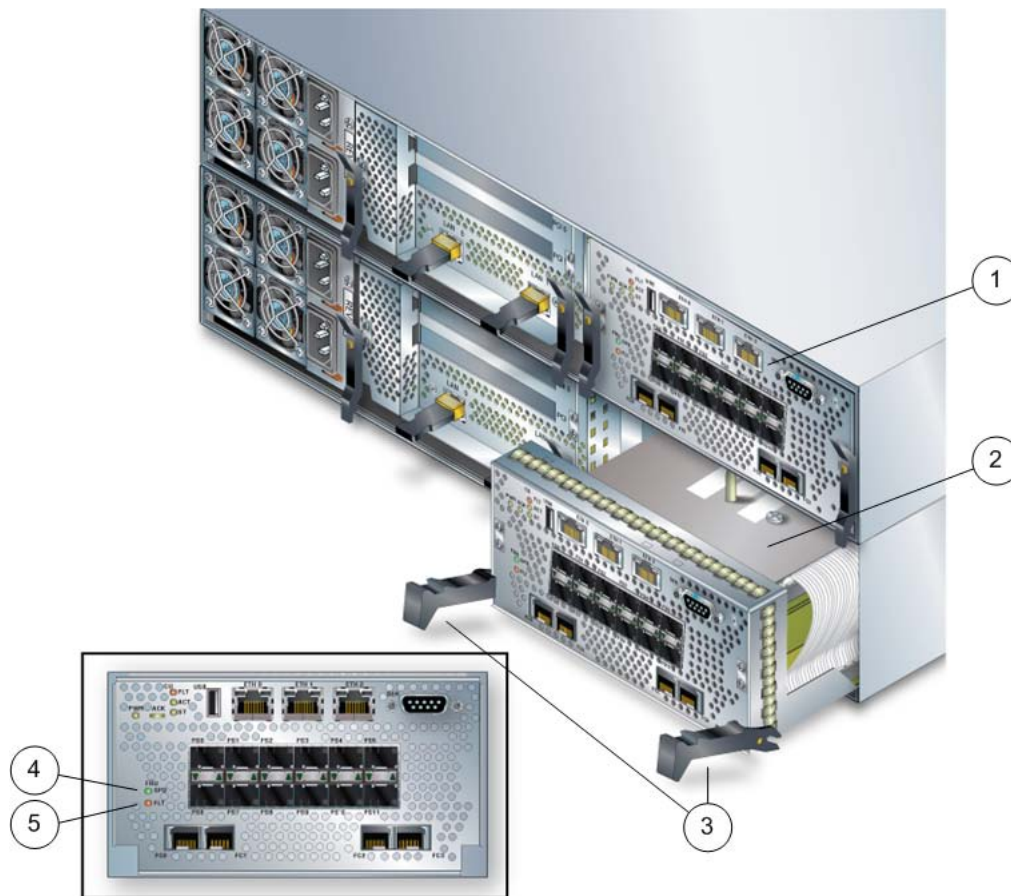
Legend

1 CU 0 private interconnect module	
2 CU 1 private interconnect module	
3 Ejectors	
4 SPD LED	
5 FRU FLT LED	

Note: The PIM displayed above is representative. The PIM that is installed in your Slammer may differ.

Slammer Private Interconnect Module LED Status

Table 24 Slammer private interconnect module PIM LED status

LED identifier and color		Meaning
SPD	Off	Version 1 PIM: Fibre Channel (FC) switch is not initialized or a problem exists. For the latter, FLT should be amber. Version 2 PIM: 2 gigabit operation.
	Green	Version 1 PIM: FC switch is ready and in switch mode. Version 2 PIM: 4 gigabit operation.
FRU FLT	Amber	Fault exists in FC switch logic, interface, or other FRU circuitry.
	Off	No failure exists.

Note: The FRU FLT LED is next to the FC 0 connector on the bottom left of the private interconnect module.

Note: The three LEDS (FLT, ACT, and ST) at the top left of the private interconnect module reflect the state of the entire Slammer CU and have the same meaning as the LEDs on the bezel.

After you replace this FRU, Guided Maintenance restarts the target CU.

Important! You may instead receive an Administrator Action to restart the system.

To replace a Slammer private interconnect module, perform the tasks that are outlined in the following table.

Table 25 Slammer private interconnect module replacement tasks

Guided Maintenance	Task
Step 1 Identify	Identify the Target FRU.
Step 2 Prepare	Prepare the System for FRU Replacement.

Table 25 Slammer private interconnect module replacement tasks (continued)

Guided Maintenance	Task
Step 3 Replace	Replace the private interconnect module FRU: 1 Remove a Private Interconnect Module 2 Insert a Slammer Private Interconnect Module
Step 4 Verify Status	Performed as part of private interconnect module replacement.
Step 5 Recover Control Unit	Performed as the final step in private interconnect module replacement.

About Slammer Private Interconnect Module Removal

To help you identify the target control unit (CU) that has the FRU that needs to be replaced, Guided Maintenance beacons the bezel LEDs on the target CU. If you click **Reverse Identify** in the GUI, Guided Maintenance beacons all LEDs except for the target CU.

After the system is prepared, Guided Maintenance displays a completion message and enables **Next**.

Remove a Private Interconnect Module

Tip: When removing the cables in this task, label the cables or draw a diagram to show which cable connects to which port on the private interconnect module.

1   Within Guided Maintenance, click **Next** in the Prepare System page.

2   When Guided Maintenance prompts you, remove the power cords from both power supplies of the target control unit (CU).

   Important! Do not remove the power cords from the partner CU. That CU supports all the user data paths for this Slammer.

3   Disconnect all Ethernet cables from the ETH ports in the target CU.

   Fibre Channel (FC) cables are color coded and labelled and should match the FC labels attached below the port socket connectors. If the cable and

port labels do not match, contact the Pillar World Wide Customer Support Center.

4   Disconnect all FC cables from the FC and FS ports in the target CU.

To disconnect the cables, follow these instructions:

Important! Do not use force or rock the connector from side to side or up and down to remove it. Doing so will damage the socket. Also, for the FC cables:

- Do not pull on the FC cables.

- Do not apply sideways force on the FC cables.

- Do not pull the FC cables tight. Leave them slack at all times.

To disconnect the cables:

- For HSSDC2 connectors: Carefully grasp the cable connector and, while pushing the connector gently into the socket, press the latch on the *top* of the connector to unlatch it.

- For SFP connectors: Carefully grasp the cable connector and, while pushing the connector gently into the socket, press the latch on the *bottom* of the connector to unlatch it.

Then, gently pull the connector straight out to release the connector with the cable.

5   Loosen and disengage the two screws that secure the private interconnect module ejectors to the Slammer chassis.

Ejectors look like this:

Figure 61 Module ejector

Legend	1 Screw
	2 Front
	3 Back

6   Press both ejectors down firmly to disengage the private interconnect module from the chassis midplane.

7   Slide the private interconnect module out of the chassis and set it aside.

About Slammer Private Interconnect Module Insertion

After you insert this FRU into a Slammer control unit (CU), use Guided Maintenance to complete the replacement process. After you add the FRU and reattach the power cords, Guided Maintenance fails back the target CU from its partner CU.

Note: When the target CU fails back, if the Slammer is a NAS Slammer and CIFS is enabled, user data paths will pause for up to 30 sec.

Important! If Guided Maintenance encounters a problem during failback, you must contact the Pillar World Wide Customer Support Center to continue Guided Maintenance for this FRU.

Watch for an Administrator Alert, which may instruct you to restart the system.

When the FRU replacement process is complete, the Pillar Axiom system reports the status of the FRU.

For complete information on how to cable a private interconnect module into the system, refer to the *Pillar Axiom 600 SSF Cabling Reference* located on the Pillar Customer Support (http://support-portal.pillardata.com/csportal/login.seam).

Important! When you replace this FRU, slowly and evenly slide the replacement into place. If the FRU has ejectors or locking tabs, use them for final connector seating.

Insert a Slammer Private Interconnect Module

1   Slide the replacement private interconnect module into the Slammer chassis and push the module firmly into place.

2   Lift both ejectors up and press firmly to engage the private interconnect module with the chassis midplane.

3   Engage and tighten the two screws that lock the ejectors to the Slammer chassis.

⚠ **Caution**   When reconnecting Fibre Channel (FC) cables, be sure to reconnect them in their correct locations; otherwise, the system may not function properly or resources may go offline.

4   Reconnect all FC cables to the FC and FS ports in the target CU. Gently insert the cables straight into the socket and use gentle pressure to latch them in place.

   Tip: Place your finger on the top and bottom of the connector to guide the connector gently into the socket.

   Important! Do not rock the connector from side to side or up and down to insert it.

5   Reconnect all Ethernet cables to the ETH ports.

6   In the Guided Maintenance page, click **Next**.

7   When prompted, attach both power cords to both power supplies of the target CU, which causes the CU to power up.

8   In the Guided Maintenance page, click **Next**.

9   On the **Verify** page, click **Verify Status**.

   If Guided Maintenance displays a verification failed message, click **Try Again** and re-seat the FRU. If the second attempt is not successful, contact the Pillar World Wide Customer Support Center to continue Guided Maintenance for the FRU.

   Note: The length of time for the verification step to complete and the system to return a Normal status depends on the I/O load being carried by the system. For that reason, Pillar recommends that you lighten the I/O load as much as possible before replacing the FRU.

10   If prompted, to fail back the control unit (CU), click **Recover Control Unit**.

   Note: If the **Enable Automatic Failback of NAS Control Units** option is set as part of the global settings, **Recover Control Unit** is not displayed.

   Result:
   In any case, the CU fails back (recovers) from its partner.

11   On a NAS Slammer, look for an Administrator Action. You may be instructed to restart the system, which makes this FRU and all other resources on the target Slammer CU available.

   Note: On a SAN Slammer, the system automatically attempts to recover.

12 Click **Finish**.

13 Review the status of the replacement FRU to confirm that it has a Normal status.

Important! Visually inspect the replaced part and all other private interconnect modules and RAID CUs in the system. For every port that has a cable, the port LED should be in one of the following states (if this is not the case, contact the Pillar World Wide Customer Support Center:

- Green, which means the FC port is online.

- Amber, which means the FC port has faulted or has been disabled.

- Flashing green, which means the FC port is initializing.

CHAPTER 5

Service the Brick and Brick FRUs

About Brick Service Procedures

⚠ Caution	During maintenance of drives or other Brick field replaceable units (FRUs), operator error or other mishaps that can occur around a service action can compromise the robust data redundancy that is designed into a Pillar Axiom 600 system.

Note: If you have Fibre Channel (FC) Bricks, Guided Maintenance on them should be done very carefully with only light to medium I/O traffic. Please contact the Pillar World Wide Customer Support Center for help in running Guided Maintenance on FC Bricks.

When a Brick storage enclosure or one of its FRUs fails, any or all of the following notification methods occur:

- If the email and Call-Home features are configured and enabled, a Call-Home message is sent to the Pillar World Wide Customer Support Center. A Technical Support Engineer (TSE) initiates a service call.

- If email and alerts are configured and enabled, an alert is emailed to designated recipients.

- An event is written to the event log.

- The graphical user interface (GUI) displays a Failed status in the Health pages.

- One or more FLT LEDs light steady amber.

A Brick contains two control units (CUs). You can replace a CU while the other CU is powered and running.

⚠ Caution	To avoid data loss, contact the Pillar World Wide Customer Support Center before you attempt to replace an entire Brick storage enclosure or Slammer storage controller. The Pillar World Wide Customer Support Center can help you determine whether a particular filesystem or LUN is physically on the Brick.

Related concepts

- *About Guided Maintenance Initiation*

Brick FRU Replacement Tasks

The following table identifies the FRUs within a Brick, indicates whether the FRU is hot swappable (meaning, can be replaced with out powering down), and lists the replacement tasks for those FRUs.

Table 26 Brick FRU replacement tasks

Component	Hot swap?	Failover?	Task
Bezel	Yes	No	1 About Brick Bezel Removal. 2 Attach a Brick Bezel.
Drive	Yes	No. *The drive is rebuilt.*	1 Identify the Target FRU. 2 Prepare the System for FRU Replacement. 3 Remove a Brick Drive. 4 Insert a Drive.
Enclosure Services (ES) module	Yes	No	1 Identify the Target FRU. 2 Prepare the System for FRU Replacement. 3 Remove an Enclosure Services (ES) Module. 4 Set the Identity of Bricks. 5 Insert an Enclosure Services (ES) Module.
Power supply and fan	Yes, one at a time	No	1 Identify the Target FRU. 2 Prepare the System for FRU Replacement. 3 Remove a Brick Power Supply-Fan Module. 4 Insert a Brick Power Supply-Fan Module.
RAID or FC Expansion controller	Yes, one at a time	Yes	1 Identify the Target FRU. 2 Prepare the System for FRU Replacement.

Table 26 Brick FRU replacement tasks (continued)

Component	Hot swap?	Failover?	Task
			3 Remove a RAID or Expansion Controller. 4 Insert a RAID Expansion Controller.
Spare drive (SATA, SSD, and SATA (version 2) only)	Yes	No	1 Identify the Target FRU. 2 Prepare the System for FRU Replacement. 3 Remove a Spare Drive. 4 Insert a spare SATA Drive.

Important! Replacement of FRUs, other than bezels, must be started through Guided Maintenance.

Map of Brick FRUs

The following figures illustrate the set of replaceable FRUs in Brick storage enclosures. Ensure that you are replacing the correct FRU.

Figure 62 Schematic of replaceable SATA Brick FRUs
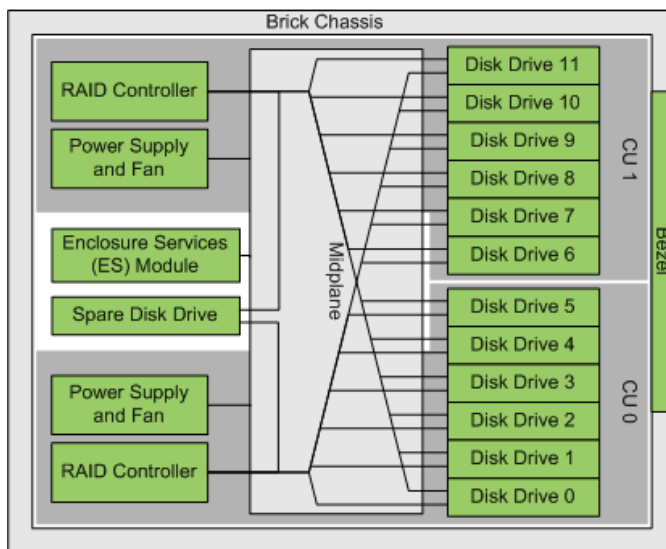
Figure 63 Schematic of replaceable FC Brick FRUs
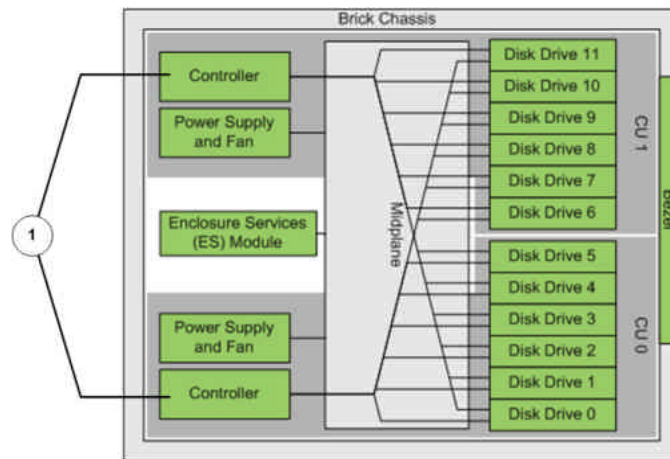
| Legend | 1 FC RAID or Expansion Controller, depending on Brick type. |

Related tasks

* *Identify the Target FRU*

Brick FRU Part Numbers

Below are the field replaceable units (FRUs) that are in a Pillar Axiom Brick.

Table 27 Brick FRUs

Part number	FRU description
1450-00013-XX	Bezel
1450-00040-XX	Chassis midplane, SATA (version 2) and SSD
1450-00090-XX	Chassis midplane, Fibre Channel (FC)
1450-00028-XX	160 GB SATA drive
1450-00029-XX	250 GB SATA drive
1450-00108-XX	400 GB SATA drive
1450-00264-XX	500 GB SATA drive

Table 27 Brick FRUs (continued)

Part number	FRU description
1450-00172-XX	750 GB SATA drive
1450-00266-XX	1 TB SATA drive
1450-00239-XX	2 TB SATA drive, 7200 RPM
1450-00226-XX	2 TB SATA drive, 5400 RPM
1450-00080-XX 1450-00142-XX	73 GB FC drive
1450-00171-XX	300 GB FC drive
1450-00146-XX	146 GB FC drive
1450-00192-XX	450 GB FC drive
1000-00221-XX	50 GB SSD drive
1000-00254-XX	200 GB SSD drive
1450-00016-XX	Enclosure services (ES) module
1450-00015-XX	Power supply-fan module, SATA Bricks under 500 GB only
1450-00165-XX	Power supply-fan module for 750 GB SATA Bricks Power supply-fan module for FC Bricks This power supply can be used for all Bricks
1450-00014-XX 1450-00194-XX	SATA RAID controller (version 1) SATA RAID controller (version 2)
1450-00076-XX 1450-00256-XX	FC RAID Controller (version 1) FC RAID Controller (version 2)
1450-00077-XX	FC Expansion Controller
1450-00031-XX	160 GB SATA spare drive
1450-00032-XX	250 GB SATA spare drive

Table 27 Brick FRUs (continued)

Part number	FRU description
1450-00109-XX	400 GB SATA spare drive
1450-00265-XX	500 GB SATA spare drive
1450-00173-XX	750 GB SATA spare drive
1450-00267-XX	1 TB SATA spare drive
1450–00269–XX	50 GB SSD spare drive
1450–00255–XX	200 GB SSD spare drive
1450–00227–XX	2 TB SATA, 5400 RPM, spare drive
1450–00240–XX	2 TB SATA, 7200 RPM, spare drive
1450-00253-XX	Optical cable kit for FC Brick (version 2) installation

Note: A Pillar Axiom system uses binary units to calculate drive capacities. For example, 1 GB = 1024^3 bytes (sometimes referred to as 1 gigibyte, GiB).

About Brick Bezel Replacement

Brick bezels can be replaced while the Brick is operational. The following figure shows a Brick bezel FRU.

Figure 64 Brick bezel

Related concepts

- *Spare Drive Replacement Tasks*

About Brick Bezel Replacement Tasks

To replace a Brick bezel, perform the tasks that are outlined in the following table.

Table 28 Brick bezel replacement tasks

Task	Reason
1 Remove a Brick Bezel.	To make room for the bezel replacement.
2 Attach a Brick Bezel.	To add the bezel replacement.

About Brick Bezel Removal

Guided Maintenance is not used to remove a Brick bezel.

As the Brick bezel is removed:

- A bezel event is generated.

- The FLT LED is lit on both RAID controllers.

Note: If the bezel does not light or the FLT LED lights but the GUI indicates normal operation, the bezel is not properly seated.

Remove a Brick Bezel

1 Press the button on each ejector tab to unlock the tabs.

Figure 65 Brick bezel ejector tabs
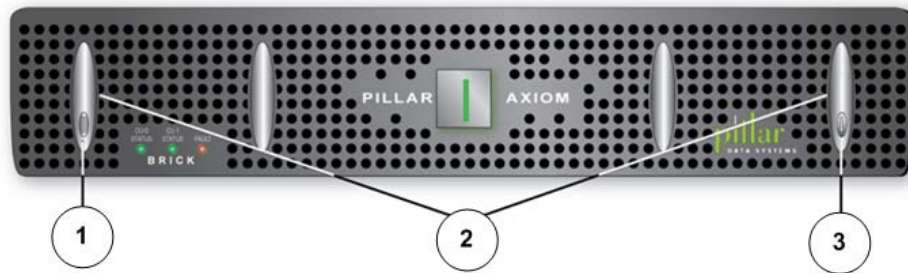
Legend	1 Button
	2 Ejector tabs
	3 Button

2 Lift each ejector tab at the same time to disengage the Brick bezel from the rack mounts.

3 Carefully rotate the top of the bezel outward and, as the latches disengage, lift the bezel slightly to disengage the bottom of the bezel.

4 Set the bezel aside.

Attach a Brick Bezel

Note: Ensure that there is no interference at the top and bottom of the bezel so it seats properly.

1 Insert the bottom two hooks on the bezel into the bottom rack rail tabs.

2 Press the top corners of the Brick bezel to engage the top two bezel hooks with the top rail tabs.

3 Press both ejector tabs (if open) until they lock in place.

The top hooks should latch with an audible click. If the bezel does not light when you apply power to the system, verify that the top and bottom hooks are all properly engaged. If the bezel does not light or the FLT LED lights, but the RAID controller FLT LED and the GUI indicate normal operation, the bezel is not properly seated.

Tip: The bezel power and LED signals are transferred to the bezel by a small circuit assembly on the front right of the Brick chassis.

About Brick Drive Replacement

A Brick contains two controllers (either a RAID or Fibre Channel Expansion controllers) and 12 drives.

Note: SATA Bricks also contain a 13th spare drive.

Each controller manages six of those drives. Each controller and its drives form what is called an *array* and reside in a Brick control unit (CU).

The following figure shows an array drive in its carrier.

Figure 66 Brick drive FRU
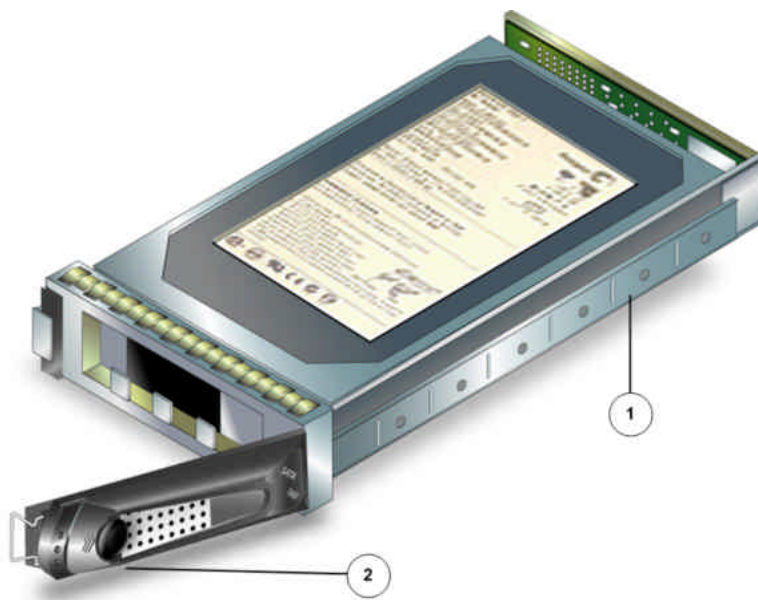
Legend	
	1 Drive carrier
	2 Cam latch

Note: The FRU shown in the above figure is a SATA drive. Fibre Channel (FC) drives look slightly different. Check the type and size of the new drive to be sure it matches exactly the drives in the Brick.

Important! The capacity of the drive replacement must be equal to or greater than that of the other drives in the Brick enclosure.

Access any drive in the storage array from behind the Brick's bezel as shown in the following figure. Drives are numbered from 0 to 11 as shown in the following

figure. Drives 0 to 5 are managed by controller 0, while drives 6 to 11 are managed by controller 1.

Figure 67 Location of a drive
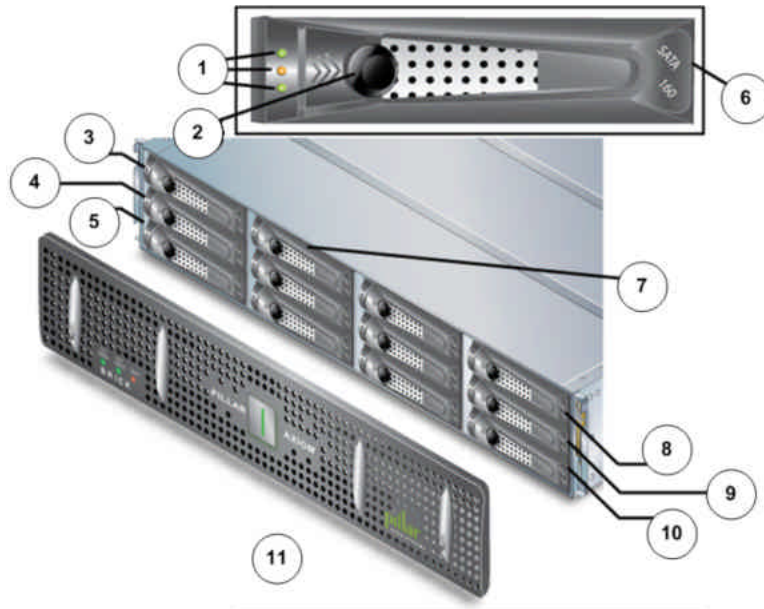
Legend	1 LEDs	7 Drive 3
	2 Cam latch button	8 Drive 9
	3 Drive 0	9 Drive 10
	4 Drive 1	10 Drive 11
	5 Drive 2	11 Brick bezel
	6 Drive type and size indicator	

⚠️ **Caution** Do not move drives from their original positions. If you move a drive, all data on that drive will be lost. If multiple drives are moved, you will lose data.

If a drive is defective, use Guided Maintenance in the Pillar Axiom Storage Services Manager GUI to replace the drive.

Note: You can also manually replace defective drives without using Guided Maintenance by pulling the bezel with the orange LED light and replacing the drive with the yellow LED light. You may receive some administrative alerts for the disk drive being offline that you can safely ignore.

> ⚠️ **Caution** When removing the drives from the Brick, be sure to pull the drive straight out and not turn the drive. The platters may still be spinning and the gyroscope may cause damage.

Note: Always use a new Pillar Axiom 600 drive when replacing a drive with or without using Guided Maintenance.

- If a drive fails, do not attempt to recover by removing and reinserting that drive. Contact the Pillar World Wide Customer Support Center for a new drive.

- If a drive fails, use a sealed spare drive from the Pillar World Wide Customer Support Center. Do not use a drive of unknown status.

- Do not attempt to replace a failed drive with one from another Brick or from another Pillar Axiom system.

- If a new drive is placed in a Fiber Channel (FC) RAID or Expansion Brick, that new drive should have a green LED indicator and must be in normal state within a few minutes.

- If a new drive is placed in a SATA (version 1) or SATA (version 2) Brick, the drive remains in warning status, until the task to copy back data from the spare drive is complete.

- If testing Drive Pull, wait a few seconds after removing the drive before reinserting it. Be sure to check for Administrator Actions to accept the drive.

  Important! Contact the Pillar World Wide Customer Support Center before pulling a drive.

- If a drive fails to be accepted into a Brick and the drive is set to Rejected status, do not attempt to use that drive. Contact the Pillar World Wide Customer Support Center for another drive and for assistance.

- If an Administrator Action asking you to accept the drive is generated, be sure to select the Accept Drive option, which initiates a copyback operation.

  Important! If an Administrator Action to Accept a Drive is ever answered negatively, do not attempt to use that drive again. Contact the Pillar World Wide Customer Support Center for another drive.

Contact the Pillar World Wide Customer Support Center for a new replacement drive.

Related tasks

- *Remove a Brick Drive*

LEDs on Drive Carriers

When Guided Maintenance beacons the drive to identify it, Guided Maintenance:

- Turns off the top and bottom LEDs.

- Blinks the middle LED.

On the front of a Brick chassis (beneath the bezel), you have access to all twelve drive carriers. The carriers are numbered as shown in the following figure.

Figure 68 Drive carrier numbering in a Brick and carrier LEDs
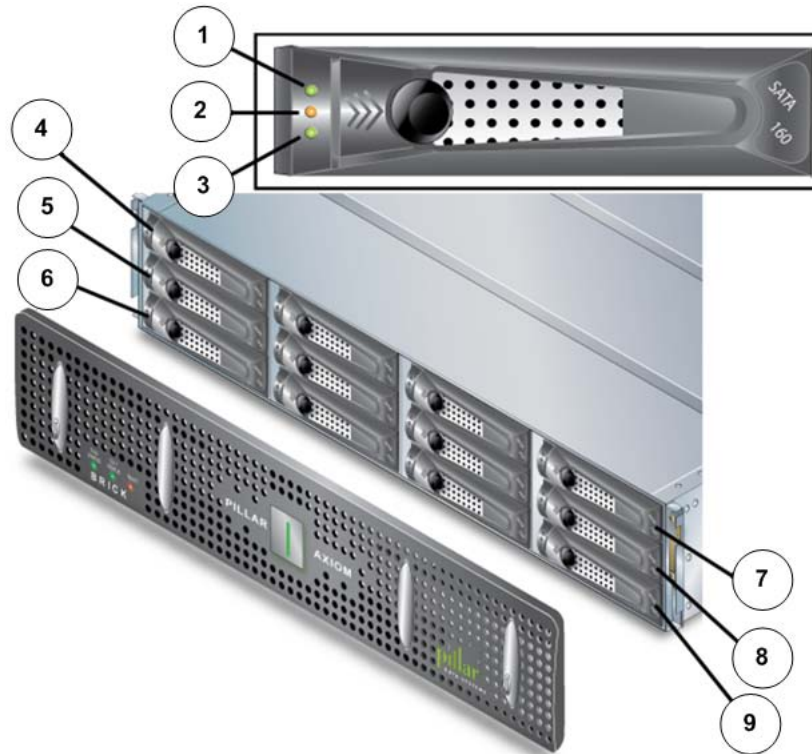
Legend		
1 CU 1 active	6 Drive 2
2 Ready light	7 Drive 9
3 CU 0 active	8 Drive 10
4 Drive 0	9 Drive 11
5 Drive 1	

Each carrier has three LEDs to indicate its status.

Table 29 LEDs on drive carriers

Position	Color	Meaning
Top	SATA: Green (blink)	Activity from RAID controller 1.
	FC: Off	Not used for FC.
Middle	Amber	Drive has faulted.
	Off	- ES module is missing. - Drive has no power. - Drive has spun down.
	Green (blink)	Drive discovery. The Brick is determining the physical existence of this drive after power up or drive insertion.
	Green	Drive is ready.
Bottom	Green (blink)	SATA drives: Activity from RAID controller 0. FC drives: Activity on the drive.

Note: When there is no I/O activity on a Brick storage enclosure, the RAID firmware runs a background operation that scans all drives for media errors and, if media errors are found, performs repair operations. This background activity causes the LEDs to blink green on the idle system or Brick. Such activity can take several hours to complete. When host I/O resumes, this background operation stops; it resumes only when there are no further I/Os from a host.

Note: When Guided Maintenance beacons the drive to identify it, Guided Maintenance:

- Turns off the top and bottom LEDs.

- Blinks the middle LED.

Tip: Guided Maintenance also shows the position of the drive in the Brick to help you avoid introducing a double fault into a RAID array.

About Drive Replacement Tasks

To replace a Brick drive, perform the tasks that are outlined in the following table.

Table 30 Drive replacement tasks

Guided Maintenance	Task
Step 1 Identify	Identify the Target FRU (optional).
Step 2 Prepare	Prepare the System for FRU Replacement.
Step 3 Replace	Replace the drive FRU: 1 Remove a Brick Bezel to gain access to the drive. 2 Remove a Brick Drive to make room for the drive replacement. 3 Insert a Drive to insert the drive replacement. 4 Attach a Brick Bezel to reattach the bezel.
Step 4 Verify Status	Performed as final step in drive replacement.

Important! If a second drive in a given array fails before the system rebuilds the first disk on the spare drive, you should immediately repair both drives. In this scenario, logical volumes (filesystems and LUNs) having standard redundancy go offline, whereas volumes having double redundancy remain online.

⚠ **Caution**   For a given Brick array, do not replace more than one drive in that array at a time. Replacement of more than one drive at the same time causes data loss for those logical volumes (filesystem or LUNs) that have standard redundancy and that reside on the additional drive being replaced. We recommend that you allow a drive replacement to rebuild before you replace another drive in the same array. The rebuild operation can take several hours, depending on the capacity of the Brick.

About Drive Removal From Bricks

To help you identify the target Brick that has the drive FRU that needs to be replaced, Guided Maintenance beacons the bezel LEDs on the target Brick. If

you click **Reverse Identify** in the GUI, Guided Maintenance beacons the LEDs on all Bricks except for the target Brick.

After you click **Prepare System** in the GUI, Guided Maintenance prepares the system for replacement of the target drive FRU:

- If the following conditions are true, the system copies all data from the drive to the spare:

    o The array drive is in a Normal state.

    o The drive has not already been rebuilt on the spare.

    o The spare drive is available.

- If the array drive is in a Normal state and the spare drive is not available, the array rebuilds the data from parity from the existing members of the array onto the replacement drive after the replacement drive is inserted.

    Note: In most instances, the data is already on the spare drive, and the spare drive status will be In Use.

- If the array drive is in a rebuild state, Guided Maintenance waits for the rebuild to complete before initiating the copyback after the replacement drive is inserted.

- If the array drive is in a degraded or failed state, Guided Maintenance may continue.

After the system is prepared, Guided Maintenance displays a completion message and enables **Next**.

Important! Before removing an array drive, read the following notices:

- Make sure you remove the correct drive. Removal of the incorrect drive can disrupt data access and possibly corrupt the data.

- Once you initiate Guided Maintenance to replace a drive and proceed to the Prepare System stage, you must finish the entire procedure.

- Guided Maintenance will issue a stop command to the drive. To bring that drive back online, you must pull it and replace it with a new one.

    Do not cancel this replacement process once it has started.

    If you are simply testing a drive pull, put the drive back or replace it.

- You will see instructions and an Administrator Action to remove the drive.

- Failure to remove the drive will stop all further recovery operations on this array.

Remove a Brick Drive

1 Within Guided Maintenance, click **Next** in the Prepare System page.

2 When Guided Maintenance prompts you to remove the drive, press the cam latch button on the face of the drive carrier to release the cam latch.

3 Open the cam latch fully.

   Result:
   The drive disengages from the Brick's midplane. The system then begins rebuilding the data that was on the drive from parity data to the spare drive. This process can take several hours.

4 Slide the drive out of the chassis and set it aside.

   Note: You can manually replace defective drives without using Guided Maintenance. Always use a new Pillar Axiom 600drive when replacing a drive.

⚠ Caution	Immediately replace the component to maintain proper airflow and cooling. Over-temperature conditions will occur if the replacement FRU is not installed into the chassis. Over-temperature conditions can damage other components.

Related concepts
* *About Brick Drive Replacement*

About Brick Drive Insertion

Only factory-fresh, Pillar-supplied drives are supported in Pillar Axiom systems. These drives have a unique identifier. The process of writing this identifier to the physical drive is called branding. If the drive is unbranded, the Pillar Axiom system rejects it.

Important! The capacity of the drive replacement must be equal to or greater than that of the other drives in the Brick enclosure.

After Guided Maintenance successfully validates the drive replacement, the drive is bound to the Brick in which it was added. Any and all data that existed on the drive will be erased.

If you observe an Administrator Action to accept the foreign drive, be sure to click **Accept**. If the drive came from a spares kit, the Accept Foreign Drive task should begin automatically within a few minutes.

Note: If a Copyback or Rebuild operation to this drive occurs, the Accept Foreign Drive task will not complete until that operation completes.

After you insert this FRU into a Brick control unit (CU), use Guided Maintenance to complete the replacement procedure.

Important! If Guided Maintenance encounters a problem at this stage, you must contact the Pillar World Wide Customer Support Center to continue Guided Maintenance for this FRU.

When the FRU replacement process is complete, the Pillar Axiom system reports the status of the FRU.

Insert a Drive

Inserting a drive improperly can cause errors and faults. Follow these instructions to ensure success.

1 Fully open the cam latch on the replacement drive and slide the drive into the Brick chassis until it snaps into place.

   If a drive is not fully seated, either or both of the following will be true:

   * The metal portion of the carrier will be visible.

   * The front of the drive carrier will not be flush with the other carriers.

   Important! Do not unlatch and re-latch a drive carrier unnecessarily. Doing so can lead to potential troubles in the future.

2 Close the cam latch until it snaps shut to engage the drive with the Brick midplane.

   Result:
   The center LED should flash green for up to one minute.

3 In Guided Maintenance, click **Next**.

   While the system checks the drive for acceptance, the drive status displays as Foreign. Also, you should see brief bursts of activity on the top and bottom LEDs as each RAID controller checks the drive. After a short while, the center LED should light steady green.

Important! If the center LED lights amber, the system has rejected the drive or the drive failed to spin up properly. Contact the World Wide Customer Support Center.

4   Choose one of the following options:

- If prompted to acknowledge the successful discovery of the drive replacement, click **OK** to accept the drive.

- If the replacement is not new, Guided Maintenance displays a dialog box that contains the prompt "Are you sure you want to do this?" Choose one:

   - Click **OK** to accept the replacement.

     Acceptance binds this drive to this Brick and destroys any data that may have existed on the drive.

     Note: When you click **OK**, the system copies the data from the spare drive back to the array drive. The status of this drive is Copying Back and the spare drive remains in use during this period. Under some circumstances, if there are two failed drives in the Brick, the new drive may go to a Rebuild status indicating that the array is being rebuilt from parity.

   - Click **Cancel** to reject the replacement.

     Rejection terminates this procedure and retains any previous data that might have existed on the drive.

     Important! If you reject the drive, you cannot use it in this system again.

5   When the copyback process completes, review the status of the replacement FRU to ensure that:

- The status of the replacement FRU is Normal.

- The task to accept the drive has completed successfully.

About Brick ES Module Replacement

Each Brick has a single enclosure services (ES) module. This module reports the temperature of the Brick and the status of the Brick fans and power supplies. There is a digital push button on all Bricks that is used to set the Brick ID:

- 0 = FC RAID Brick, SATA Brick, and SSD Brick

- 1 = FC Expansion Brick

The following figure shows an ES module.

Figure 69 ES module FRU
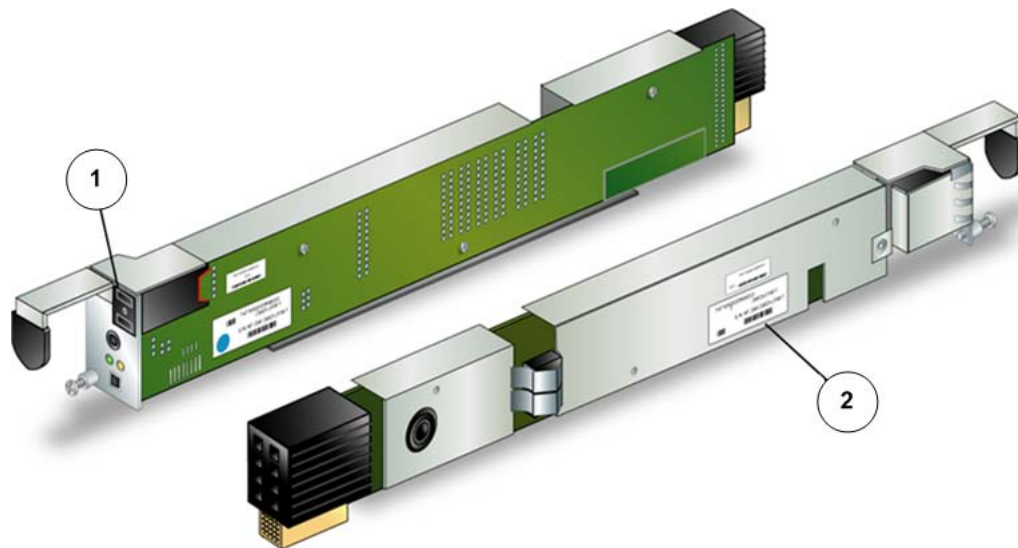
Legend	1 Digital push button to set Brick ID
	2 Serial number

Access the ES module from the back of the Brick chassis, as shown in the following figure. This figure identifies the location of the ES module, its LEDs, and the digital push button to set Brick ID.

Figure 70 ES module location

Legend

1 Pull tab	4 Brick back
2 Screw	5 Dial settings
3 LEDs	6 Digital push button

Related tasks
- *Set the Identity of Bricks*

Brick ES Module LED Status

Table 31 Brick ES module LED status

LED identifier and color		Meaning
Left	Amber	An enclosure-related fault is present.
Right	Green	Brick has power.

Note: Guided Maintenance cannot beacon the enclosure services (ES) module to identify it. Use Brick Identify to locate the ES module in the correct Brick.

Brick ES Module Replacement Tasks

To replace a Brick ES module, perform the tasks that are outlined in the following table.

Table 32 Brick ES module replacement tasks

Guided Maintenance	Task
Step 1 Identify	Identify the Target FRU.
Step 2 Prepare	Prepare the System for FRU Replacement.
Step 3 Replace	Replace the ES module FRU: 1 Remove an Enclosure Services (ES) Module to make room for the ES module replacement. 2 Insert an Enclosure Services (ES) Module to insert the ES module replacement.
Step 4 Verify Status	Performed as final step in ES module replacement.

About Brick ES Module Removal

To help you identify the target Brick that has the FRU that needs to be replaced, Guided Maintenance beacons the bezel LEDs on the target Brick. If you click **Reverse Identify** in the GUI, Guided Maintenance beacons the LEDs on all Bricks except for the target Brick.

After you click **Prepare System** in the GUI, Guided Maintenance prepares the system for replacement of the ES module. After the system is prepared, Guided Maintenance displays a completion message and enables the **Next** button.

Remove an Enclosure Services (ES) Module

1 Within Guided Maintenance, click **Next** in the Prepare System page.

2 When Guided Maintenance prompts you to remove the ES module, unscrew the screw that secures the ES module to the Brick chassis.

   A spring retains the screw in the module.

3 Grasp the pull tab on the ES module and slide the module out of the chassis and set it aside.

⚠ Caution	Immediately replace the component to maintain proper airflow and cooling. Over-temperature conditions will occur if the replacement FRU is not installed into the chassis. Over-temperature conditions can damage other components.

Set the Identity of Bricks

1 Locate the digital push button at the top of the face of the Enclosure Services (ES) module.

   This figure identifies the location of the digital push button, which is used to set the Brick ID.

Figure 71 ES module location

Legend	1 Pull tab	5 Dial settings
	2 Screw	6 Digital push button
	3 LEDs	7 ES module
	4 Brick back	

The digit setting of the Brick is visible in the center of the digital push button and identifies the type of Brick.

2 Verify that the digit setting on the Brick Enclosure Services (ES) module is set correctly for the Brick before powering on the Brick.

Important! The digit setting for all Bricks (SATA, SSD, and FC RAID) is pre-set to 0. The digit setting for the FC Expansion Brick is pre-set to 1. However, the digit setting must always be verified during installation. Otherwise, the Pillar Axiom 600 system cannot bring the Brick online.

3   If the digit setting is not set correctly, push the button using a sharp object, such as the end of a paper clip or a small screwdriver to set the Brick ID.

The top button (-) decrements the counter and the bottom button (+) increments the counter.

Important! Do not change the digit settings while the Brick is powered on.

About Brick ES Module Insertion

Fibre Channel (FC) Bricks must be given an identity so the system can differentiate between the FC RAID Brick and FC Expansion Bricks in that FC set. So, when inserting an ES module into an FC Brick, be sure to set the identity of that Brick through the ES module before you insert the module into the Brick.

After you insert this FRU into a Brick control unit (CU), use Guided Maintenance to complete the replacement procedure.

Important! If Guided Maintenance encounters a problem at this stage, you must contact the Pillar World Wide Customer Support Center to continue Guided Maintenance for this FRU.

When the FRU replacement process is complete, the Pillar Axiom system reports the status of the FRU.

Important! For ES modules in SATA Bricks, always set the identity to zero.

Insert an Enclosure Services (ES) Module

1   Slide the ES module replacement into the Brick chassis until the module stops.

2   Firmly push the ES module into place to engage it with the chassis midplane.

Tip: After you install the module, the module performs a self test, which can take up to 10 to 15 sec. The system will not recognize the ES module until the system completes this self test. Pillar recommends that you wait 10 to 15 sec before you perform Step 4.

3   Tighten the Phillips screw to secure the ES module to the chassis.

4   In the Guided Maintenance page, click **Next**.

5   On the **Verify** page, choose one of these options as appropriate:

- Click **Finish**, when Guided Maintenance enables it.

- If Guided Maintenance displays a verification failed message:

  ○ Click **Try Again** and reseat the FRU.

    If the second attempt is successful, click **Next**; otherwise, contact the Pillar World Wide Customer Support Center to continue Guided Maintenance for the FRU.

  ○ Click **Exit** and contact the Pillar World Wide Customer Support Center.

6 Review the status of the replacement FRU to confirm that it has a Normal status.

About Brick Power Supply-Fan Module Replacement

A Brick has two power supply-fan modules, one on each side of the Brick. Each module provides shared power for the whole Brick and focused cooling for one of the control units (CUs). The modules are rated to power the entire Brick.

The cooling fans are powered from a common bus and will be powered from the other module if the module in which they reside fails. If a module fails or is turned off:

- All fans in the Brick increase speed markedly to provide the extra cooling.

- An audible alarm, the only audible alarm on the Pillar Axiom system, is turned on.

The following figure shows a power supply-fan module.

Figure 72 Power supply-fan module FRU

Legend	1 Retaining clip
	2 Locking tab
	3 Back

Access power supply-fan modules from the back of the Brick chassis, as shown in the following figure. The figure helps you locate power supply-fan module 1 and its LEDs.

Figure 73 Brick power supply-fan module location
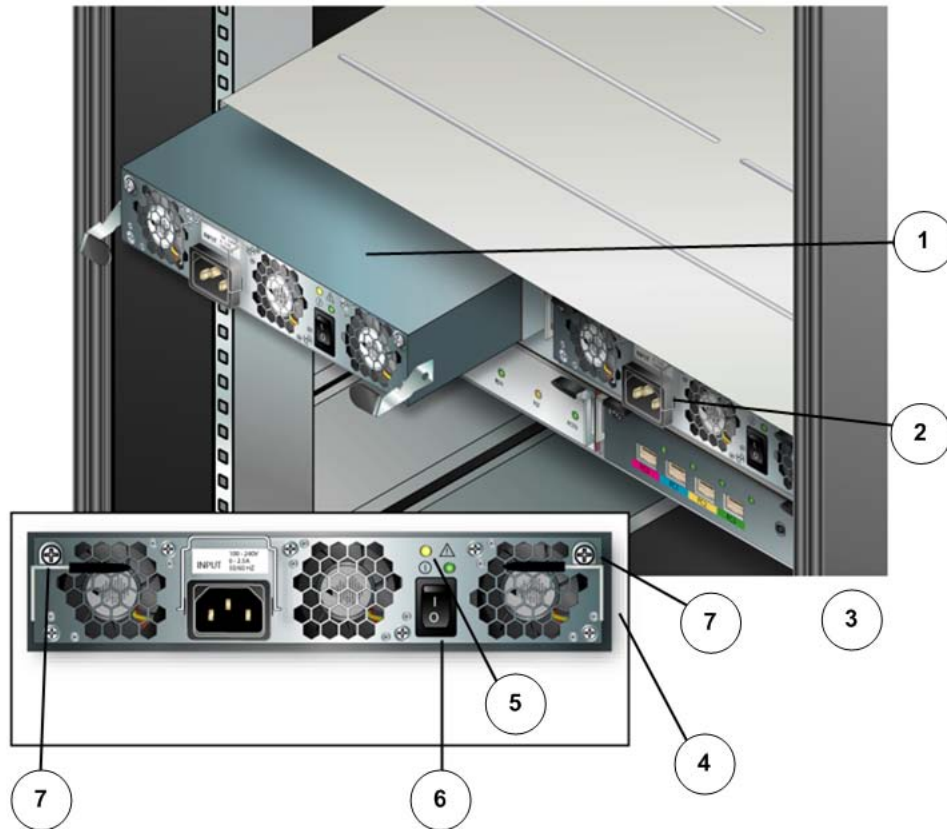
Legend

1 Power supply-fan module 1	5 LEDs
2 Power supply-fan module 2	6 Power switch
3 Back of Brick	7 Screws
4 Locking tab	

Note: The fans in the power supply fan module are not visible and it is not possible to tell visually if the fan is spinning. Some models have curved fan supports that appear to be fan blades. In order to tell if a fan is spinning, use a moistened finger or a small strip of light weight paper.

Related references

• *Brick Power Supply-Fan Module LED Status*

Brick Power Supply and Fan Module LED Status

Table 33 Brick power supply-fan module LED status

LED identifier and color		Meaning
⚠	Amber	Power supply-fan module in this controller has failed for one of these reasons: • Power supply AC or DC has failed. • Power supply exceeded its temperature limits. • Fan(s) in this module have failed.
	Off	Power supply-fan module in this controller is functioning normally.
⏻	Green	AC is available and DC is active.
	Off	AC is not available.

Note: When Guided Maintenance beacons the power supply-fan module to identify it, Guided Maintenance lights the amber LED.

About Brick Power Supply-Fan Module Replacement Tasks

Table 34 Brick power supply-fan module replacement tasks

Guided Maintenance	Task
Step 1 Identify	Identify the Target FRU.
Step 2 Prepare	Prepare the System for FRU Replacement.
Step 3 Replace	Replace the power supply-fan module FRU: 1 Remove a Brick Power Supply-Fan Module to make room for the power supply-fan module replacement.

Table 34 Brick power supply-fan module replacement tasks (continued)

Guided Maintenance	Task
	2 Insert a Brick Power Supply-Fan Module to insert the power supply-fan module replacement.
Step 4 Verify Status	Performed as final step in power supply-fan module replacement.

About Brick Power Supply-Fan Module Removal

To help you identify the target Brick that has the FRU that needs to be replaced, Guided Maintenance beacons the bezel LEDs on the target Brick. If you click **Reverse Identify** in the GUI, Guided Maintenance beacons the LEDs on all Bricks except for the target Brick.

After you click **Prepare System** in the GUI, Guided Maintenance prepares the system for replacement of the power supply-fan module. After the system is prepared, Guided Maintenance displays a completion message and enables the **Next** button.

Remove a Brick Power Supply-Fan Module

Important! If you must disconnect Fiber Channel (FC) cables to make room for removal of the power supply-fan module, be careful to mark the cables so you can reconnect them in their correct locations.

1   Within Guided Maintenance, click **Next** in the Prepare System page.

2   When Guided Maintenance prompts you to power off the Brick power supply-fan module, switch off the power to the target module.

Important! Do not switch off the power to the other Brick power supply-fan module. That module supplies power to both control units (CUs).

Result:
You will hear an audible alarm. The alarm is normal and indicates that the Brick is still operating but with a single power supply-fan module. The audible alarm stops when the power to the Brick is restored to full redundancy.

You will also hear an increase in fan noise while all Brick fans increase in speed to provide additional cooling.

3   Slip the power-cord retaining clip up and off the power cord for the target power supply module.

4   Disconnect the power cord from the target power supply.

5   Unscrew the two screws that secure the locking tabs to the power supply module casing.

The springs retain the screws in the locking tabs.

6   Push the power supply module's two locking tabs down.

Result:
The power supply module disengages from the Brick midplane.

7   Slide the power supply-fan module out of the chassis and set it aside.

> ⚠ **Caution**   Immediately replace the component to maintain proper airflow and cooling. Over-temperature conditions will occur if the replacement FRU is not installed into the chassis. Over-temperature conditions can damage other components.

Important! Because the power supply is also the cooling unit of the Brick, swap the module as quickly as possible.

About Brick Power Supply-Fan Module Insertion

After you insert this FRU into a Brick control unit (CU), use Guided Maintenance to complete the replacement procedure.

Important! If Guided Maintenance encounters a problem at this stage, you must contact the Pillar World Wide Customer Support Center to continue Guided Maintenance for this FRU.

When the FRU replacement process is complete, the Pillar Axiom system reports the status of the FRU.

Insert a Brick Power Supply-Fan Module

1   Slide the power supply-fan module into the Brick chassis until the module stops.

2   Push up the two locking tabs on the power supply to engage the module with the Brick midplane.

3   Screw the two Phillips screws into the power supply module casing to secure the locking tabs.

4   Connect the power cord to the target power supply.

5   Slip the power-cord retaining clip down over the power cord for the target power supply.

6   Switch on the power to the target power supply module.

   As you apply power to the replacement FRU, the following should occur:

   - The green LED lights.

   - The audible alarm turns off.

   - The fan speed may decrease.

   Important! If the above actions do not occur, contact the Pillar World Wide Customer Support Center.

7   In the Guided Maintenance page, click **Next**.

8   On the **Verify** page, click **Verify Status**.

   If Guided Maintenance displays a verification failed message, click **Try Again** and re-seat the FRU. If the second attempt is not successful, contact the Pillar World Wide Customer Support Center to continue Guided Maintenance for the FRU.

   Note: The length of time for the verification step to complete and the system to return a Normal status depends on the I/O load being carried by the system. For that reason, Pillar recommends that you lighten the I/O load as much as possible before replacing the FRU.

9   Review the status of the replacement FRU to confirm that it has a Normal status.

About Brick RAID Controller Replacement

Brick storage enclosures contain a number of drives, which are managed by a pair of controllers. Each controller provides access to and control over an array of six drives located within a Brick control unit (CU).

All Pillar Axiom systems support two kinds of RAID controllers: Serial ATA (SATA) RAID controllers and Fibre Channel (FC) RAID controllers.

The types of ports in these SATA RAID controller versions are listed as follows:

- Version 1 (legacy) controllers have one set of four Fibre Channel (FC) ports and appear in the GUI as type SATA.

- Version 2 controllers have two pair of FC ports and appear in the GUI as type SATA V2.

The following figure depicts the Version 1 SATA RAID controller.

Figure 74 Version 1 SATA RAID controller

Legend
1	SATA version 1 Brick
2	SATA version 1 RAID controllers

Figure 75 Version 2 SATA RAID controller
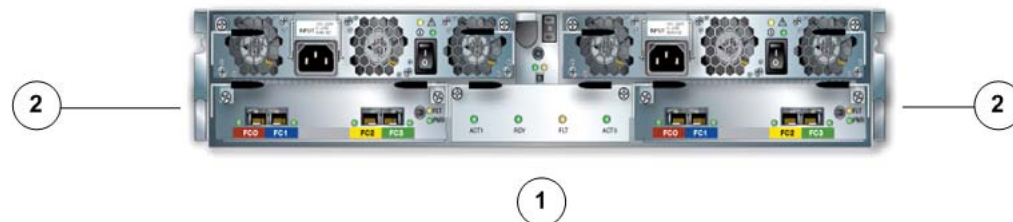
Legend
1	SATA version 2 Brick
2	SATA version 2 RAID controllers

Because version 1 and version 2 SATA controllers use different internal communication protocols, these two types of SATA controllers cannot co-exist in

the same Brick chassis. In other words, you cannot use a version 2 SATA controller to replace a legacy version 1 controller. A Pillar Axiom 600 system can, however, contain a mix of version 1 and version 2 SATA Bricks.

The following figure shows a RAID controller for a SATA Brick.

Figure 76 RAID controller FRU in a SATA Brick
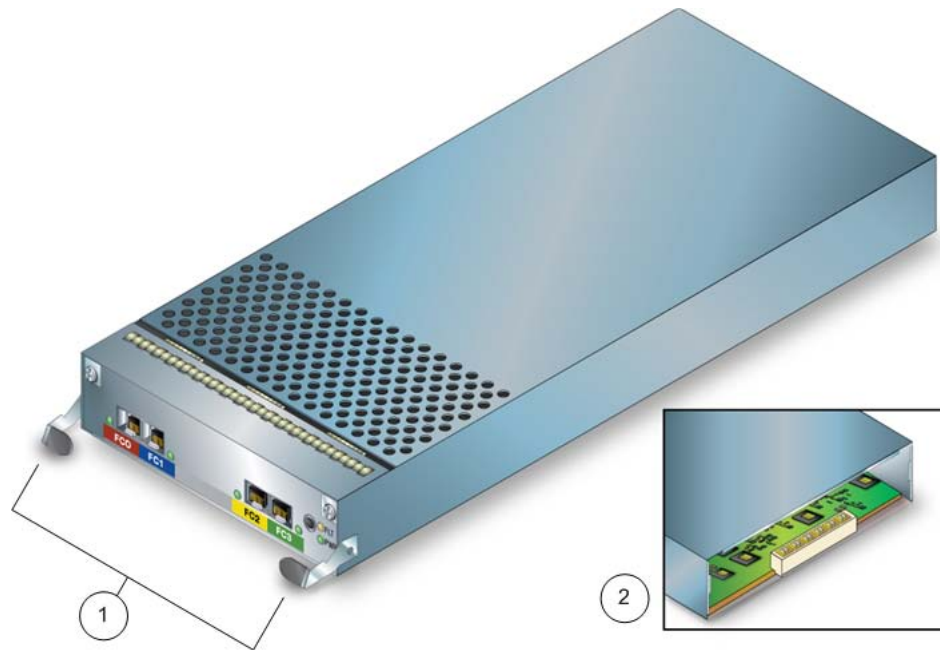
Legend

1 Locking tabs	
2 Back	

Note: The SATA controller displayed above is representative. The SATA controller that is installed in your Brick may differ.

The types of connectors and cables for these FC RAID controller versions are listed as follows:

- Version 1 (legacy) FC RAID (FCR) controllers that appears in the GUI as type FC.

- Version 2 FC RAID (FCR) controllers that appears in the GUI as type FC V2.

- FC Expansion (FCE) controllers have ports PNet0, PNet1, J0, and J1 to connect to an FCE Brick.

  Note: Each Expansion controller provides the FC RAID Brick to which it is connected access to six drives in the FC Expansion Brick.

The following figure shows a version 1 FC RAID controller for an FC RAID Brick.

Figure 77 Version 1 FC RAID controller in an FC RAID Brick
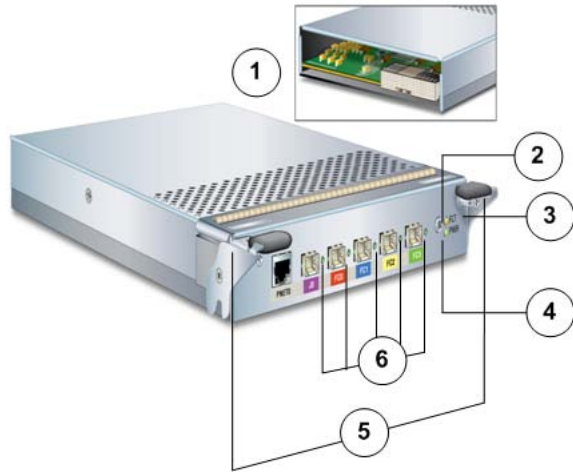
Legend

1 Back view of version 1 FCR controller	4 Power LED
2 Screw	5 Locking tabs
3 Fault (FLT) LED	6 FCR controller LEDs

The following figure shows a version 2 FC RAID controller for an FC RAID Brick.

Figure 78 Version 2 FC RAID controller in an FC RAID Brick
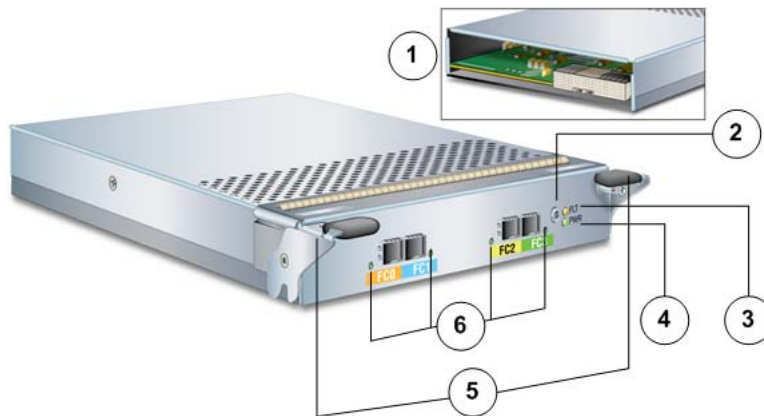
Legend

1 Back view of version 2 FCR controller	4 Power LED
2 Screw	5 Locking tabs
3 Fault (FLT) LED	6 FCR controller LEDs

Note: The FC RAID controllers displayed above are representative. The FC RAID controllers that are installed in your Brick may differ.

The following figure shows a RAID controller for an FC Expansion Brick.

Figure 79 RAID controller FRU in a FC Expansion Brick
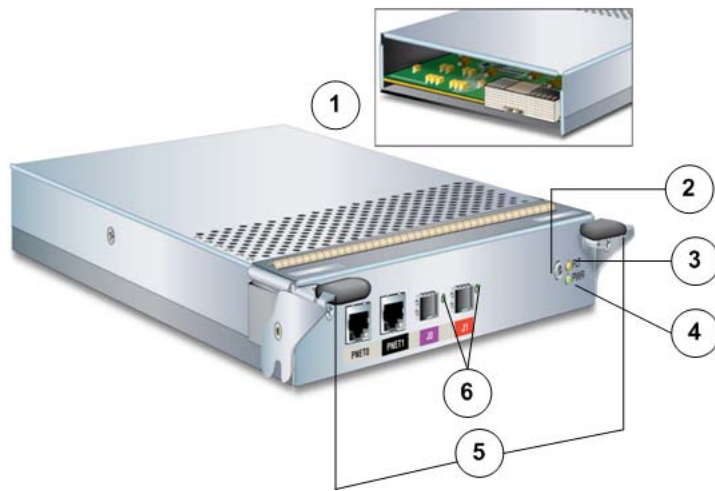
Legend

1 Back view of FCE controller	4 Power LED
2 Screw	5 Locking tabs
3 Fault (FLT) LED	6 FCE controller LEDs

Access RAID controllers from the back of the Brick chassis, as shown in the following figure. This figure identifies the location of RAID controller 1 and its LEDs.

Figure 80 SATA Brick RAID controller location
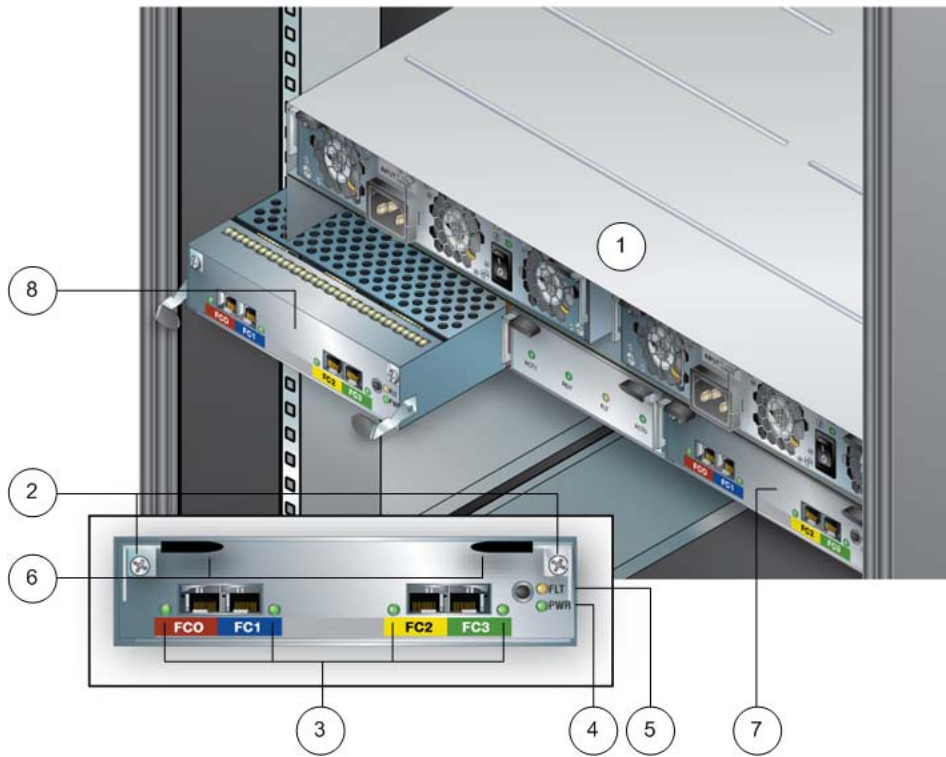
Legend		
1 Brick back	5 FLT LED
2 Screw	6 Locking tab
3 FC 0-3 LEDs	7 RAID controller 0
4 PWR LED	8 RAID controller 1

FC RAID Brick LED Status

Table 35 FC RAID Brick LED status

LED identifier and color		Meaning
PNet 0	Amber (blink)	Polling for PNET connection.
	Green	PNET has established connection.

Table 35 FC RAID Brick LED status (continued)

LED identifier and color		Meaning
	Green (off), Amber (slow blink)	PNET is unavailable.
J0 & FC0–FC3	Amber (SOS blink)	Internal error exists within RAID controller FC interface.
	Amber	FC link does not exist.
	Amber (fast blink)	Initializing or self-testing.
	Green (slow blink)	Connecting FC link.
	Green	FC link exists.
FLT	Amber	An error condition exists.
	Off	No failure exists.
PWR	Green	Power is available.
	Off	Power is not available.

FC Expansion Brick LED Status

Table 36 FC Expansion Brick LED status

LED identifier and color		Meaning
PNet0 & PNet1	Amber (blink)	Polling for PNET connection.
	Green	PNET has established connection.
	Green (off) Amber (slow blink)	PNET is unavailable.

Table 36 FC Expansion Brick LED status   (continued)

LED identifier and color		Meaning
J0 & J1	Amber (SOS blink)	Internal error exists within Brick controller FC interface.
	Amber	FC link does not exist.
	Amber (fast blink)	Initializing or self-testing.
	Green (slow blink)	Connecting to or waiting for FC link.
	Green	FC link exists.
FLT	Amber	An error condition exists.
	Off	No failure exists.
PWR	Green	Power is available.
	Off	Power is not available.

SATA Brick RAID Controller LED Status

Table 37 SATA Brick RAID controller LED status

LED identifier and color		Meaning
FC0–FC3	Amber (SOS blink)	Internal error exists in Storage System Fabric (SSF).
	Amber	FC link does not exist.
	Amber (fast blink)	Initializing or self-testing.
	Green (slow blink)	Waiting for FC link.
	Green	FC link exists.

Table 37 SATA Brick RAID controller LED status (continued)

LED identifier and color		Meaning
FLT	Amber	An error condition exists.
	Off	No failure exists.
PWR	Green	Power is available.
	Off	Power is not available.

Because the local RAID controller has no electrical circuit to light its FLT LED, the partner RAID controller lights the LED on the local controller. Also, the FLT LED will light if the Brick bezel is removed.

Tip: If FC0, FC1, FC2, and FC3 are blinking in unison on one RAID controller and FLT on the other controller is lit, the controller with the blinking FC0-FC3 is in a fault condition.

When a Brick powers up, the FC and FLT LEDs blink. When Guided Maintenance beacons the RAID controller to identify it, Guided Maintenance:

- Blinks the FC and PWR LEDs.

- Lights the FLT LED steady amber.

Important! Use Guided Maintenance to coordinate the replacement of the target RAID controller. The Pillar Axiom system must fail over a RAID controller and its Fibre Channel (FC) ports to the partner controller before you can replace the target RAID controller. This re-configuration may cause some performance degradation for user data paths until you complete the replacement.

Brick RAID Controller Replacement Tasks

To replace a Brick RAID controller, perform the tasks that are outlined in the following table.

Table 38 RAID or Expansion controller replacement tasks

Guided Maintenance	Task
Step 1 Identify	Identify the Target FRU.

Table 38 RAID or Expansion controller replacement tasks (continued)

Guided Maintenance	Task
Step 2 Prepare	Prepare the System for FRU Replacement.
Step 3 Replace	Replace the RAID or Expansion controller FRU: 1 Remove a RAID or Expansion Controller to make room for the RAID or Expansion controller replacement. 2 Insert a RAID Expansion Controller to insert the RAID or Expansion controller replacement.
Step 4 Verify Status	Performed as final step in RAID or Expansion controller replacement.

About Brick RAID Controller Removal

To help you identify the target Brick that has the FRU that needs to be replaced, Guided Maintenance beacons the bezel LEDs on the target Brick. If you click **Reverse Identify** in the GUI, Guided Maintenance beacons the LEDs on all Bricks except for the target Brick.

After you click **Prepare System** in the GUI, if the reconfiguration has not yet occurred, Guided Maintenance reconfigures the target FC port group so that the data paths that are supported by this port group fail over to the FC port group on the partner CU. This failover causes the partner RAID controller to assume control of all drives in the storage array.

After system preparation completes, Guided Maintenance displays a completion message and enables the **Next** button.

New RAID controllers that are shipped from spares have no firmware on them. As the replacement controller powers on, the partner RAID controller in the Brick does a partner burn to install its version of firmware on the new controller.

If the replacement RAID Control Unit (CU) has firmware on it as it attempts to transition to Online state, the Pilot checks the firmware version. If necessary, the Pilot downloads and burns the correct version of firmware and then resets the new RAID CU.

Important! Because replacement RAID CUs from spares have no firmware, if you need to replace both RAID controller CUs in a Brick, it is critical to replace one RAID controller CUat a time. After replacing one RAID controller CU, verify that it is fully online with the correct firmware, and then replace the other RAID controller CU.

Replacement Fiber Channel (FC) Expansion Controllers obtain their firmware from the FC RAID Bricks as they are powered on.

Remove a RAID or Expansion Controller

1 Within Guided Maintenance, click **Next** in the Prepare System page.

2 If the Fibre Channel (FC) cables are not labeled to show where they connect on the controller, make a notation that shows which cable connects to which port.

3 When Guided Maintenance prompts you to remove the controller, disconnect all FC cables from the FC ports on the target controller.

   To disconnect the cables, follow these instructions:

   Important! Do not use force or rock the connector from side to side or up and down to remove it. Doing so will damage the socket. Also, for the FC cables:

   - Do not pull on the FC cables.

   - Do not apply sideways force on the FC cables.

   - Do not pull the FC cables tight. Leave them slack at all times.

   To disconnect the cables:

   - For HSSDC2 connectors: Carefully grasp the cable connector and, while pushing the connector gently into the socket, press the latch on the *top* of the connector to unlatch it.

   - For SFP connectors: Carefully grasp the cable connector and, while pushing the connector gently into the socket, press the latch on the *bottom* of the connector to unlatch it.

   Then, gently pull the connector straight out to release the connector with the cable.

4 Unscrew the two screws that secure the locking tabs to the controller casing.

Springs retain the screws in the locking tabs.

5   Push the controller's two locking tabs down.

Result:
The controller disengages from the Brick midplane.

6   Slide the controller out of the Brick chassis and set it aside.

⚠ **Caution**	Immediately replace the component to maintain proper airflow and cooling. Over-temperature conditions will occur if the replacement FRU is not installed into the chassis. Over-temperature conditions can damage other components.

About Brick RAID or FC Expansion Controller Insertion

After you insert this FRU into a Brick control unit (CU), use Guided Maintenance to complete the replacement procedure.

When the FRU replacement process is complete, the Pillar Axiom system reports the status of the FRU.

Insert a RAID Expansion Controller

1   Slide the controller replacement into the Brick chassis until the controller stops.

2   Push up the two locking tabs on the controller to engage the controller with the Brick midplane.

Important! It is very important that the RAID controller locking tabs engage the midplane in a single motion. Partially closing the locking tabs on the RAID controller causes an incorrect data connection and the RAID controller is not allowed to power on. If the RAID controller does not immediately power on, remove it and wait 60 sec, then re-engage the locking tabs with a single motion. If this does not resolve the problem, contact the Pillar World Wide Customer Support Center to continue Guided Maintenance for this FRU.

3   Screw the two Phillips screws into the controller casing to secure the locking tabs.

4   Reconnect all Fibre Channel (FC) cables into the FC ports on the replacement controller.

Important! Do not use force or rock the cable connector from side to side or up and down to insert it. Doing so will damage the socket. Also, for FC cables:

- Do not pull on them.

- Do not apply sideways force to them.

- Do not pull them tight; leave them slack at all times.

For complete information on how to cable a controller, refer to the *Pillar Axiom 600 SSF Cabling Reference*.

5 In the Guided Maintenance page, click **Next**.

Note: At this point, Guided Maintenance fails back the FC port group in the replacement controller so that these FC ports again support the data paths.

6 On the **Verify** page, click **Verify Status**.

If Guided Maintenance displays a verification failed message, click **Try Again** and re-seat the FRU. If the second attempt is not successful, contact the Pillar World Wide Customer Support Center to continue Guided Maintenance for the FRU.

Note: The length of time for the verification step to complete and the system to return a Normal status depends on the I/O load being carried by the system. For that reason, Pillar recommends that you lighten the I/O load as much as possible before replacing the FRU.

7 Review the status of the replacement FRU to confirm that it has a Normal status.

About SATA Brick Spare Drive Replacement

Each SATA Brick has a spare drive that provides backup storage capacity for the RAID controllers if any of the 12 standard drives should fail.

The following figure shows a spare drive. The following figure identifies the location of the spare drive, which is accessed from the back side of the Brick.

Figure 81 Spare drive location
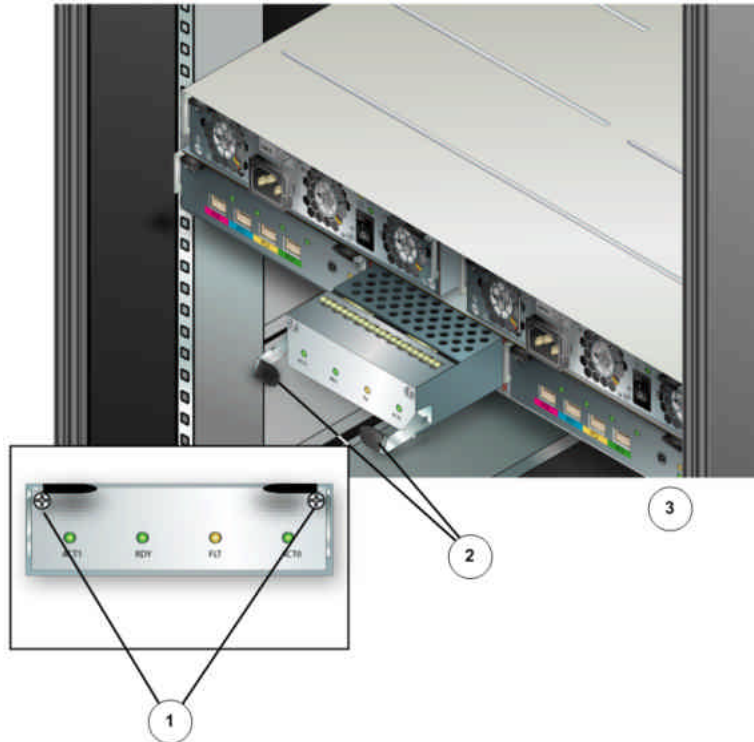
Legend	
	1 Screws
	2 Locking tabs
	3 Brick back

SATA Brick Spare Drive LED Status

Table 39 SATA Brick spare drive LED status

LED identifier and color		Meaning
ACT1	Green (blink)	RAID controller 1 activity.
RDY	Off	The spare drive is not ready for use.
	Green (blink)	Drive discovery. The Brick is determining the physical existence of the spare drive after power up or after insertion of a spare drive FRU.
	Green	The spare drive is in a normal state.
FLT	Amber	The spare drive has failed.
	Off	No failure exists.
ACT0	Green (blink)	RAID controller 0 activity.

Important! If ACT0 or ACT1 is blinking regularly, the spare drive is currently in use. Check for failed drives in this Brick, replace as needed, and wait for the copyback to complete before servicing the spare drive.

Note: When Guided Maintenance beacons the spare drive to identify it, Guided Maintenance:

- Turns off the ACT0, RDY, and ACT1 LEDs.

- Lights the FLT LED solid amber.

Spare Drive Replacement Tasks

To replace a spare drive in a Brick, perform the tasks that are outlined in the following table.

Table 40 Spare drive replacement tasks

Guided Maintenance	Task
Step 1 Identify	Identify the Target FRU.
Step 2 Prepare	Prepare the System for FRU Replacement.
Step 3 Replace	Replace the spare drive FRU: 1 Remove a Spare Drive to make room for the spare drive replacement. 2 Insert a spare SATA Drive to insert the spare drive replacement.
Step 4 Verify Status	Performed as final step in spare drive replacement.

About SATA Brick Spare Drive Removal

To help you identify the target Brick that has the FRU that needs to be replaced, Guided Maintenance beacons the bezel LEDs on the target Brick. If you click **Reverse Identify** in the GUI, Guided Maintenance beacons the LEDs on all Bricks except for the target Brick.

After you click **Prepare System**, Guided Maintenance continues the replacement process only if the spare drive is not in use. If the spare drive is in use, Guided Maintenance reports this fact. You can try again or exit Guided Maintenance.

Important! Removal of the spare drive can occur only when it is not in use. A spare drive is in use when an array drive has failed or is being rebuilt. To replace the spare drive, first replace the failed drive in the array or wait until the drive rebuild process is complete.

After the system is prepared, Guided Maintenance displays a completion message and enables **Next**.

Remove a Spare Drive

1 Within Guided Maintenance, click **Next** in the Prepare System page.

2 When Guided Maintenance prompts you to remove the spare drive, unscrew the two screws that secure the locking tabs to the spare drive casing.

Springs retain the screws in the locking tabs.

3   Push the two locking tabs down.

Result:
The spare drive disengages from the Brick's midplane.

4   Slide the spare drive out of the chassis and set it aside.

⚠ **Caution**	Immediately replace the component to maintain proper airflow and cooling. Over-temperature conditions will occur if the replacement FRU is not installed into the chassis. Over-temperature conditions can damage other components.

About SATA Brick Spare Drive Insertion

Only factory-fresh, Pillar-supplied drives are supported in Pillar Axiom systems. These drives have a unique identifier. The process of writing this identifier to the physical drive is called branding. If the drive is unbranded, the Pillar Axiom system rejects it.

After you insert this FRU into a Brick control unit (CU), use Guided Maintenance to complete the replacement procedure.

Important! If Guided Maintenance encounters a problem at this stage, you must contact the Pillar World Wide Customer Support Center to continue Guided Maintenance for this FRU.

When the FRU replacement process is complete, the Pillar Axiom system reports the status of the FRU.

After Guided Maintenance successfully validates the drive replacement, the drive is bound to that Brick.

Important! The capacity of the drive replacement must be equal to or greater than that of the other drives in the Brick.

Insert a spare SATA Drive

1   Slide the replacement spare drive into the Brick chassis and push the drive into place.

2   Lift up the locking tabs to engage the spare drive with the Brick midplane.

The RDY LED should begin flashing green when the drive is inserted. This LED should stop flashing and light steady green within one minute.

A burst of flashing should then be seen on the CU 1 and CU 0 LEDs.

If the RDY LED continues to flash or the FLT LED lights, contact the Pillar World Wide Customer Support Center.

3   Screw the two screws that are located on either side of the component into the back of the chassis until they are firmly secured.

Do not overtighten.

4   In Guided Maintenance, click **Next**.

5   Choose one of these options as appropriate:

- If prompted to acknowledge the successful discovery of the spare drive replacement, click **OK**.

- If the replacement is not new, Guided Maintenance opens a dialog box and displays the prompt "Are you sure you want to do this?" Choose one of these options:

  ○ Click **OK** to accept the replacement. Acceptance binds this drive to this Brick and destroys any data that may have existed on the drive.

  ○ Click **Cancel** to reject the replacement. Rejection terminates this procedure and retains any previous data that might have existed on the drive.

  Important! If you reject the replacement spare drive, it cannot be used again in this system.

6   Review the status of the replacement FRU to ensure that it is Normal.

APPENDIX A

Safety Statements

Introduction to Safety Statements

For the Pillar Axiom system, safety statements provide specific warning and cautionary notices about the electrical and weight properties that are associated with a Pillar Axiom system and its hardware components.

About Safety Statements

For the Pillar Axiom 600 system, safety statements provide specific warning and cautionary notices about the electrical and weight properties that are associated with a Pillar Axiom 600 system and its hardware components.

Important! Procedures listed in the body of this document assume that the electrical characteristics of the power supply to which Pillar Axiom 600 system components are connected comply with the technical specifications for those components.

Related concepts

* *Pillar Axiom Hardware Specifications*

Warning Notices

⚠ Warning	This hazard symbol means warning. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards that are involved with electrical circuitry and be familiar with standard practices for preventing accidents.

Electrical Warning in Other Languages

Table 41 Electrical warning in other languages

Waarschuwing	Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen.
Varoitus	Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista.
Attention	Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents.
Warnung	Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt.
Avvertenza	Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi

Table 41 Electrical warning in other languages   (continued)

	ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti.
Advarsel	Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan fØre til personskade. FØr du utfØrer arbeid på utstyr, må du vare oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjØre deg kjent med vanlig praksis når det gjelder å unngå ulykker.
Aviso	Este sÍmbolo de aviso indica perigo. Encontra-se numa situaÇão que lhe poderá causar danos fÍ sicos. Antes de comeÇar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possÍ veis acidentes.
Advertencia	Este sÍmbolo de aviso significa peligro. Existe riesgo para su integridad fÍ sica. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos está ndar de prevención de accidentes.
Varning	Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på nå gon utrustning må ste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador.

⚠ **Warning**	Do not work on the system or connect or disconnect cables during periods of lightning activity.

⚠ **Warning**	When removing a power supply, do not touch the power supply when the power cord is connected. For systems with a power switch, line voltages are present within the power supply even when the power switch is off and the power cord is connected. For systems without a power switch, line voltages are present within the power supply when the power cord is connected.

⚠ **Warning**	The power supply cord is used as the main disconnect device. Ensure that the socket outlet is located or installed near the equipment and is easily accessible.

⚠ **Warning**	When working on a chassis or near power supplies, use extreme caution because line voltages may be present within the chassis.
⚠ **Warning**	Ultimate disposal of this product should be handled according to all national laws and regulations.
⚠ **Warning**	Some equipment is connected to power lines. Before you work on this equipment, remove all jewelry that contains metal. Such jewelry includes rings, necklaces, and watches. Metal objects heat up when connected to power and ground. Hot metal objects can cause serious burns or weld the metal object to the terminals.
⚠ **Warning**	Only qualified personnel should install or replace this equipment.
⚠ **Warning**	Secure all power cabling when you install this unit to avoid disturbing field-wiring connections.
⚠ **Warning**	Do not overload the circuit when you connect components to the power supply.
⚠ **Warning**	A voltage mismatch can cause equipment damage and may pose a fire hazard. If the voltage indicated on the label differs from the power outlet voltage, *do not connect the chassis to that receptacle*.
⚠ **Warning**	To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables.
⚠ **Warning**	Incorrect connection of this equipment to a general purpose outlet could result in a hazardous situation.
⚠ **Warning**	Bricks have two power supply cords and Slammers have four. To reduce the risk of electric shock, disconnect all power supply cords to these components before you open their top covers.
⚠ **Warning**	The Pillar Axiom 600 system operates at high voltages. To protect against physical harm, power off the system whenever possible during installation.

⚠ Warning	Never block the inlet and outlet holes in the chassis components. Sufficient air circulation is required for the components to operate properly and to avoid a fire hazard. Do not push objects of any kind into the ventilation holes. Such action could result in fire or electrical shock. Keep all liquids away from hardware components.
⚠ Warning	Ensure that component distribution in the rack is balanced. Follow the hardware placement map to ensure this balance. Uneven distribution can cause hazardous instability. The rack must have stabilization plates or anti-tip brackets installed so the rack does not tip when you install a component.

Lightning Activity Warning

⚠ Warning	Do not work on the system or connect or disconnect cables during periods of lightning activity.

Lightning Warning in Other Languages

Table 42 Lightning warning in other languages

Waarschuwing	Tijdens onweer dat gepaard gaat met bliksem, dient u niet aan het systeem te werken of kabels aan te sluiten of te ontkoppelen.
Varoitus	Älä työskentele jä rjestelmä n parissa ä lä kä yhdistä tai irrota kaapeleita ukkosilmalla.
Attention	Ne pas travailler sur le système ni brancher ou débrancher les câbles pendant un orage.
Warnung	Arbeiten Sie nicht am System und schließ en Sie keine Kabel an bzw. trennen Sie keine ab, wenn es gewittert.
Avvertenza	Non lavorare sul sistema o collegare oppure scollegare i cavi durante un temporale con fulmini.
Advarsel	UtfØr aldri arbeid på systemet, eller koble kabler til eller fra systemet nå r det tordner eller lyner.

Table 42 Lightning warning in other languages (continued)

Aviso	Não trabalhe no sistema ou ligue e desligue cabos durante perÍ odos de mau tempo (trovoada).
Advertencia	No operar el sistema ni conectar o desconectar cables durante el transcurso de descargas eléctricas en la atmósfera.
Varning	Vid å ska skall du aldrig utföra arbete på systemet eller ansluta eller koppla loss kablar.

Power Supply Warning

⚠ **Warning** When removing a power supply, do not touch the power supply when the power cord is connected. For systems with a power switch, line voltages are present within the power supply even when the power switch is off and the power cord is connected. For systems without a power switch, line voltages are present within the power supply when the power cord is connected.

Power Supply Warning in Other Languages

Table 43 Power supply warning in other languages

Waarschuwing	U dient de voeding niet aan te raken zolang het netsnoer aangesloten is. Bij systemen met een stroomschakelaar zijn er lijnspanningen aanwezig in de voeding, zelfs wanneer de stroomschakelaar uitgeschakeld is en het netsnoer aangesloten is. Bij systemen zonder een stroomschakelaar zijn er lijnspanningen aanwezig in de voeding wanneer het netsnoer aangesloten is.
Varoitus	Älä kosketa virtalä hdettä virtajohdon ollessa kytkettynä . Virrankatkaisimella varustetuissa jä rjestelmissä on virtalä hteen sisä llä jä ljellä verkkojä nnite, vaikka virrankatkaisin on katkaistu-asennossa virtajohdon ollessa kytkettynä . Jä rjestelmissä , joissa ei ole virrankatkaisinta, on virtalä hteen sisä llä verkkojä nnite, kun virtajohto on kytkettynä .

Table 43 Power supply warning in other languages (continued)

Attention	Ne pas toucher le bloc d'alimentation quand le cordon d'alimentation est branché. Avec les systèmes munis d'un commutateur marche-arrêt, des tensions de ligne sont présentes dans l'alimentation quand le cordon est branché, même si le commutateur est ààl'arrêt. Avec les systèmes sans commutateur marche-arrêt, l'alimentation est sous tension quand le cordon d'alimentation est branché.
Warnung	Berü hren Sie das Netzgerä t nicht, wenn das Netzkabel angeschlossen ist. Bei Systemen mit Netzschalter liegen Leitungsspannungen im Netzgerä t vor, wenn das Netzkabel angeschlossen ist, auch wenn das System ausgeschaltet ist. Bei Systemen ohne Netzschalter liegen Leitungsspannungen im Netzgerä t vor, wenn das Netzkabel angeschlossen ist.
Avvertenza	Non toccare l'alimentatore se il cavo dell'alimentazione è collegato. Per i sistemi con un interruttore di alimentazione, tensioni di linea sono presenti all'interno dell'alimentatore anche quando l'interruttore di alimentazione è en posizione di disattivazione (off), se il cavo dell'alimentazione è collegato. Per i sistemi senza un interruttore, tensioni di linea sono presenti all'interno dell'alimentatore quando il cavo di alimentazione è collegato.
Advarsel	BerØ r ikke strØ mforsyningsenheten nå r strØ mledningen er tilkoblet. I systemer som har en strØ mbryter, er det spenning i strØ mforsyningsenheten selv om strØ mbryteren er slå tt av og strØ mledningen er tilkoblet. Nå r det gjelder systemer uten en strØ mbryter, er det spenning i strØ mforsyningsenheten nå r strØ mledingen er tilkoblet.
Aviso	Não toque na unidade abastecedora de energia quando o cabo de alimentaçção estiver ligado. Em sistemas com interruptor, a corrente eléctrica estará presente na unidade abastecedora, sempre que o cabo de alimentação de energia estiver ligado, mesmo quando o interruptor se encontrar desligado. Para sistemas sem interruptor, a tensão eléctrica dentro da unidade abastecedora só estará presente quando o cabo de alimentação estiver ligado.
Advertencia	No tocar la fuente de alimentació n mientras el cable esté enchufado. En sistemas con interruptor de alimentació n, hay voltajes de lÍ nea dentro de la fuente, incluso cuando el interruptor esté en Apagado (OFF) y el cable de alimentació n enchufado. En sistemas sin interruptor de alimentació n, hay voltajes de lÍ nea en la fuente cuando el cable está enchufado.

Table 43 Power supply warning in other languages (continued)

Varning	Vidrör inte strömförsörjningsenheten nä r nä tsladden ä r ansluten. För system med strömbrytare finns det nä tspä nning i strömförsörjningsenheten ä ven nä r strömmen har slagits av men nä tsladden ä r ansluten. För system utan strömbrytare finns det nä tspä nning i strömförsörjningsenheten nä r nä tsladden ä r ansluten.

Main Power Disconnect Warning

⚠ Warning	The power supply cord is used as the main disconnect device. Ensure that the socket outlet is located or installed near the equipment and is easily accessible.

Power Disconnect Warning in Other Languages

Table 44 Power disconnect warning in other languages

Attention	Le cordon d'alimentation est utilisé comme interrupteur général. La prise de courant doit être située ou installée àproximité de l'équipement et être facile d'accés.

Installation Warning

⚠ Warning	When working on a chassis or near power supplies, follow the Guided Maintenance procedures in the *Pillar Axiom Administrator's Guide* for instructions on how to work with and around power supplies. Use extreme caution because line voltages may be present within the chassis.

Table 45 Installation warning in other languages

Waarschuwing	Raadpleeg de installatie-aanwijzingen voordat u het systeem met de voeding verbindt.

Table 45 Installation warning in other languages (continued)

Varoitus	Lue asennusohjeet ennen jä rjestelmä n yhdistä mistä virtalä hteeseen.
Attention	Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation.
Warnung	Lesen Sie die Installationsanweisungen, bevor Sie das System an die Stromquelle anschließ en.
Avvertenza	Consultare le istruzioni di installazione prima di collegare il sistema all'alimentatore.
Advarsel	Les installasjonsinstruksjonene fØ r systemet kobles til strØ mkilden.
Aviso	Leia as instruç ões de instalação antes de ligar o sistema àsua fonte de energia.
Advertencia	Ver las instrucciones de instalació n antes de conectar el sistema a la red de alimentació n.
Varning	Lä s installationsanvisningarna innan du kopplar systemet till dess strömförsörjningsenhet.

Power Disconnect Warning

Warning	When working on a chassis or near power supplies, follow the Guided Maintenance procedures in the *Pillar Axiom Administrator's Guide* for instructions on how to work with and around power supplies. Use extreme caution because line voltages may be present within the chassis.

Warning Statement for Norway and Sweden

Table 46 Warnings for Norway and Sweden

Advarsel	Apparatet skal kobles til en jordet stikkontakt.
Varning	Apparaten skall anslutas till jordat nä tuttag.

Restricted Access Area Warning

🚫 Warning	This unit is intended for installation in restricted access areas. A restricted access area is where access can only be gained by service personnel through the use of a special tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.

Restricted Access Warning in Other Languages

Table 47 Restricted access warning in other languages

Waarschuwing	Dit toestel is bedoeld voor installatie op plaatsen met beperkte toegang. Een plaats met beperkte toegang is een plaats waar toegang slechts door servicepersoneel verkregen kan worden door middel van een speciaal instrument, een slot en sleutel, of een ander veiligheidsmiddel, en welke beheerd wordt door de overheidsinstantie die verantwoordelijk is voor de locatie.
Varoitus	Tä mä laite on tarkoitettu asennettavaksi paikkaan, johon pä ä sy on rajoitettua. Paikka, johon pä ä sy on rajoitettua, tarkoittaa paikkaa, johon vain huoltohenkilöstö pä ä see jonkin erikoistyökalun, lukkoon sopivan avaimen tai jonkin muun turvalaitteen avulla ja joka on paikasta vastuussa olevien toimivaltaisten henkilöiden valvoma.
Attention	Cet appareil est àinstaller dans des zones d'accès réservé. Ces dernières sont des zones auxquelles seul le personnel de service peut accéder en utilisant un outil spécial, un mécanisme de verrouillage et une clé, ou tout autre moyen de sécurité. L'accès aux zones de sécurité est sous le contr ô le de l'autorité responsable de l'emplacement.
Warnung	Diese Einheit ist zur Installation in Bereichen mit beschrä nktem Zutritt vorgesehen. Ein Bereich mit beschrä nktem Zutritt ist ein Bereich, zu dem nur Wartungspersonal mit einem Spezialwerkzeugs, Schloß und Schlü ssel oder anderer Sicherheitsvorkehrungen Zugang hat, und der von dem fü r die Anlage zustä ndigen Gremium kontrolliert wird.

Table 47 Restricted access warning in other languages (continued)

Avvertenza	Questa unitàdeve essere installata in un'area ad accesso limitato. Un'area ad accesso limitato è un'area accessibile solo a personale di assistenza tramite un'attrezzo speciale, lucchetto, o altri dispositivi di sicurezza, ed è controllata dall'autoritàresponsabile della zona.
Advarsel	Denne enheten er laget for installasjon i område der med begrenset adgang. Et område de med begrenset adgang gir kun adgang til servicepersonale som bruker et spesielt verktØ y, lå s og nØ kkel, eller en annen sikkerhetsanordning, og det kontrolleres av den autoriteten som er ansvarlig for områ det.
Aviso	Esta unidade foi concebida para instalação em á reas de acesso restrito. Uma á rea de acesso restrito é uma á rea àqual apenas tem acesso o pessoal de serviço autorizado, que possua uma ferramenta, chave e fechadura especial, ou qualquer outra forma de segurança. Esta á rea é controlada pela autoridade responsá vel pelo local.
Advertencia	Esta unidad ha sido diseñ ada para instalarse en á reas de acceso restringido. Área de acceso restringido significa un á rea a la que solamente tiene acceso el personal de servicio mediante la utilizació n de una herramienta especial, cerradura con llave, o algún otro medio de seguridad, y que está bajo el control de la autoridad responsable del local.
Varning	Denna enhet ä r avsedd för installation i områ den med begrä nsat tillträ de. Ett områ de med begrä nsat tillträ de få r endast tillträ das av servicepersonal med ett speciellt verktyg, lå s och nyckel, eller annan sä kerhetsanordning, och kontrolleras av den auktoritet som ansvarar för områ det.

Product Disposal Warning

⚠ Warning	Ultimate disposal of this product should be handled according to all national laws and regulations.

Product Disposal Warning in Other Languages

Table 48 Product disposal warning in other languages

Waarschuwing	Dit produkt dient volgens alle landelijke wetten en voorschriften te worden afgedankt.
Varoitus	Tä mä n tuotteen lopullisesta hä vittä misestä tulee huolehtia kaikkia valtakunnallisia lakeja ja sä ä nnöksiä noudattaen.
Attention	La mise au rebut définitive de ce produit doit être effectuée conformément àtoutes les lois et réglementations en vigueur.
Warnung	Dieses Produkt muß den geltenden Gesetzen und Vorschriften entsprechend entsorgt werden.
Avvertenza	L'eliminazione finale di questo prodotto deve essere eseguita osservando le normative italiane vigenti in materia.
Advarsel	Endelig disponering av dette produktet må skje i henhold til nasjonale lover og forskrifter.
Aviso	A descartagem final deste produto deverá ser efectuada de acordo com os regulamentos e a legislação nacional.
Advertencia	El desecho final de este producto debe realizarse seg\x9c n todas las leyes y regulaciones nacionales.
Varning	Slutlig kassering av denna produkt bör skötas i enlighet med landets alla lagar och föreskrifter.

Jewelry Removal Warning

⚠ Warning	Some equipment is connected to power lines. Before you work on this equipment, remove all jewelry that contains metal. Such jewelry includes rings, necklaces, and watches. Metal objects heat up when connected to power and ground. Hot metal objects can cause serious burns or weld the metal object to the terminals.

Jewelry Removal Warning in Other Languages

Table 49 Jewelry removal warning in other languages

Waarschuwing	Alvorens aan apparatuur te werken die met elektrische leidingen is verbonden, sieraden (inclusief ringen, kettingen en horloges) verwijderen. Metalen voorwerpen worden warm wanneer ze met stroom en aarde zijn verbonden, en kunnen ernstige brandwonden veroorzaken of het metalen voorwerp aan de aansluitklemmen lassen.
Varoitus	Ennen kuin työskentelet voimavirtajohtoihin kytkettyjen laitteiden parissa, ota pois kaikki korut (sormukset, kaulakorut ja kellot mukaan lukien). Metalliesineet kuumenevat, kun ne ovat yhteydessä sä hkövirran ja maan kanssa, ja ne voivat aiheuttaa vakavia palovammoja tai hitsata metalliesineet kiinni liitä ntä napoihin.
Attention	Avant d'accéder àcet équipement connecté aux lignes électriques, ô ter tout bijou (anneaux, colliers et montres compris). Lorsqu'ils sont branchés àl'alimentation et reliés àla terre, les objets métalliques chauffent, ce qui peut provoquer des blessures graves ou souder l'objet métallique aux bornes.
Warnung	Vor der Arbeit an Gerä ten, die an das Netz angeschlossen sind, jeglichen Schmuck (einschließ lich Ringe, Ketten und Uhren) abnehmen. Metallgegenstä nde erhitzen sich, wenn sie an das Netz und die Erde angeschlossen werden, und können schwere Verbrennungen verursachen oder an die Anschluß klemmen angeschweiß t werden.
Avvertenza	Prima di intervenire su apparecchiature collegate alle linee di alimentazione, togliersi qualsiasi monile (inclusi anelli, collane, braccialetti ed orologi). Gli oggetti metallici si riscaldano quando sono collegati tra punti di alimentazione e massa: possono causare ustioni gravi oppure il metallo puòsaldarsi ai terminali.
Advarsel	Fjern alle smykker (inkludert ringer, halskjeder og klokker) fØ r du skal arbeide på utstyr som er koblet til kraftledninger. Metallgjenstander som er koblet til kraftledninger og jord blir svært varme og kan forå rsake alvorlige brannskader eller smelte fast til polene.

Table 49 Jewelry removal warning in other languages (continued)

Aviso	Antes de trabalhar em equipamento que esteja ligado a linhas de corrente, retire todas as jó ias que estiver a usar (incluindo anéis, fios e reló gios). Os objectos metá licos aquecerão em contacto com a corrente e em contacto com a ligação àterra, podendo causar queimaduras graves ou ficarem soldados aos terminais.
Advertencia	Antes de operar sobre equipos conectados a lÍ neas de alimentació n, quitarse las joyas (incluidos anillos, collares y relojes). Los objetos de metal se calientan cuando se conectan a la alimentació n y a tierra, lo que puede ocasionar quemaduras graves o que los objetos metá licos queden soldados a los bornes.
Varning	Tag av alla smycken (inklusive ringar, halsband och armbandsur) innan du arbetar på utrustning som ä r kopplad till kraftledningar. Metallobjekt hettas upp nä r de kopplas ihop med ström och jord och kan förorsaka allvarliga brä nnskador; metallobjekt kan också sammansvetsas med kontakterna.

Qualified Personnel Warning

⚠ **Warning**   Only qualified personnel should install or replace this equipment.

Table 50 Qualified personnel warning in other languages

Waarschuwing	Installatie en reparaties mogen uitsluitend door getraind en bevoegd personeel uitgevoerd worden.
Varoitus	Ainoastaan koulutettu ja pä tevä henkilökunta saa asentaa tai vaihtaa tä mä n laitteen.
Avertissement	Tout installation ou remplacement de l'appareil doit être réalisé par du personnel qualifié et compétent.
Achtung	Gerä t nur von geschultem, qualifiziertem Personal installieren oder auswechseln lassen.

Table 50 Qualified personnel warning in other languages (continued)

Avvertenza	Solo personale addestrato e qualificato deve essere autorizzato ad installare o sostituire questo apparecchio.
Advarsel	Kun kvalifisert personell med riktig opplæring bØ r montere eller bytte ut dette utstyret.
Aviso	Este equipamento deverá ser instalado ou substituÍ do apenas por pessoal devidamente treinado e qualificado.
Atenció n	Estos equipos deben ser instalados y reemplazados exclusivamente por personal técnico adecuadamente preparado y capacitado.
Varning	Denna utrustning ska endast installeras och bytas ut av utbildad och kvalificerad personal.

Warning Statement for Finland

Table 51 Warning statement for Finland

Varoitus	Alleviates ja suojalukitus ohitettaessa olet alttiina nãkymãttõmãlle lasersãteilylle.Ãjã katso sãteeseen.

Warning Statement for Sweden

Table 52 Warning statement for Sweden

Varning	Osynlig laserstrå lning nä r denna del ä r öppen och förregleringen ä r urkopplad. Rikta inte blicken in mot strå len.

Power Cabling Warning

⚠ **Warning**	Secure all power cabling when you install this unit to avoid disturbing field-wiring connections.

Power Cabling Warning in Other Languages

Table 53 Power cabling warning in other languages

Waarschuwing	Zet alle stroomkabels vast wanneer dit toestel wordt geÏnstalleerd om te voorkomen dat de verbindingen van de veldbedrading worden verstoord.
Varoitus	Kiinnitä kaikki voimakaapelit tiukkaan tä tä laitetta asentaessasi, jotta vä ltä t kentä n johdinkytkentöjen vioittumista.
Attention	Lors de l'installation de cet appareil, fixer tous les câ bles d'alimentation pour éviter de provoquer des perturbations aux raccordements des câ blages propres au site.
Warnung	Bei der Installation dieser Einheit die Netzverkabelung befestigen, um die Störung von Feldkabelanschlü ssen zu vermeiden.
Avvertenza	In fase di installazione dell'unità, assicurare tutti i cablaggi di alimentazione per evitare di alterare i collegamenti degli avvolgimenti di campo.
Advarsel	Nå r denne enheten installeres, må alle kraftledninger sikres for å unngå at feltkabelkoblingene forstyrres.
Aviso	Para evitar problemas com as ligaç õ, es de rede de campanha, prenda todos os cabos de corrente quando instalar esta unidade.
Advertencia	Sujetar todo el cableado de alimentació n cuando se instale este equipo para evitar que se mezcle con las conexiones del cableado "in situ".
Varning	Fä st allt starkströmskablage vid installation av denna enhet så att fä ltkopplingen inte rubbas.

Supply Circuit Warning

| ⚠ Warning | Do not overload the circuit when you connect components to the power supply. |

Supply Circuit Warning in Other Languages

Table 54 Supply circuit warning in other languages

Waarschuwing	Let erop dat de toestellen op voedingscircuits worden aangesloten zonder het vermogen van de bedrading te overschrijden.
Varoitus	Laiteyksiköt on yhdistettä vä huolellisesti syöttöpiiriin niin, että johdot eivä t ole ylikuormitettuja.
Avertissement	Veillez àbien connecter les unités au circuit d'alimentation afin de ne pas surcharger les connections.
Achtung	Beim Anschließ en der Gerä te an das Stromnetz ist darauf zu achten, daß die Schaltverbindungen nicht ü berlastet werden.
Avvertenza	Fare attenzione quando si collegano le unitàal circuito di alimentazione, per non sovraccaricare i cablaggi.
Advarsel	Vær nØ ye med å koble enheter til strØ mforsyningskretsen slik at ledningene ikke overbelastes.
Aviso	Deverá ter precaução ao ligar unidades ao circuito de fornecimento de energia, para não sobrecarregar a instalação.
Atenció n	Poner mucho cuidado al conectar los equipos al circuito de alimentació n a fin de no sobrecargar el cableado.
Varning	Var noga vid anslutning av enheter till matarströmkretsen så att ledningarna inte överbelastas.

Voltage Mismatch Warning

| ⚠ Warning | A voltage mismatch can cause equipment damage and may pose a fire hazard. If the voltage indicated on the label differs from the power outlet voltage, *do not connect the chassis to that receptacle*. |

Voltage Mismatch Warning in Other Languages

Table 55 Voltage mismatch warning in other languages

Waarschuwing	Aansluiting op een verkeerd voedingsvoltage kan beschadiging van de apparatuur veroorzaken en tot brandgevaar leiden. Het chassis mag niet aangesloten worden als de spanning die op het label staat aangegeven, anders is dan de spanning van het stopcontact.
Varoitus	Erisuuruisten jä nnitteiden yhdistä minen voi aiheuttaa laitevaurion ja tulipalon vaaran. Jos tarraan merkitty jä nnite eroaa pistorasian jä nnitteestä , ä lä yhdistä asennuspohjaa pistorasiaan.
Avertissement	Une erreur de voltage risque d'endommager l'appareil et constitue un risque d'incendie. Si la tension indiquée sur l'étiquette est différente de la tension de l'alimentation, ne connectez en aucun cas le châ ssis àla prise.
Achtung	Bei nicht ü bereinstimmender Spannung kann es zu Gerä teschä den und Feuergefahr kommen. Wenn die auf dem Etikett angegebene Spannung nicht mit der Steckdosenspannung ü bereinstimmt, schließ en Sie das Gerä t nicht an diese Steckdose an.
Avvertenza	Una tensione inadeguata puõcausare danni all'apparecchio e rischio di incendio. Se la tensione riportata sulla targhetta è diversa da quella della presa di alimentazione, non collegare lo chassis a tale presa.
Advarsel	Ulik spenning kan forå rsake skade på utstyret og inneb\xbe re brannfare. Dersom spenningen på merkelappen er

Table 55 Voltage mismatch warning in other languages (continued)

	forskjellig fra spenningen i stikkontakten, må du ikke koble kabinettet til den stikkontakten.
Aviso	Uma voltagem incorrecta poderá causar danos no equipamento e constituir um risco de incêndio. Se a voltagem indicada na etiqueta for diferente da voltagem de saÍ da de corrente da parede, não ligue o chassis a esse receptá culo.
Atenció n	Las diferencias en el voltaje pueden causar dañ os a los equipos y presentar peligro de incendio. Si el voltaje indicado en la etiqueta es diferente al de la toma de alimentació n, no conectar el chasis a dicha toma.
Varning	Inkompatibla spä nningar kan resultera i materiella skador samt utgör brandfara. Om den spä nning som anges på etiketten skiljer sig frå n strömuttagets spä nning ska chassit inte anslutas till detta uttag.

SELV Circuit Warning

 Warning To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables.

SELV Circuit Warning in Other Languages

Table 56 SELV circuit warning in other languages

Waarschuwing	Om elektrische schokken te vermijden, mogen veiligheidscircuits met extra lage spanning (genaamd SELV = Safety Extra-Low Voltage) niet met telefoonnetwerkspanning (TNV) circuits verbonden worden. LAN (Lokaal netwerk) poorten bevatten SELV circuits en WAN (Regionaal netwerk) poorten bevatten TNV circuits. Sommige LAN en WAN poorten gebruiken allebei RJ-45 connectors. Ga voorzichtig te werk wanneer u kabels verbindt.

Table 56 SELV circuit warning in other languages (continued)

Varoitus	Jotta vä ltyt sä hköiskulta, ä lä kytke pienjä nnitteisiä SELV-suojapiirejä puhelinverkkojä nnitettä (TNV) kä yttä viin virtapiireihin. LAN-portit sisä ltä vä t SELV-piirejä ja WAN-portit puhelinverkkojä nnitettä kä yttä viä piirejä . Osa sekä LAN- että WAN-porteista kä yttä ä RJ-45-liittimiä . Ole varovainen kytkiessä si kaapeleita.
Attention	Pour éviter une électrocution, ne raccordez pas les circuits de sécurité basse tension (Safety Extra-Low Voltage ou SELV) àdes circuits de tension de réseau téléphonique (Telephone Network Voltage ou TNV). Les ports du réseau local (LAN) contiennent des circuits SELV et les ports du réseau longue distance (WAN) sont munis de circuits TNV. Certains ports LAN et WAN utilisent des connecteurs RJ-45. Raccordez les câ bles en prenant toutes les précautions nécessaires.
Warnung	Zur Vermeidung von Elektroschock die Sicherheits-Kleinspannungs-Stromkreise (SELV-Kreise) nicht an Fernsprechnetzspannungs-Stromkreise (TNV-Kreise) anschließ en. LAN-Ports enthalten SELV-Kreise, und WAN-Ports enthalten TNV-Kreise. Einige LAN- und WAN-Ports verwenden auch RJ-45-Steckverbinder. Vorsicht beim Anschließ en von Kabeln.
Avvertenza	Per evitare scosse elettriche, non collegare circuiti di sicurezza a tensione molto bassa (SELV) ai circuiti a tensione di rete telefonica (TNV). Le porte LAN contengono circuiti SELV e le porte WAN contengono circuiti TNV. Alcune porte LAN e WAN fanno uso di connettori RJ-45. Fare attenzione quando si collegano cavi.
Advarsel	Unngå å koble lavspenningskretser (SELV) til kretser for telenettspenning (TNV), slik at du unngå r elektrisk stØ t. LAN-utganger inneholder SELV-kretser og WAN-utganger inneholder TNV-kretser. Det finnes bå de LAN-utganger og WAN-utganger som bruker RJ-45-kontakter. Vår forsiktig nå r du kobler kabler.
Aviso	Para evitar choques eléctricos, não conecte os circuitos de segurança de baixa tensão (SELV) aos circuitos de tensão de rede telefó nica (TNV). As portas LAN contêm circuitos SELV e as portas WAN contêm circuitos TNV. Algumas portas LAN e WAN usam conectores RJ-45. Tenha o devido cuidado ao conectar os cabos.
Advertencia	Para evitar la sacudida eléctrica, no conectar circuitos de seguridad de voltaje muy bajo (safety extra-low voltage =

Table 56 SELV circuit warning in other languages (continued)

	SELV) con circuitos de voltaje de red telefó nica (telephone network voltage = TNV). Los puertos de redes de á rea local (local area network = LAN) contienen circuitos SELV, y los puertos de redes de á rea extendida (wide area network = WAN) contienen circuitos TNV. En algunos casos, tanto los puertos LAN como los WAN usan conectores RJ-45. Proceda con precaució n al conectar los cables.
Varning	För att undvika elektriska stötar, koppla inte sä kerhetskretsar med extra lå g spä nning (SELV-kretsar) till kretsar med telefonnä tspä nning (TNV-kretsar). LAN-portar innehå ller SELV-kretsar och WAN-portar innehå ller TNV-kretsar. Vissa LAN- och WAN-portar ä r försedda med RJ-45-kontakter. Iaktta försiktighet vid anslutning av kablar.

Incorrect Connection Warning

⚠ Warning	Incorrect connection of this equipment to a general purpose outlet could result in a hazardous situation.

Incorrect Connection Warning in Other Languages

Table 57 Connection warning in other languages

Waarschuwing	Incorrecte aansluiting van deze of aangesloten apparatuur op een stopcontact voor algemene doeleinden kan een gevaarlijke situatie tot gevolg hebben.
Varoitus	Tä mä n laitteen tai siihen liitettyjen laitteiden virheellinen kytkentä yleispistorasiaan voi aiheuttaa vaaratilanteen.
Attention	Un branchement incorrect de cet équipement ou de l'équipement branché àune prise d'usage général peut créer une situation dangereuse.
Warnung	Inkorrektes Anschließ en von diesem oder damit verbundenen Gerä ten an einer Allzwecksteckdose kann eine Gefahrensituation verursachen.

Table 57 Connection warning in other languages (continued)

Avvertenza	Un collegamento errato di questo apparecchio, o dell'apparecchiatura a esso collegato, a una presa di uso generale pu\x98 causare una situazione pericolosa.
Advarsel	Feil kobling av dette utstyret eller tilhØ rende utstyr til et vanlig uttak kan fØ re til farlige situasjoner.
Aviso	Uma conexão incorrecta a uma ficha de alimentação eléctrica normal, deste ou de qualquer equipamento a este conectado, poderá resultar numa situação potencialmente perigosa.
Advertencia	La conexió n incorrecta de este equipo, o del equipo conectado, a una toma o receptá culo de tipo general podrÍ a resultar en una situació n peligrosa.
Varning	Felaktig koppling av denna eller ansluten utrustning till ett universaluttag kan orsaka riskfylld situation.

Caution Notices

⚠ Caution	It is required that, if interconnecting equipment resides within more than one equipment rack, these racks should be at the same ground potential.
⚠ Caution	When handling any electronic device, be sure to take electrostatic discharge (ESD) precautions. The minimum requirement is a properly grounded antistatic wrist strap and grounding wire.
⚠ Caution	If removal of a FRU or blanking plate leaves a hole, block the hole quickly with a blanking plate or by installing a replacement FRU. Failure to do this can disrupt airflow and seriously reduce cooling.
⚠ Caution	Ambient temperature within the rack may be greater than that of the room. With regard to the maximum rated ambient for Pillar Axiom 600 components, do not reduce the amount of airflow that is required for safe operation.
⚠ Caution	Never block the ventilation holes in a chassis. Sufficient air circulation is required for the internal components to operate properly and to prevent the possibility of fire. Do not push objects of any kind into the ventilation holes. Such action could result in fire or electrical shock. Keep all liquids away from Pillar Axiom 600 components.
⚠ Caution	Ensure that component weight distribution in the rack is balanced. Uneven weight distribution can cause hazardous instability. The rack should have stabilization feet or brackets installed, or have another means that does not permit the rack to tip when you service it. At a minimum, we recommend that you install stabilization brackets on the rear feet of the rack because the rack is front-heavy.
⚠ Caution	A Slammer weighs 94 pounds (42.6 kilograms). For safe handling, use two people to lift it.

| ⚠ **Caution** | Qualified personnel are advised to exercise great care at all times when they work on a Pillar Axiom 600 system. Remember to: |

- Remove rings, watches, or other jewelry and neckties before you begin any procedure.

- Use caution near fan assemblies; the moving parts can change speed unexpectedly.

- Use the correct tools for the job.

- Keep all paperwork up to date, complete, and accurate.

| ⚠ **Caution** | The sum of the ratings of the components that plug into the PDU must be less than 80% of the current and power ratings of the PDU. Similarly, the current rating of the PDU must be less than 80% of the rating for the building supply circuit. |

| ⚠ **Caution** | A Brick weighs up to 65 pounds (29.5 kilograms). For safe handling, use two people to lift it. |

APPENDIX B

Slammer and Brick LED Status

About LED Status

To restore reliability to the Pillar Axiom system, you must locate the specific failed component so that you can replace it. Hardware LED configuration helps you identify the failed component.

Important! If you cannot locate the hardware component that needs to be replaced, contact the Pillar World Wide Customer Support Center:

- USA: 1-877-4PILLAR (1-877-474-5527)

- International: +1 408 518 4400

Tip: Have your system serial number ready. If you contact the Pillar World Wide Customer Support Center by telephone, you will need the six digits in the middle of your system serial number. For example, if your serial number is A001368BFT, provide the digits 001368.

A Pillar Axiom system includes LEDs to indicate the status of the hardware components:

- A yellow or amber (orange) LED typically indicates a fault or that a component is initializing.

- A green LED or an LED that is flickering rapidly indicates a normal operational state, such as when a connection exists or traffic is present.

- A fixed frequency blinking green LED indicates that a path is offline or a component is booting.

- An LED can:

    o Be continuously on but flickering with activity at a varying rate.

    o Be off.

    o Be continuously on.

    o Blink fast—just over 2 blinks each sec (or 2.375 blinks/sec).

    o Blink slowly—once every 1 1/2 sec (0.67 blinks/sec).

Pillar Axiom Storage Services Manager's Guided Maintenance feature triggers Slammer and Brick LEDs to blink or display in specific patterns to help you identify component status. The Pilot has no Guided Maintenance except the Identify function, so the bezel LEDs do not blink. Note that the other Pilot's LEDs do blink.

Note: LED interpretations in this appendix apply to a system after it has powered on.

Related concepts
- *About LED Startup Codes*

Slammer LED Status

Light emitting diodes (LEDs) on a Slammer indicate the status of the controller and its two control units (CUs). The LEDs are located on the bezel and on the front and back of the controller chassis. The following table describes the bezel LED states for the Status, Activity, and Fault LEDs. These LED states are pertinent when the Slammer node is brought online upon having booted successfully and the GUI recognizes the system. If the Slammer node is in the boot process and the GUI does not recognize the system, refer to the detailed LED states documented in this guide.

Note: The bezel LED states (for the Status, Activity, and Fault LEDs) and the private interconnect module (PIM) LED states (for the ST, ACT, FLT LEDs) display similar information. However, if the bezel is not seated correctly or has a faulty connection, the PIM LEDs indicate an error because the bezel is not detected by the Pillar Axiom system.

Table 58 LEDs on the Slammer bezel

Status	Activity	Fault	Software module	Meaning
Green	Off	Off	DMS	System is normal with no activity.
Green	Variable green	Off	Various	System is normal and displays some activity. Higher the activity, faster is the blinking of the Activity LED.
Variable	Variable	On	DMS	Fault LED is turned on due to various hardware errors, such as: • The bezel is not detected (at the PIM side only). • The network interface module (NIM) or PIM is not detected.

Table 58 LEDs on the Slammer bezel (continued)

Status	Activity	Fault	Software module	Meaning
				• There is a DMS initialization error. • There is a power supply error. • The Slammer cannot be powered off due to the thermal or voltage rail being out of bounds.
Slow orange	Slow orange	Slow	DMS	Beaconing. All other FRU Fault LEDs are slowly starting to blink amber.
Variable	Variable	Variable	Various	If the Slammer node is in the boot process and the GUI does not recognize the system, refer to the detailed LED states documented in this guide.

On the front of a Slammer chassis (behind the bezel), each CU has a set of FRU Fault LEDs to indicate the status of the following components:

- Battery

- Fans

- Motherboard

The LEDs on the Slammer bezel are identical to the LEDs on the upper left corner of the private interconnect module (PIM) and must have the same status.

> **Note:** The LEDs for a particular CU may not be lit after that CU is prepared for service through the GUI.

Figure 82 LEDs on the front of the Slammer chassis
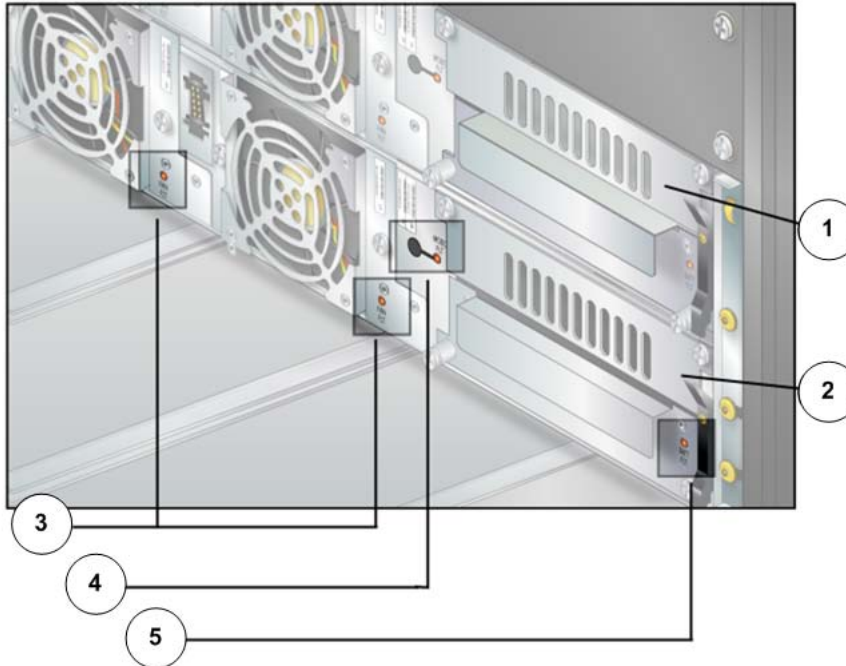
Legend

1 CU 0	
2 CU 1	
3 Fan LEDs	
4 Motherboard LEDs	
5 Battery LEDs	

Related references

- *Slammer LED Startup and Halt Codes*

Slammer Battery LED Status

Table 59 Slammer battery LED status

Label	Color	Meaning
BATT FLT	Amber	Battery in this CU has failed.

Table 59 Slammer battery LED status (continued)

Label	Color	Meaning
	Off	No failure exists.

Slammer Fan LED Status

Table 60 Slammer fan LED status

Label	Color	Meaning
FAN FLT	Amber	Fan in this CU has encountered an error or has failed.
	Off	No failure exists.

Slammer Motherboard LED Status

Table 61 Slammer motherboard LED status

Label	Color	Meaning
MOBO FLT	Amber	Motherboard in this CU has failed.
	Off	No failure exists.

LEDs on the Back of the Slammer Chassis

On the back of a Slammer chassis, each control unit (CU) has a set of LEDs to indicate the status of the following components in that CU:

- Power supply assemblies

- Network interface module (copper or optical):

    o GbE copper connectors for 1000BaseT

○ GbE optical connectors for optical GbE

○ SAN GBIC for Fibre Channel longwave or shortwave optical connectors

- Private interconnect module

- CU

- Fibre Channel switch (FS) circuits

- Fibre Channel (FC) circuits

Figure 83 LEDs on the back of the Slammer chassis
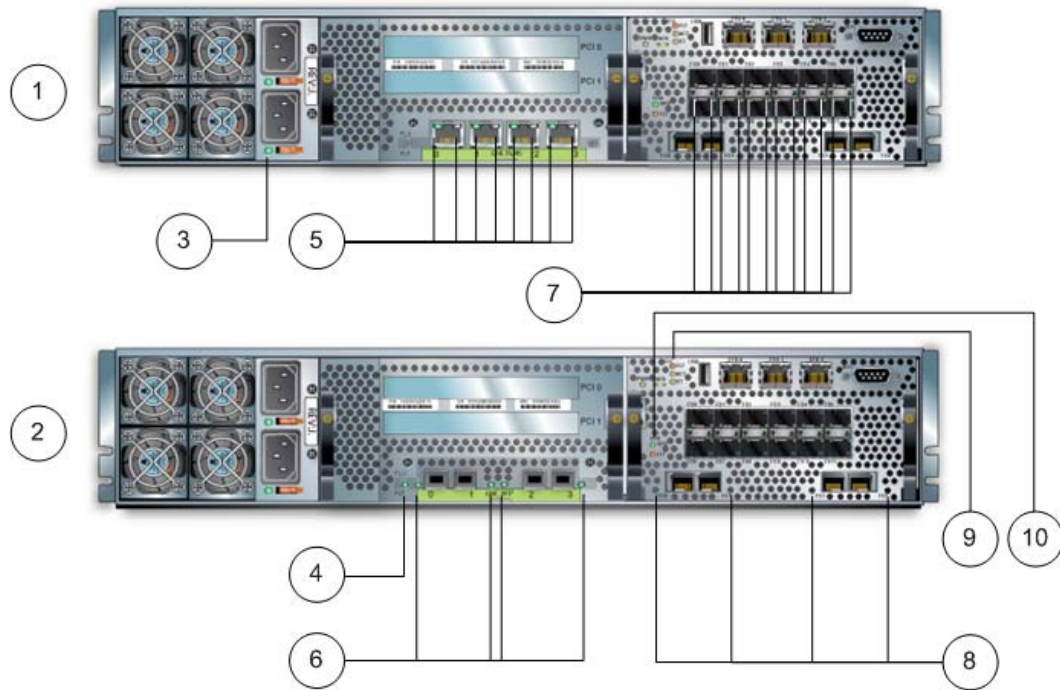
Legend	1 Slammer CU with a copper network interface module (NIM)	6 Optical network port LEDs
	2 Slammer CU with an optical NIM	7 Private interconnect module (PIM) Fibre Channel (FC) port LEDs
	3 Power supply LED	8 PIM FC switch circuit port LEDs
	4 NIM FRU LED	9 Slammer CU LEDs
	5 Copper network port LEDs	10 PIM FRU LEDs

Note: The NIMs and PIMs displayed above are representative. The FRUs that are installed in your Slammer may differ.

Slammer CU LED Status

Use the following tables to interpret the meanings of the LEDs on the back of the Slammer chassis. The table below describes the private interconnect module (PIM) LED states for the Status, Activity, and Fault LEDs. These LED states are pertinent when the Slammer node is brought online upon having booted successfully and the GUI recognizes the system. If the Slammer node is in the boot process and the GUI does not recognize the system, refer to the detailed LED states documented in this guide.

Note: The bezel LED states (for the Status, Activity, and Fault LEDs) and the private interconnect module (PIM) LED states (for the ST, ACT, FLT LEDs) display similar information. However, if the bezel is not seated correctly or has a faulty connection, the PIM LEDs indicate an error because the bezel is not detected by the Pillar Axiom system.

Table 62 LEDs on the Slammer CU LED status

ST	ACT	FLT	Software module	Meaning
Green	Off	Off	DMS	System is normal with no activity.
Green	Variable green	Off	Various	System is normal and displays some activity. Higher the activity, the faster the blinking of the Activity LED.
Variable	Variable	On	DMS	Fault LED is turned on due to various hardware errors, such as: • The bezel is not detected (at the PIM side only). • The network interface module

Table 62 LEDs on the Slammer CU LED status (continued)

ST	ACT	FLT	Software module	Meaning
				(NIM) or PIM is not detected. • There is a DMS initialization error. • There is a power supply error. • The Slammer cannot be powered off due to the thermal or voltage rail being out of bounds.
Slow orange	Slow orange	Slow	DMS	Beaconing. All other FRU Fault LEDs are slowly starting to blink amber.
Variable	Variable	Variable	Various	If the Slammer node is in the boot process and the GUI does not recognize the system, refer to the detailed LED states documented in Slammer LED Startup and Halt Codes.

Note: If the FLT LED at the back of the private interconnect module is lit and no other fault LEDs are lit, and the GUI status is Normal, the bezel is most likely removed or loose.

The Slammer CU LEDs at the back of the PIM must match the LEDs on the front bezel of the Slammer except where noted. If the Slammer CU LEDs at the back of the PIM and on the bezel do not match, it is important to note this for troubleshooting purposes.

Related references
- *Slammer LED Startup and Halt Codes*

Slammer FC Circuit LED Status

Table 63 Slammer FC circuit LED status

LED identifier and color	Meaning
Yellow (blink)	FS circuits in this CU have failed.
Yellow (solid)	Link exists.
Green (solid)	Link exists.
Green (blink)	Traffic exists.

Slammer FS Port LED Status

Table 64 Slammer FS port LED status

LED identifier and color	Meaning
Yellow	FS circuits in this CU have failed.
Green (solid)	Link exists.

Slammer Copper GbE Network Port Status

Table 65 Slammer copper GbE network port status

LED identifier and color	Meaning
Amber (blink) [right side]	Traffic exists.
Green [left side]	Link is established; if off, no link exists.

About Slammer Optical Network Port Status

Table 66 NAS Slammer SFP optical network port status

LED identifier and color	Meaning
Amber (blink)	Traffic exists; if off, no traffic exists.
Green	Link is established; if off, no link exists.

8 Gb/s Fiber Channel (FC) HBA LED Status

Table 67 8 Gb/s FC HBA LED status

LED identifier and color		Meaning
8 (top LED)	Yellow	Link is operating at 8 Gb/s, blinking with I/O activity.
	Off	Link is not operating at 8 Gb/s.
	Note: In a normal operating optimized port, the speed should be 8 Gb/s.	
4 (middle LED)	Green	Link is operating at 4 Gb/s, blinking with I/O activity.
	Off	Link is not operating at 4 Gb/s.
2 (bottom LED)	Amber	Link is operating at 2 Gb/s, blinking with I/O activity.
	Off	Link is not operating at 2 Gb/s.
Note: All three LEDs are turned on and blinking when power is applied to the HBA and after the firmware initialization for the 8 Gb/s FC HBA.		
Note: All three LEDs are turned on solid when power is applied to the HBA and before the firmware initialization for the 8 Gb/s FC HBA.		

Table 67 8 Gb/s FC HBA LED status (continued)

LED identifier and color	Meaning
Note: All three LEDs blinking alternately indicates a firmware error for the 8 Gb/s FC HBA.	
Note: The blinking of the 8 Gb/s LED and the 2 Gb/s LED indicates that the LED is a beacon.	

10 Gb/s Ethernet HBA LED Status

Table 68 10 Gb/s Ethernet HBA LED status

LED identifier and color		Meaning
Speed (left LED)	Solid green	The HBA is operating at 10 Gb/s.
	Solid yellow	The HBA is operating at 1 Gb/s.
	Off	No physical connection to the port or the port is not operational.
	Note: In a normal operating optimized port, the speed should be 10 Gb/s.	
Activity or Link (right LED)	Solid green	Link on this port is operational.
	Blinking green	Indicates activity on this port.
	Off	No physical connection to the port or the port is not operational.

Slammmer Network Interface Module LED Status

Table 69 Slammer network interface module LED status

LED identifier and color	Meaning
Amber	Network interface module in this CU has failed.
Off	No failure is indicated.

Slammmer Power Supply LED Status

Table 70 Slammer power supply LED status

LED identifier and color	Meaning
Amber	Power supply in this CU has failed. Contact the Pillar World Wide Customer Support Center if this condition persists.
Green	AC is applied and DC is active.
Off	No AC.

Slammer High Efficiency Power Supply (HEPS) LED Status

Table 71 Slammer High Efficiency Power Supply (HEPS) LED status

LED identifier and color	Meaning
Green	Node is powered with no power supply module errors.
Off	No power. Check the seating of the HEPS module and AC. If both power supply modules have no LEDs, it indicates that the node is not

Table 71 Slammer High Efficiency Power Supply (HEPS) LED status (continued)

LED identifier and color	Meaning
	powered. Contact the Pillar World Wide Customer Support Center if this condition persists.
Blinking red	Persistent warning condition or missing AC. Check the AC and if the warning continues, call Pillar World Wide Customer Support Center.
Solid red	Critical condition and requires replacement. If both power supply modules display solid red LEDs, it indicates that the node is not powered. Contact the Pillar World Wide Customer Support Center if this condition persists.
Alternating blinking red and green	Warning condition is cleared. This is a transitory state, indicating that the power supply module warning condition is cleared. However, there have been no updates to the software state. Once updates to the software state are made, the LED should turn to green. If this condition continues, call Pillar World Wide Customer Support Center.

Slammer Private Interconnect Module LED Status

Table 72 Slammer private interconnect module PIM LED status

LED identifier and color		Meaning
SPD	Off	Version 1 PIM: Fibre Channel (FC) switch is not initialized or a problem exists. For the latter, FLT should be amber. Version 2 PIM: 2 gigabit operation.
	Green	Version 1 PIM: FC switch is ready and in switch mode. Version 2 PIM: 4 gigabit operation.

Table 72 Slammer private interconnect module PIM LED status (continued)

LED identifier and color		Meaning
FRU FLT	Amber	Fault exists in FC switch logic, interface, or other FRU circuitry.
	Off	No failure exists.

Note: The FRU FLT LED is next to the FC 0 connector on the bottom left of the private interconnect module.

Note: The three LEDS (FLT, ACT, and ST) at the top left of the private interconnect module reflect the state of the entire Slammer CU and have the same meaning as the LEDs on the bezel.

About Brick LED Status

Brick LEDs indicate the status of the Brick and disk arrays. For SATA Bricks and FC RAID Bricks, these LEDs also indicate the status of the RAID controllers. The LEDs are on the bezel and on the front and back of the chassis.

On the bezel, each control unit (CU) in the Brick has a status LED to indicate the activity for that CU and whether the Brick is powered on.

Figure 84 Brick bezel LEDs

Legend   1 Three LEDs

Brick Bezel LED Status

Table 73 Brick bezel LED status

LED identifier and color		Meaning
CU 0 Status	Green (blink)	This control unit (CU) is active. Blink rate is constant at 20Hz.
CU 1 Status	Green (blink)	This CU is active. Blink rate is constant at 20Hz.
Fault	Amber	A FRU failed or the bezel is improperly seated.
	Off	No FRU has failed.
Pillar	Green (solid)	Power is on.
	Off	Power is off or bezel power cable is damaged.

Note: When Guided Maintenance beacons the Brick to identify it, Guided Maintenance:

- Blinks the CU Status LEDs at 2Hz.

- Lights the Fault LED solid amber.

LEDs on Drive Carriers

When Guided Maintenance beacons the drive to identify it, Guided Maintenance:

- Turns off the top and bottom LEDs.

- Blinks the middle LED.

On the front of a Brick chassis (beneath the bezel), you have access to all twelve drive carriers. The carriers are numbered as shown in the following figure.

Figure 85 Drive carrier numbering in a Brick and carrier LEDs
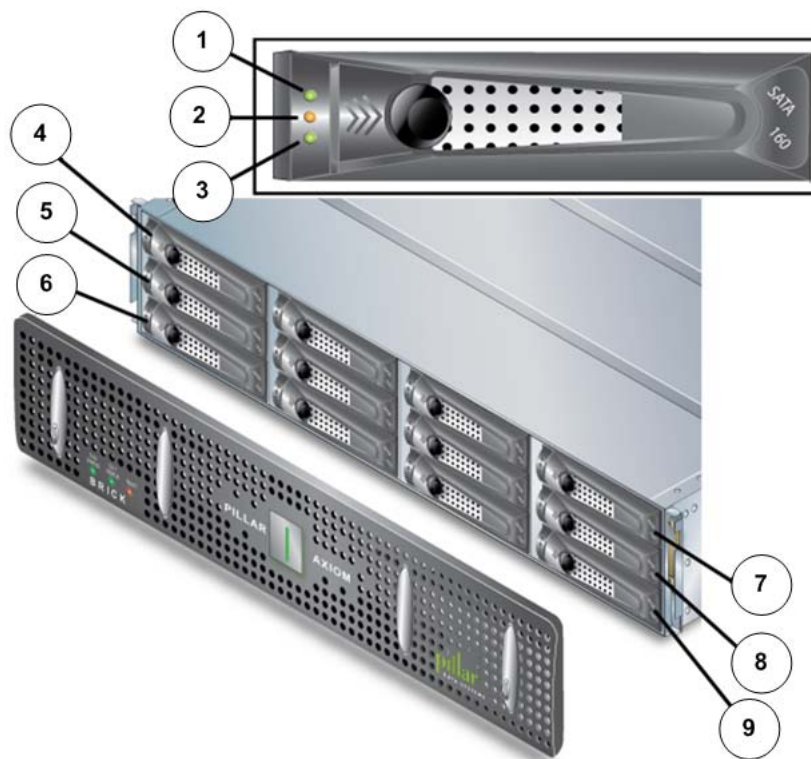
Legend

1 CU 1 active	6 Drive 2
2 Ready light	7 Drive 9
3 CU 0 active	8 Drive 10
4 Drive 0	9 Drive 11
5 Drive 1	

Each carrier has three LEDs to indicate its status.

Table 74 LEDs on drive carriers

Position	Color	Meaning
Top	SATA: Green (blink)	Activity from RAID controller 1.
	FC: Off	Not used for FC.
Middle	Amber	Drive has faulted.

Table 74 LEDs on drive carriers (continued)

Position	Color	Meaning
	Off	• ES module is missing. • Drive has no power. • Drive has spun down.
	Green (blink)	Drive discovery. The Brick is determining the physical existence of this drive after power up or drive insertion.
	Green	Drive is ready.
Bottom	Green (blink)	SATA drives: Activity from RAID controller 0. FC drives: Activity on the drive.

Note: When there is no I/O activity on a Brick storage enclosure, the RAID firmware runs a background operation that scans all drives for media errors and, if media errors are found, performs repair operations. This background activity causes the LEDs to blink green on the idle system or Brick. Such activity can take several hours to complete. When host I/O resumes, this background operation stops; it resumes only when there are no further I/Os from a host.

Note: When Guided Maintenance beacons the drive to identify it, Guided Maintenance:

- Turns off the top and bottom LEDs.

- Blinks the middle LED.

Tip: Guided Maintenance also shows the position of the drive in the Brick to help you avoid introducing a double fault into a RAID array.

Guided Maintenance Beacon LEDs on Bricks

When Guided Maintenance beacons the Brick to identify it, Guided Maintenance:

- Blinks the CU Status LEDs at 2Hz.

- Lights the Fault LED solid amber.

The back of a Brick chassis displays a set of LEDs for the following FRUs:

- RAID controller 0—SATA and Fibre Channel (FC) RAID Bricks only

- RAID controller 1—SATA and FC RAID Bricks only

- Enclosure Services (ES) module

- Spare drive—SATA Bricks only

- Two power supply-fan modules

Each RAID controller has a set of LEDs to indicate the status of the controller and its FC ports.

Figure 86 LEDs on the back of a SATA Brick
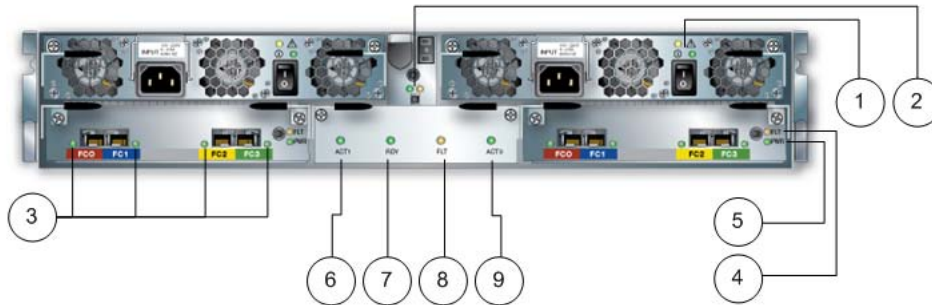
Legend

1 Power supply LEDs	6 Spare drive CU 1 activity LED
2 ES module LEDs	7 Spare drive Ready LED
3 RAID controller 1 FC LEDs	8 Spare drive Fault LED
4 RAID controller 0 fault LED	9 Spare drive CU 0 activity LED
5 RAID controller 0 power LED	

Note: The Brick displayed in the above figure is a SATA Brick. The SATA RAID controllers displayed in this Brick are representative and may differ from those in your system. FC Bricks do not have external spare drives like SATA Bricks and SSD Bricks. FC Bricks have 12 drives, and one of those 12 drives acts as the spare. SATA Bricks and SSD Bricks have 13 drives, and the external 13th drive is the spare, as shown in the figure.

Figure 87 LEDs on the back of a FC RAID Brick
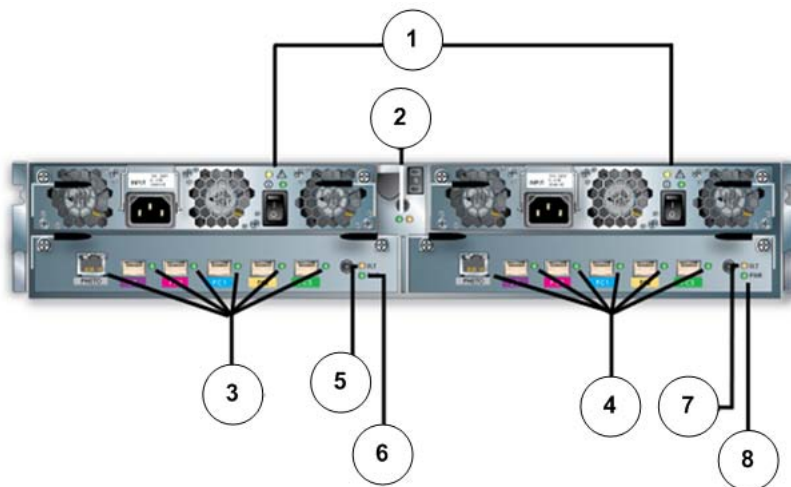
Legend		
1 Power supply LEDs	5 FC RAID controller 1 fault LED
2 ES module LEDs	6 FC RAID controller 1 power LED
3 FC RAID controller 1 LEDs	7 FC RAID controller 0 fault LED
4 FC RAID controller 0 LEDs	8 FC RAID controller 0 power LED

Figure 88 LEDs on the back of a FC Expansion Brick
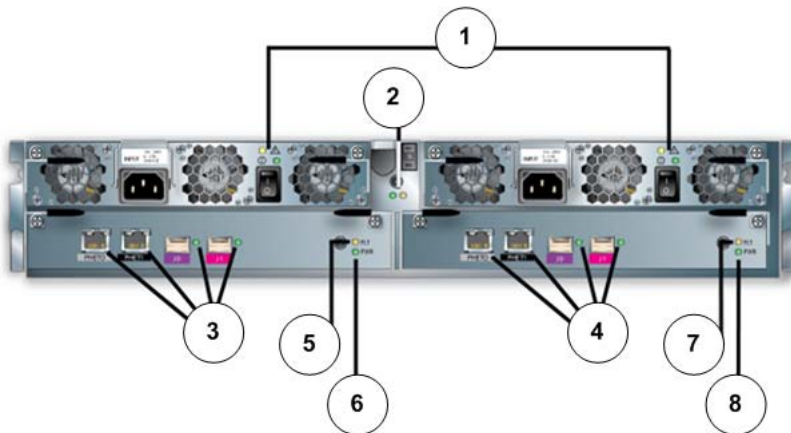
Legend		
1 Power supply LEDs	5 FC Expansion controller 1 fault LED
2 ES module LEDs	6 FC Expansion controller 1 power LED
3 FC Expansion controller 1 LEDs	7 FC Expansion controller 0 fault LED
4 FC Expansion controller 0 fault LEDs	8 FC Expansion controller 0 power LED

Brick Power Supply-Fan Module LED Status

Table 75 Brick power supply-fan module LED status

LED identifier and color		Meaning
⚠	Amber	Power supply-fan module in this controller has failed for one of these reasons: • Power supply AC or DC has failed. • Power supply exceeded its temperature limits. • Fan(s) in this module have failed.
	Off	Power supply-fan module in this controller is functioning normally.
⏻	Green	AC is available and DC is active.
	Off	AC is not available.

Note: When Guided Maintenance beacons the power supply-fan module to identify it, Guided Maintenance lights the amber LED.

Related concepts

• *About Brick Power Supply-Fan Module Replacement*

FC RAID Brick LED Status

Table 76 FC RAID Brick LED status

LED identifier and color		Meaning
PNet 0	Amber (blink)	Polling for PNET connection.
	Green	PNET has established connection.
	Green (off), Amber (slow blink)	PNET is unavailable.

Table 76 FC RAID Brick LED status (continued)

LED identifier and color		Meaning
J0 & FC0–FC3	Amber (SOS blink)	Internal error exists within RAID controller FC interface.
	Amber	FC link does not exist.
	Amber (fast blink)	Initializing or self-testing.
	Green (slow blink)	Connecting FC link.
	Green	FC link exists.
FLT	Amber	An error condition exists.
	Off	No failure exists.
PWR	Green	Power is available.
	Off	Power is not available.

FC Expansion Brick LED Status

Table 77 FC Expansion Brick LED status

LED identifier and color		Meaning
PNet0 & PNet1	Amber (blink)	Polling for PNET connection.
	Green	PNET has established connection.
	Green (off) Amber (slow blink)	PNET is unavailable.
J0 & J1	Amber (SOS blink)	Internal error exists within Brick controller FC interface.

Table 77 FC Expansion Brick LED status   (continued)

LED identifier and color		Meaning
	Amber	FC link does not exist.
	Amber (fast blink)	Initializing or self-testing.
	Green (slow blink)	Connecting to or waiting for FC link.
	Green	FC link exists.
FLT	Amber	An error condition exists.
	Off	No failure exists.
PWR	Green	Power is available.
	Off	Power is not available.

SATA Brick RAID Controller LED Status

Table 78 SATA Brick RAID controller LED status

LED identifier and color		Meaning
FC0–FC3	Amber (SOS blink)	Internal error exists in Storage System Fabric (SSF).
	Amber	FC link does not exist.
	Amber (fast blink)	Initializing or self-testing.
	Green (slow blink)	Waiting for FC link.
	Green	FC link exists.
FLT	Amber	An error condition exists.

Table 78 SATA Brick RAID controller LED status (continued)

LED identifier and color		Meaning
	Off	No failure exists.
PWR	Green	Power is available.
	Off	Power is not available.

Brick ES Module LED Status

Table 79 Brick ES module LED status

LED identifier and color		Meaning
Left	Amber	An enclosure-related fault is present.
Right	Green	Brick has power.

Note: Guided Maintenance cannot beacon the enclosure services (ES) module to identify it.

APPENDIX C

Slammer LED Startup Progress Codes

About LED Startup Codes

When a Slammer is powered on, it goes through a sequence of actions. Generally, the time to finish these actions for a new installation is about 12 minutes.

The time to start up your system may be shorter or longer, depending on the number of configured entities (LUNs, Snap FSs, Clone LUNs, quotas, and so on) and, to some degree, on the configuration of Slammers and Bricks. Slammers cannot complete the startup sequence without the Pilot being powered on and functioning.

While a Slammer performs startup diagnostics and then waits for its runtime image to download from the Pilot:

- The Fault LED (FLT) is off.

- The Activity LED (ACT) is green and blinks fast.

- The Status LED (ST) is green and blinks slowly.

During the remainder of the startup process, FLT and ACT are off while ST slowly blinks amber once each second. During this time, the GUI shows the Slammer to have a status of `Booting 0xnnnn` while the Pilot initializes the Slammer' s data services components.

When the Slammer successfully completes the startup sequence, ST is steady green.

Tip: If the front bezel Fault (FLT) LED or the private interconnect module (PIM) FLT LED is on steady and no other fault indicators on the Slammer are lit, the bezel may not be properly seated. Slammers always light FLT when the bezel is off.

Tip: The FLT, ST, and ACT LED indicators are duplicated on the upper left of the PIM in the rear of the Pillar Axiom 600 system.

If the Slammer halts during startup, the three LEDs on the back of the chassis (FLT, ACT, and ST) or the three LEDs on the bezel (Status, Activity, and Fault) help you identify where the Slammer halted in the startup sequence.

About Slammer LED Codes

The Slammer bezel has Fault, Status, and Activity LEDs that can display various colors and blink rates. These LEDs also appear on the private interface module at the back of the Slammer chassis, and are labeled FLT (Fault), ACT (Activity), and ST (Status).

These LEDs can:

- Be green or amber.

- Be on or off.

- Be steady, with no blinks.

- Blink rapidly—slightly more than two blinks for each sec (2.375Hz).

- Blink slowly—one blink for each 1.5 sec (0.67Hz).

Slammer LED Startup and Halt Codes

The following table describes the meaning of the Slammer startup and halt codes as indicated by the LEDs.

The system may go through this sequence more than once if the network is having trouble responding.

Table 80 Slammer LED boot block status codes

Code			Software module	Meaning
FLT	ACT	ST		
Off	Off	Rapid green	EEL_BOARD_INIT_0	Clean progress to BoardInit0.
Off	Orange	Rapid green	EEL_BOARD_INIT_1	Clean progress to BoardInit1.
Off	Green	Rapid green	EEL_BOARD_INIT_2	Clean progress to BoardInit2.
On	Green	Rapid orange	EEL_MEM_INIT	Memory training has begun.
Off	Rapid orange	Rapid green	EEL_BOARD_INIT_4	Clean progress to BoardInit4.
Off	Green	Slow orange	EEL_MEM_READY	Memory training has completed.
Off	Slow orange	Rapid green	EEL_BOARD_INIT_6	Clean progress to BoardInit6.
Off	Rapid green	Rapid green	EEL_BOARD_INIT_8	Clean progress to BoardInit8.
Off	Slow green	Rapid green	EEL_BOARD_INIT_10	Clean progress to BoardInit10.
Off	Green	Green	EEL_RAM_LOADER	Clean progress to RAM loader.

Table 81 Slammer LED boot block error codes

Code			Software module	Meaning
FLT	ACT	ST		
On	Rapid orange	Rapid green	EEL_BATTERY_MISSING_ERR	Battery is not present.
On	Rapid orange	Slow green	EEL_BATTERY_LOW_ERR	Battery voltage is low (below 5.5 V).
On	Slow orange	Rapid orange	EEL_VRT_CLEAR_ERR	CMOS is invalid due to low battery.
On	Slow orange	Slow orange	EEL_VRT_CMOS_ERR	Error in checking CMOS VRT.
On	Slow orange	Rapid green	EEL_AGESA_CMOS_ERR	Error in checking the CMOS training-data-valid flag.
On	Slow orange	Slow green	EEL_AGESA_CMOS_INVALID	Memory controller DQS data in NVRAM is corrupt.
On	Rapid green	Rapid orange	EEL_CLAMP_UNEXPECTED_ERR	CPLD memory clamp was set, even though it should not have been set.
On	Rapid green	Slow orange	EEL_CLAMP_EXPECTED_ERR	CPLD memory clamp was not set even though it should have been set.

Table 81 Slammer LED boot block error codes

Code			Software module	Meaning
FLT	**ACT**	**ST**		
On	Rapid green	Rapid green	EEL_CLAMP_STATUS_UNKNOWN_ ERR	CPLD memory clamp is in an indeterminate state.
On	Rapid green	Slow green	EEL_CRC_FAILED	A PROM sector has an invalid CRC.
On	Slow green	Rapid orange	EEL_ALT_PAGE_BOOT	Ready to switch to the PROM alternate page.
On	Slow green	Green	EEL_BOOT_FAILED	Both A and B page CRC failed.
On	Slow green	Slow green	EEL_RAM_LOADER_ERROR	Problem in switching from the bootblock code to the ramloader code. See the serial console output for details.
NA	NA	NA	EEL_I2C_SCL_STUCK	I2C SCL is stuck low.
NA	NA	NA	EEL_I2C_SDA_STUCK	I2C SDA stuck low.
On	Green	Rapid orange	EEL_MEM_INIT_FAILURE	Memory training has failed. See the bootblock console

Table 81 Slammer LED boot block error codes

Code			Software module	Meaning
FLT	ACT	ST		
				output for details.

Table 82 Slammer LED RAM loader codes

Code			Software module	Meaning
FLT	ACT	ST		
Rapid	Off	Off	EEL_MAIN	Entered "C" code main routine.
Rapid	Off	Slow orange	EEL_INIT_IDT	The ramloader has initialized the IDT.
Rapid	Off	Slow green	EEL_POWERFAIL_INIT	Ramloader is ready to handle NMI (powerfail) interrupts.
Rapid	Orange	Off	EEL_COM1_INIT	Diagnostic serial port is ready for use.
Rapid	Orange	Slow orange	EEL_FANS_INIT	Fans are about to be initialized.
Rapid	Rapid orange	Off	EEL_PCI_INIT	About to enumerate the PCI topology.
Rapid	Rapid orange	Slow green	EEL_MONITOR	About to enter the ramloader monitor (diagnostic environment only).

Table 82 Slammer LED RAM loader codes (continued)

Code			Software module	Meaning
FLT	ACT	ST		
Rapid	Slow orange	Off	EEL_CONTINUE	Exited the ramloader monitor (diagnostic environment only).
Rapid	Slow orange	Green	EEL_MPOST	About to enter MPOST (diagnostic environment only).
Rapid	Slow orange	Slow orange	EEL_MEMORY_CONFIG	About to check the memory configuration.
Rapid	Slow orange	Slow green	EEL_MEM_CONFIG_CHANGED	Mismatch between the discovered memory configuration and the EEPROM memory configuration.
Rapid	Rapid green	Off	EEL_MEM_CONFIG_ERROR	Mismatch between the discovered memory configuration and the CMOS memory configuration.
Rapid	Rapid green	Green	EEL_UNSUPPORTED_MEM_CONFIG	The installed memory configuration is not valid.

Table 82 Slammer LED RAM loader codes (continued)

Code			Software module	Meaning
FLT	ACT	ST		
Rapid	Rapid green	Slow orange	EEL_EEPROM_DATA_ERROR	Unrecognized DIMM size is installed.
Rapid	Rapid green	Slow green	EEL_MEMTEST	About to start memory test.
Rapid	Slow green	Off	EEL_MEMTEST_FAILED	Memory test detected an error.
Slow	Slow green	Slow green	EEL_NETBOOT	Transition to the startup program codes.

Table 83 Slammer LED states after POST process completion

Code			Meaning
FLT	ACT	ST	
Off	Rapid orange	Slow orange	MicroDMS starting in Netboot. This is a very brief transient state.
Off	Rapid green	Slow green	MicroDMS has completed one pass in Netboot and is downloading and booting slammer.ifs.
Off	Off	Slow orange	DMS started.
Off	Off	Green	MCCAgent cold or warmstart complete.
Off	Variable	Green	The Slammer has booted and is waiting for the Pilot. The ACT LED tracks activity and is variable.

Related references

- *Slammer LED Status*
- *Slammer CU LED Status*

APPENDIX D

Pillar Axiom Component Power Consumption

About Component Power Consumption

Pillar Axiom systems use one of the following:

- 115V, 208V, or 230V single-phase power that two or four power distribution units (PDUs) supply

- 115V/208V three-phase (USA) WYE power that two PDUs supply (30A rating)

- 230V/400V three-phase (Europe) WYE power that two PDUs supply (16A rating)

Important! Attach each PDU to a dedicated supply.

Important! Using a 208V PDU limits the number of Bricks that can be placed in a rack due to lower voltage. It is recommended to use 230V PDUs if available with Pillar Axiom 600 systems.

Tip: Use a voltmeter to verify the voltage of the available power. The Pillar Axiom 600 PDUs support multiple ranges of voltage and the current rating on the PDU breakers varies with the external available power. The external available power determines the number of Pillar Axiom 600 components that can be connected to the PDU port groups or circuit breakers (CB). If the voltage of the input power into the PDU is lower than the nominal rating of the PDU, the current rating on the breakers is decreased to compensate the lower voltage of the available power. For example, a 15A breaker on a 230V PDU is rated at 12A if the voltage of the input available power into the PDU is 208V.

About Single-Phase PDUs

Single-phase (115V, 208V, or 230V) PDUs have 16 power outlets. These outlets are organized into two groups of eight where each group is controlled by its own internal circuit breaker (CB):

- For CB 1, all eight outlets are located at the back of the PDU.

- For CB 2, four outlets are located at the back of the PDU and four are located at the front, next to the circuit breakers.

Each circuit can carry the following current loads:

- 20A (EU 16A) service, 16A limit

- 30A (EU 32A) service, where each circuit breaker is rated at 15A each, 24A limit

Figure 89 Single-phase 20A PDU circuit breakers (front view)
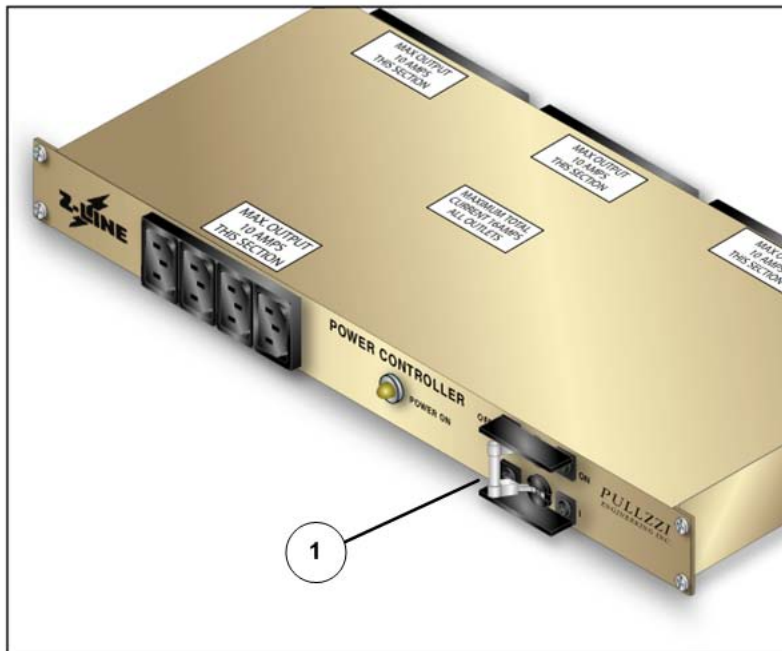
Legend	1 Circuit breaker and circuit breaker 2 are controlled by a single switch on the front of the PDU by the power switch.

The following figure shows the distribution of the twelve outlets on the back of the PDU across the two circuit breakers.

Figure 90 Single-phase 20A PDU outlet distribution (back view)
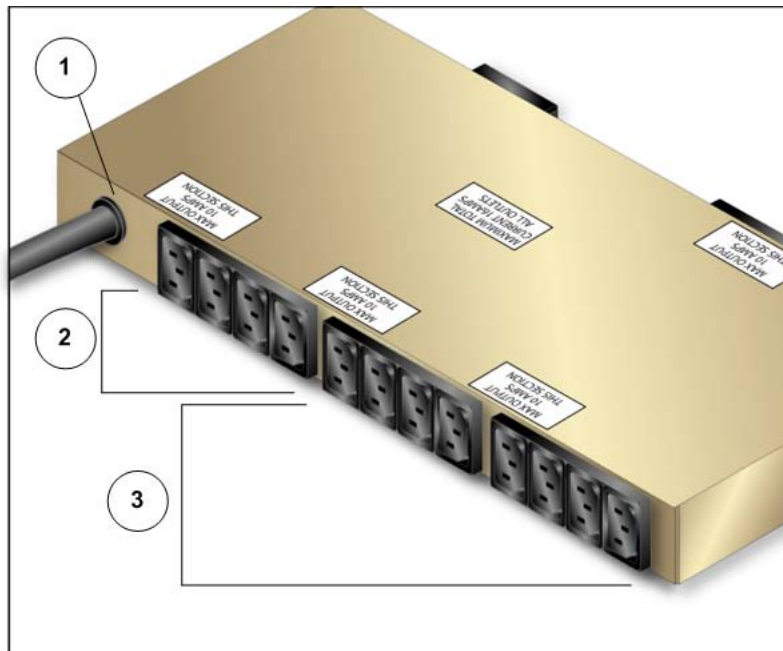
Legend

1 Power inlet	
2 Circuit breaker 2 (which also switches four additional outlets on the front of the PDU.)	
3 Circuit breaker 1	

Figure 91 Single-phase 30A PDU circuit breakers and outlets
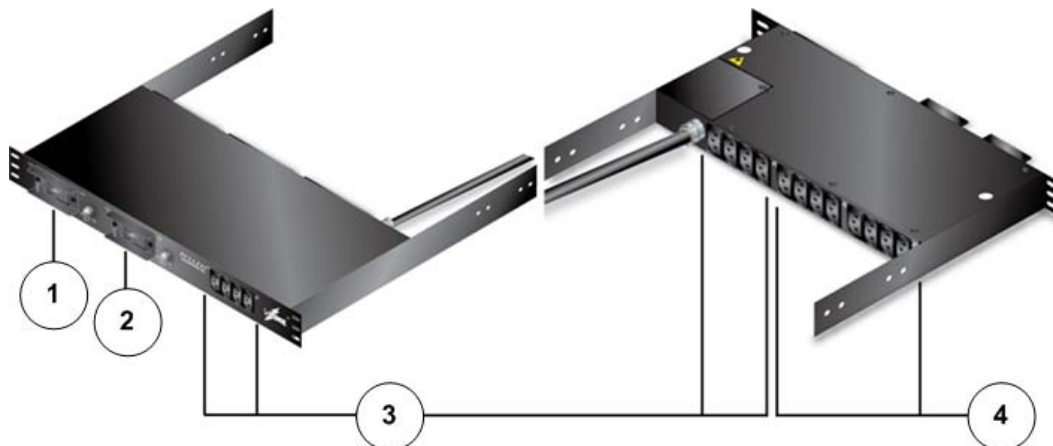
Legend	1 Switch for circuit breaker 1
	2 Switch for circuit breaker 2
	3 Plugs controlled by circuit breaker 2
	4 Plugs controlled by circuit breaker 1

Note: The 30A PDU is rated at 24A output, but each 15A circuit breaker is rated for 12A output.

In a Pillar rack, single-phase PDUs operate in pairs: two for a small system and four for a fully populated rack.

About Three-Phase PDUs

Three-phase (115/208V in United States (30A)), 230/400V in Europe (20A). PDUs have 24 power outlets. Each outlet supplies 115V, 10A service in US, 230V 10A in Europe.

Each phase is protected by a 30A (in United States) or 20A (in Europe) circuit breaker, which have 24A and 16A rating respectively. The phase circuit breakers switch on and off at the same time.

Three-phase Pillar Axiom systems use a pair of three-phase PDUs.

Figure 92 Front view of the three-phase PDU

Legend	1 Phase X power switch
	2 Phase Y power switch
	3 Phase Z power switch
	4 Circuit breaker

Figure 93 Back view of the three-phase PDU
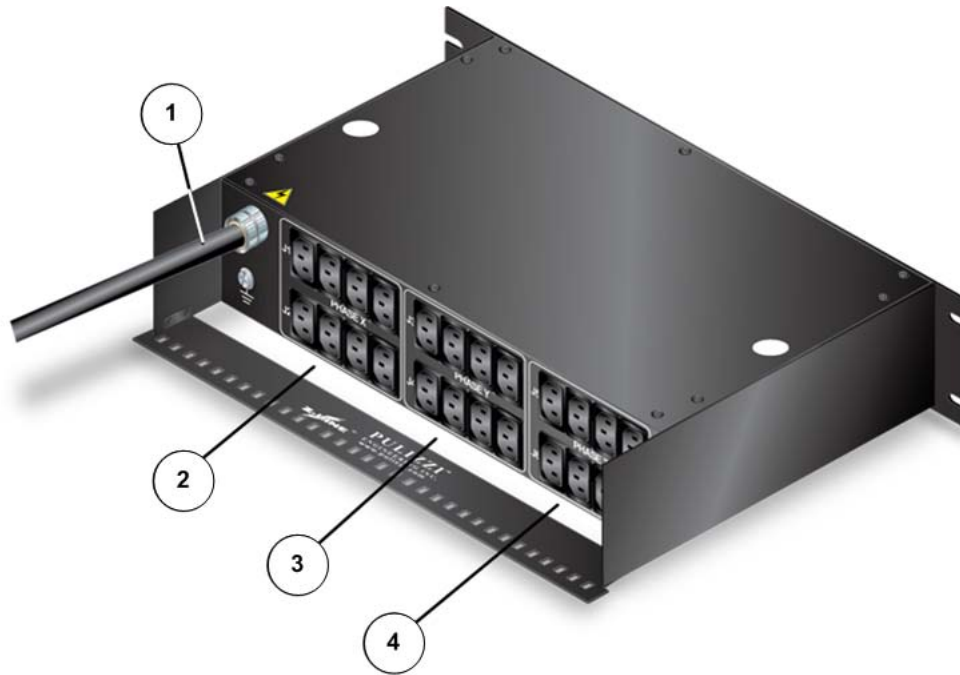
Legend	1 Input power cable
	2 Phase X outlet bank
	3 Phase Y outlet bank
	4 Phase Z outlet bank

About PDU Connections

Pillar Axiom 600 racks come with the Brick power cords or Wye power cables pre-installed in the rack with colored tie wraps. These Wye power cables are ready to be plugged into the back of each Brick.

For simplicity, all illustrations in the following cabling sections show half of the PDUs and associated cabling. The other half provides redundant power and is cabled in an identical way.

About Cabling 115V 20A Single-Phase PDUs

Pillar Axiom systems that have a single pair of 115V, 20A single-phase PDUs can support:

- The Pilot

- One Slammer

- Four SATA Bricks

Systems with only a single pair of 115V, 20A PDUs can support a second Slammer, but only with a maximum of two or three Bricks (depending on how close the system is to the PDU limits).

Note: For more information on Pillar Axiom systems with Fibre Channel (FC) Bricks, solid-state drive (SSD) Bricks or a mix of Brick types, contact Pillar World Wide Customer Support Center.

Figure 94 PDU connections (1X3 Pillar Axiom system) 115V, 20A (two PDUs)
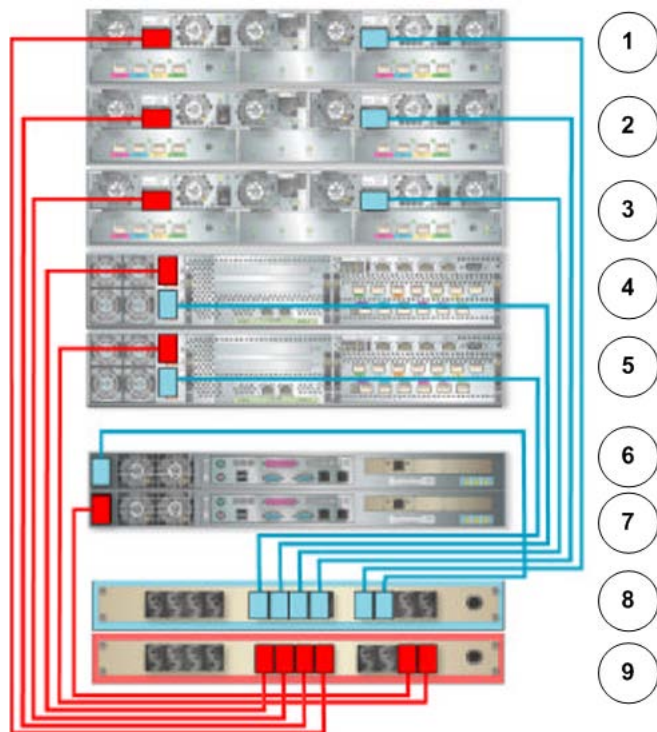
Legend

1 Brick 3	6 Pilot CU 0
2 Brick 2	7 Pilot CU 1
3 Brick 1	8 PDU 2
4 Slammer 1 CU 0	9 PDU 1
5 Slammer 1 CU 1	

Note: The previous figure shows the power cable configuration for a two-PDU (115V, 20A) system. The red and blue lines represent the redundant power supplies on the components connected to the separate PDUs that are connected to separate power circuits. This configuration can support up to four Bricks.

A single set of 115V, 20A system with a second pair of PDUs supports seven additional Bricks in a Pillar Axiom system.

Related references

*   *Component Configuration Limits for Single-Phase Service*

About Cabling 230V, 30A and 208V, 30A Single-Phase PDU

Pillar Axiom systems that have a single pair of 208V, 24A or 230V, 30A single-phase PDUs can support:

- The Pilot

- One of the following configurations:

    - One Slammer and 16 Bricks

    - Two Slammers and 14 SATA Bricks

Important! For installations outside the United States of America, the limit is six Bricks per single-phase PDU (and six Bricks per phase in a three-phase PDU).

Note: For more information on Pillar Axiom systems with Fibre Channel (FC) Bricks, solid-state drive (SSD) Bricks or a mix of Brick types, contact Pillar World Wide Customer Support Center. FC Bricks require a higher load of current and requires you to use more PDUs at 208V power.

⚠ **Caution**	Cable the power load so that it is evenly balanced across the two circuit breakers. If there are more than four power cords for every PDU, install them in the outlets on the front of the PDU.

Figure 95 Sample power cabling scheme with 230V (one circuit shown)
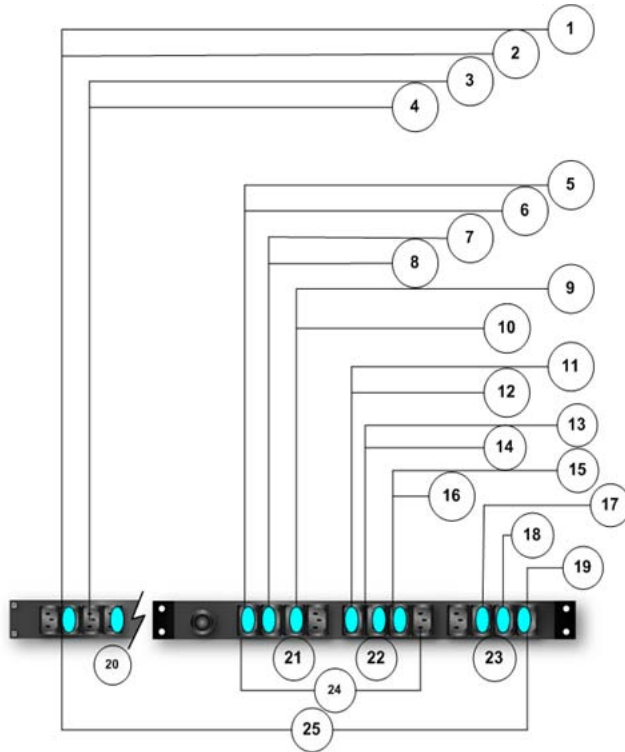
Legend			
1–16 (Brick 16 through Brick 1): SATA, 1.17A drawn		21 Total 7.08A drawn	
17 Slammer CU 0: 1.525A drawn		22 Total 7.08A drawn	
18 Slammer CU 1: 1.525A drawn		23 Total 6.07A drawn	
19 Pilot: 0.8A drawn		24 Grand total 11.8A drawn	
20 Total 4.72A drawn		25 Grand total 10.8A drawn	

Important! If you use split power cables, as shown in the figure above, make sure the split cables power separate components. Do not use a split power cable to power two sides of the same component. The two sides need to be on separate circuits, in case one side fails.

Related references

- *Component Configuration Limits for Single-Phase Service*

About Cabling 115/208V 30A Three-Phase PDUs

Pillar Axiom systems that have a pair of 115/208V, 30A three-phase PDUs can support:

- The Pilot

- One Slammer

- 16 Bricks

Note: 115/208V three-phase PDUs are supported only in the United States. 230/400V three phase PDUs are used in Europe and have no power limitations for any configuration of Pillar Axiom system in one cabinet. Care should be taken to balance the current load across all three phases of the PDU.

Important! For fewer than 13 Bricks, be sure to balance the load across the three phases.

To add a second Slammer, remove two Bricks that are plugged into phase A and phase C.

Note: For more information on Pillar Axiom systems with Fibre Channel (FC) Bricks, solid-state drive (SSD) Bricks or a mix of Brick types, contact Pillar World Wide Customer Support Center.

Figure 96 PDU connections for 115/208V, 30A power (two PDUs)
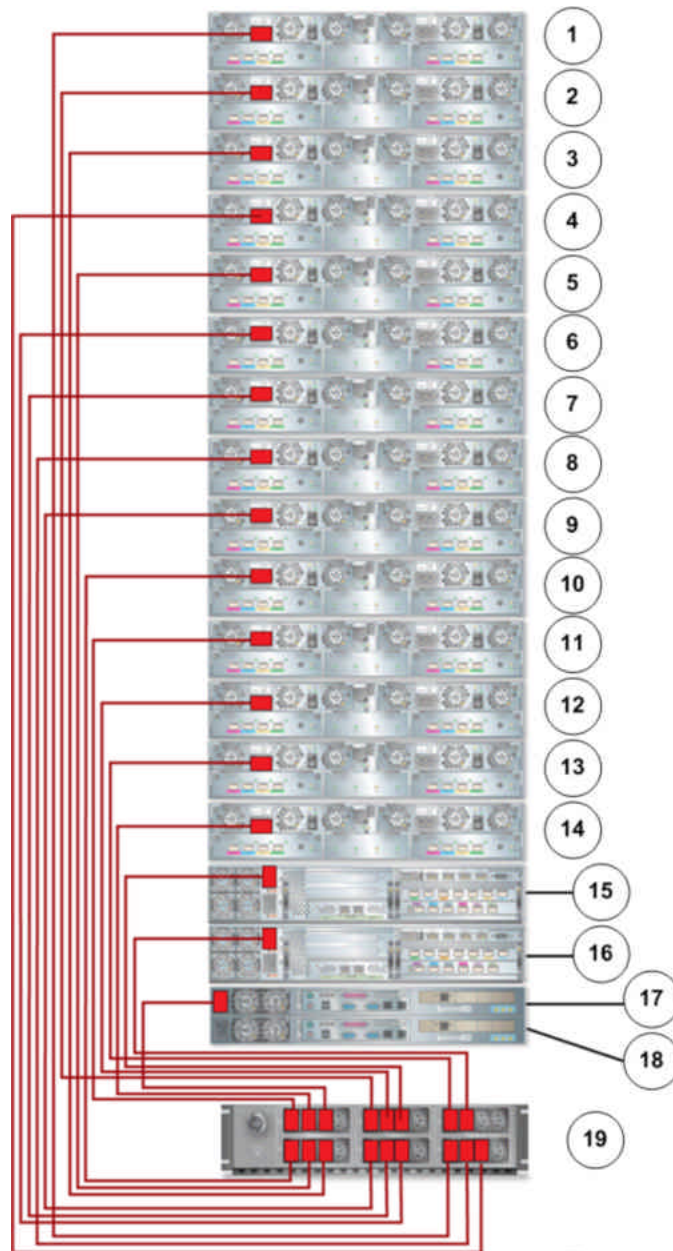
Legend	1 Brick 14	5 Brick 10	9 Brick 6	13 Brick 2	17 Pilot CU 0
	2 Brick 13	6 Brick 9	10 Brick 5	14 Brick 1	18 Pilot CU 1
	3 Brick 12	7 Brick 8	11 Brick 4	15 Slammer 1 CU 0	19 PDU 1
	4 Brick 11	8 Brick 7	12 Brick 3	16 Slammer 1 CU 1	

Note: The previous figure shows the power cable configuration for a two-PDU, 115/208V, 30A, three-phase system. It shows half of the power cables. A fully cabled, 115/208V, 30A, two-PDU system connects the redundant power cables to PDU 2 in a similar pattern.

Component Configuration Limits for Single-Phase Service

The tables below list the maximum electrical requirements for selected Pillar Axiom components.

Note: All systems include one Pilot.

Table 84 System configuration limits for 115V 20A service

Service voltage, AC	Number of PDUs	Number of Slammers	Maximum number of Bricks	Current required (amps)	Power consumed (watts)
115	2	1	4	15.1	1866
		2	2	15.2	1886
	4	1	11	31.0	3686
		2	9	31.2	3706
208	2	1	9	15.1	3166
		2	7	15.2	3186
	4	1	21	30.8	6286
		2	19	30.9	6306
230	2	1	11	16.0	3426
		2	8	14.9	3446
	4	1	22	31.3	7066
		2	24	31.2	7086

Note: The table represents only SATA Bricks of highest power. For more information on Pillar Axiom systems with Fibre Channel (FC) Bricks, solid state drive (SSD) Bricks or a mix of Brick types, contact Pillar World Wide Customer Support Center.

Note: For 115V, 20A service, Underwriters Laboratories (UL) allows no more than 16A per PDU. This restriction limits the configuration of a two-PDU system to one Slammer and four Bricks. For 230V, 30A service, the configuration is limited only by the cabinet size.

Table 85 System configuration limits for 230V, 30A or 208V, 24A service

Service voltage, AC	Number of PDUs	Number of Slammers	Maximum number of Bricks	Current required (amps)	Power consumed (watts)
115	2	1	7	21.9	2646
		2	5	22.1	2666
	4	1	18	46.9	5506
		2	16	47.1	5526
208	2	1	15	23.0	4726
		2	13	23.0	4746
	4	1	34	47.7	9666
		2	31	47.8	9686
230	2	1	17	23.2	5246
		2	15	23.1	5266
	4	1	37	46.9	10446
		2	35	47.0	10466

Note: The table above lists more Bricks than will fit in a single 42U rack.

Note: PDUs are not typically wired across cabinets resulting in a base configuration of at least one set of PDUs per cabinet.

Note: The table represents only SATA Bricks of highest power. For more information on Pillar Axiom systems with Fibre Channel (FC) Bricks, SSD Bricks or a mix of Brick types, contact Pillar World Wide Customer Support Center.

Note: For information on the electrical requirements of a specific Pillar Axiom component or mix of various components, contact the Pillar World Wide Customer Support Center.

APPENDIX E

Return a Failed Component

About Failed Component Returns

The Return Material Authorization (RMA) process is the mechanism you use to get replacement parts for those that have failed during their warranty or support period.

Pillar Axiom 600 uses an Advance Exchange program. Under this program, Pillar ships a replacement component to the customer before the failed component reaches Pillar World Wide Customer Support Center. There is no cost to you as long as the defective component is returned within 10 calendar days.

Return a Defective FRU

Defective material must be returned within ten business days to avoid charges for the replacement components.

Carefully follow these instructions to ensure the safe and timely return of your defective material.

1 Locate and remove the prepaid return label from the replacement shipping package.

   In some cases, the return label may be included in the plastic waybill pouch on the exterior of the package.

2 Repackage the defective component using the packing material in which the replacement component was shipped.

3 Seal the package with standard packing tape appropriate for commercial freight.

4 Attach the self-adhesive, prepaid return label to the package so that it covers the previous address.

   Tip: For return labels that are not self-adhesive, place them in the plastic waybill pouch so that the address of Pillar Data Systems is clearly visible.

5 Record the RMA number, or the Customer Problem Number (CPN), in the space provided on the prepaid waybill.

   If a space has not been provided on the waybill, record the SR number clearly on the front of the package.

6 Contact the freight carrier indicated on the return label to arrange for pickup of the returned material.

   Check the RMA Material Packaging and Routing instructions at

   Customer support portal (https://support.pillardata.com/login.do)

   or call 1-877-474-5527 (USA domestic only) or 800-PILLAR-FS (+800-74552737) in Europe.

APPENDIX F

Pillar Axiom Hardware Specifications

About Hardware Specifications

Hardware specifications (sometimes called data sheets):

- Describe the system's operating environment.

- List the agency approvals.

- List physical attributes of the Pillar Axiom 600 system and its hardware components.

About Pillar Axiom 600 Hardware Specifications

A Pillar Axiom 600 system is an assembly of Pilot management controllers, Slammer storage controllers, Brick storage enclosures. power distribution units (PDUs), and racks.

Table 86 Basic components of a Pillar Axiom 600 system

Component	Pillar Axiom 600 system
Pilot	1.
Slammer	1 to 4.
Brick	1 to 64. 3–64, when Brick types are mixed.
PDUs	*The number of PDUs depends on the characteristics of the power inlets and the number of components in each rack.*
42U racks	*The number of racks depends on the number and the distribution of the hardware components that are listed above.*

Related concepts

- *About Slammer Hardware Specification*
- *About Brick Hardware Specification*

Related references

- *About Pilot Hardware Specifications*
- *Pillar Axiom 600 PDU Hardware Specification*
- *Pillar Rack Hardware Specification*

System Power Requirements

Pillar Axiom 600 systems require at least two feeds, in which both have one of the power input characteristics shown below. The voltage and frequency show minimum and maximum values.

- 100-120VAC, 50–60Hz, 20A

- 100-240VAC, 50–60Hz, 20A/30A

- 100-120VAC, 50–60Hz, 30A

- 200-240VAC, 50–60Hz, 30A

- 230VAC, 16A or 32A (Europe)

- WYE-connected 3-phase:

  ○ USA: 120/208VAC, 50-60Hz, 30A

  ○ Europe: 230/400VAC, 50-60Hz, 16A

The total power required by a rack depends on the number and type of hardware that is in the rack.

System Environmentals

Table 87 System altitude specifications

Mode	Elevation
Operational	-200 to 10,000 feet (-61 to 3048 meters)
Non-operational	-200 to 40,000 feet (-61 to 12,192 meters)

Table 88 System temperature and humidity specifications

Mode	Ambient temperature	Non-condensing humidity	Max wet bulb temperature	Gradient
Operational	Up to 7000 feet elevation: +41 to 104°F (+5 to 40°C) Up to 10,000 feet elevation: +41 to 95°F (+5 to 35°C)	10–85% 10%/hr gradient	86°F (30°C)	36°F/hr (20°C/hr)
Non-operational	-22 to 158 °F (-30 to 70 °C)	5–95% 10%/hr gradient	104°F (40°C)	54°F/hr (30°C/hr)

Note: For Bricks that have five-platter drives, the maximum ambient operational temperature from 7000 feet to 10,000 feet is 95°F (35°C).

System Acoustics

Acoustics for a Pillar Axiom 600 system that comprises the following components were tested to ISO 7779 by standard specifications:

- One Pilot

- One NAS Slammer

- Three Bricks

Such a system generates an acoustic level that is no greater than 70 dBA.

Table 89 System acoustics specification

Acoustic level (tested to ISO7779)
Does not exceed 6.5 Bels under normal conditions, which is: - 73.4°F (23°C) ambient - All fans operational - No fault conditions The acoustic level will increase under fault conditions.

System Random Vibration Specifications

Table 90 System random vibration specifications

Mode	Force	Frequency	Time
Operational	0.1 G RMS	3–100Hz (X, Y, and Z axis)	15 minutes
Non-operational	Administered using the Telcordia GR-63 CORE test specifications. Tested with the rack inside a shipping crate.		

System Regulatory Agency Compliance

Agency approvals are based on a Pillar Axiom 600 system that consists of:

- One Pilot

- Two Slammers

- Twelve Bricks

Related references
- *Regulatory Compliances*
- *FCC Warning Statement*
- *European Union Compliance Statement*

Regulatory Compliances

The Pillar Axiom 600 system complies with the following regulatory agency requirements.

Table 91 Safety, quality, and environmental standards

Logo	Standard
	FCC (United States). This device complies with FCC Rules Part 15. Operation is subject to the following two conditions: 1 This device may not cause harmful interference. 2 This device must accept any interference that may be received, including interference that may cause undesired operation.
	CB Scheme by IECEE standard IEC60950-1-2.
CE	Conformite Europeenne /DoC.

Table 91 Safety, quality, and environmental standards (continued)

Logo	Standard
	UL and CSA under UL (cUL) and UL60950-1-2.
	TUV/GS.
	We offer customers a recycle program to properly dispose of surplus products and products that have reached their end of life. Equipment that is returned to Pillar through this program is disposed of in an environmentally safe manner using processes that comply with the WEEE (EU Directive on Waste Electrical and Electronic Equipment) regulations. Pillar provides (on request) documentation about product disposition when the recycling process is complete. Upon request, Pillar also provides a Certificate of Destruction, which releases the customer from further liability for the equipment returned through the Recycle program. Customers should contact Pillar World Wide Customer Support Center for information on the logistics and location(s) of the approved recycle facilities.
	Our objectives are to ensure that our high product quality and reliability standards are met through the processes that have been verified and approved. This is achieved through ISO 9001:2000 and the development and deployment of Pb-free solder qualification guidelines for components (RoHS), interconnects, and PCB, PCA reliability. Pillar will continue to work with industry consortia to define common qualification criteria. Pillar will apply Pb-free solder technologies to product designs as required by legislation.
	ISO 9001:2000 Registered manufacturing process.

Table 91 Safety, quality, and environmental standards (continued)

Logo	Standard
STORAGE 存储 儲存設備 ORACLE AMERICA, INC. KCC-REM-SUN-SPS1 Compliance Model Number (型号)(型號) SPS1	Compliance packaging label: SPS1.
STORAGE 存储 儲存設備 ORACLE AMERICA, INC. KCC-REM-SUN-SPR1 Compliance Model Number (型号)(型號) SPR1	Compliance packaging label: SPR1.
STORAGE 存储 儲存設備 ORACLE AMERICA, INC. KCC-REM-SUN-SPA1 Compliance Model Number (型号)(型號) SPA1	Compliance packaging label: SPA1.
KCC-REM-SUN-SPS1	KCC-SPS1.
KCC-REM-SUN-SPR1	KCC-SPR1.
KCC-REM-SUN-SPA1	KCC-SPA1.
D33012	BSMI D-Mark.

Electromagnetic Emissions and Immunity

Table 92 Electromagnetic (EM) emissions and immunity

Standard
- CISPR 22-A   - EN55022 Class A radiated and conducted emissions (110V/220V)   - EN55024 Immunity: - EN 61000-3-2   - EN 61000-3-3   - EN 61000-4-2 ESD:±4 kV contact,±8 kV air   - EN 61000-4-3 Radiated immunity (within the limits that are listed in our technical specifications)   - EN 61000-4-4 Electrical fast transients/burst:±1 kV AC,±0.5 kV I/O   - EN 61000-4-5 Surges±1 kV differential mode,±2 kV common mode   - EN 61000-4-6 Conducted immunity: 3V   - EN 61000-4-11 Supply dips and interruptions: 30% and 100%   - VCCI (Japan):   この装置は、クラスA情報技術装置 です。この装置を家庭環境で使用すると 電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう 要求されることがあります。　　VCCI －A
SABS
C-TICK

FCC Warning Statement

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 users will be required to correct the interference at their own expense.

You can determine if your equipment causes interference by turning it off. If the interference stops, it was probably caused by the equipment or one of its peripheral devices. If the equipment causes interference to radio or television reception, try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.

- Move the equipment to one side or the other of the television or radio.

- Move the equipment farther away from the television or radio.

- Plug the equipment into an outlet that is on a different circuit from the television or radio. (That is, make certain the equipment and the television or radio are on circuits that are controlled by different circuit breakers or fuses.)

⚠ **Caution**	Changes or modifications that are not expressly approved by the party that is responsible for compliance could void the user's authority to operate the equipment.

European Union Compliance Statement

This product is in conformity with the protection requirements of EC Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electro-magnetic compatibility. The manufacturer cannot accept responsibility for any failure to satisfy the protection requirements that result from a non-recommended modification of the product.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The Limits for Class A equipment were derived for residential environments to provide reasonable protection against interference with licensed communication equipment.

We have signed a Declaration of Conformity with the requirements of the Directive.

The following standards were applied:

1 Emissions: EN55022 (Class A radiated and conducted, 110V, 230V)

2 EMC: EN55024 (immunity):
    - EN 61000-3-2

- EN 61000-3-3

- EN 61000-4-2 ESD:±4 kV contact,±8 kV air touch

- EN 61000-4-3 Radiated immunity (within the limits that are listed in our technical specifications)

- EN 61000-4-4 Electrical fast transients/burst:±1 kV AC,±0.5 kV I/O

- EN 61000-4-5 Surges ±1 kV differential mode,±2 kV common mode

- EN 61000-4-6 Conducted immunity: 3V

- EN 61000-4-8 PFMF

- EN 61000-4-11 Supply dips and interruptions: 30% and 100%

System Packaging and Transportation

Packaging meets the following requirements:

- For packages under 150 lb—International Safe Transit Association (ISTA 2A) Procedures 1 and 2.

- For packages over 150 lb—Network Equipment Building System (NEBS) core standards.

  GR-63-CORE, Packaged Equipment Shock (4.3.1), Office Vibration (4.4.3) and Transportation Vibration (4.4.4).

System Warranty

Hardware components in a Pillar Axiom 600 system are covered by a three-year warranty.

Note: The hardware and software warranty for all Pillar Axiom 600 products applies to the system, not to individual components like Slammers and Bricks within the system. Slammers and Bricks that are later added to expand a Pillar Axiom 600 system are warranted to fall within the same renewal cycle as the Pillar Axiom 600 system.

About Pilot Hardware Specifications

A Pilot is an active management and provisioning front end as well as the administrator interface to a Pillar Axiom 600 system.

Pilot Dimensions and Weight

Table 93 Pilot dimensions and weight (both control units)

Attribute	Value
Height	3.5 inches (8.9 centimeters); 2U
Width	17.7 inches (45.0 centimeters)
Depth	20-26 inches (50.8-66.0 centimeters)
Weight	40 pounds (18.1 kilograms)

Note: Pilots are available in multiple models of different physical dimensions. Make sure you do not install anything behind the Pilot control units (CUs) in the rack, because you can get a replacement Pilot of any of the different dimensions.

Pilot Power Characteristics

Table 94 Pilot power characteristics (for each control unit)

Power characteristic	Value
Frequency	50 to 60Hz
AC voltage	100 to 240V
Current draw	1.5A at 115V 0.8A at 230V 143W
Maximum power consumption	143VA

Table 94 Pilot power characteristics (for each control unit) (continued)

Power characteristic	Value
Maximum heat dissipation	750BTU/hr
AC plug type	2 IEC 320 connection

Pilot Regulatory Agency Compliance

This equipment has been tested and found to comply with the limits for a class B 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 guide, may cause harmful interference to radio communications. Operation of this equipment in a residential area is may cause harmful interference, in which case the user must correct the interference at his own expense.

Notice 1

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

Notice 2

Shielded interface cables and A.C. power cord, if any, must be used in order to comply with the emission limits.

VOIR LA NOTICE D'INSTALLATION AVANT DE RACCORDER AU RESEAU.

Micro-Star International MS-9211

FC Tested to comply
with FCC Standard

For Home or Office Use

Table 95 Pilot safety and quality standards

Logo	Standard
	FCC (United States). This device complies with FCC Rules Part 15 for a class B digital device.
$C \epsilon$	Conformite Europeenne /DoC

Pilot Packaging and Transportation

Pilot packaging meets the following requirements:

- For packages under 150 lb—International Safe Transit Association (ISTA 2A) Procedures 1 and 2.

- For packages over 150 lb—Network Equipment Building System (NEBS) core standards.

  GR-63-CORE, Packaged Equipment Shock (4.3.1), Office Vibration (4.4.3) and Transportation Vibration (4.4.4).

About Slammer Hardware Specification

Slammers are fully redundant controllers within a Pillar Axiom 600 system. A Slammer can be ordered as either a SAN or a NAS front end.

Slammer Dimensions and Weight

Table 96 Slammer dimensions and weight

Attribute	Value
Height	7 inches (17.78 centimeters); 4U
Width	17.72 inches (45 centimeters)
Depth	26–27 inches (66 centimeters)
Weight	94 pounds (42.6 kilograms)

Slammer Power Characteristics

Table 97 Slammer power characteristics

Power characteristic	Value
Frequency	50–60Hz
AC voltage	100–240V
Maximum power consumption	568VA
Current draw	Combined for both Slammer CUs: 4.72A at 115V 2.46A at 230V 546W
Maximum heat dissipation	1864 BTU/hr

Table 97 Slammer power characteristics (continued)

Power characteristic	Value
AC plug type	Four IEC 320 C13 connection

Slammer Regulatory Agency Compliance

Slammers comply with the following regulatory agency requirements.

Table 98 Slammer safety and quality standards

Logo	Standard
	FCC (United States). This device complies with FCC Rules Part 15. Operation is subject to the following two conditions: 1 This device may not cause harmful interference and 2 This device must accept any interference that maybe received, including interference that may cause undesired operation.
	CB Scheme by IECEE standard IEC 60950, Third Edition (1999)
CE	Conformite Europeenne /DoC
cULus	UL and CSA under UL (cUL)
GS	TUV/GS
	ISO 9001:2000 Registered manufacturing process

Slammer Packaging and Transportation

Packaging meets the following requirements:

- For packages under 150 lb—International Safe Transit Association (ISTA 2A) Procedures 1 and 2.

- For packages over 150 lb—Network Equipment Building System (NEBS) core standards.

  GR-63-CORE, Packaged Equipment Shock (4.3.1), Office Vibration (4.4.3) and Transportation Vibration (4.4.4).

About Brick Hardware Specification

A Brick is a high-performance disk subsystem with an optimized, proprietary RAID controller.

Brick Dimensions and Weight

Table 99 Brick dimensions and weight

Attribute	Value
Height	3.5 inches (8.89 centimeters); 2U
Width	17.72 inches (45 centimeters)
Depth	22 inches (55.88 centimeters)
Weight (SATA)	65 pounds (29.5 kilograms)
Weight (FC)	70 pounds (31.8kilograms)

Brick Power Characteristics

Table 100 Brick power characteristics

Power characteristic	Value
Frequency	47 to 63Hz
AC voltage	100–120V to 200–240V
Maximum power consumption	260VA (SATA) 175VA (SSD) 330VA (FC)
Current draw	SATA (260W): 2.55A at 115V 1.17A at 230V

Table 100 Brick power characteristics (continued)

Power characteristic	Value
	FC (330W) 3.35A at 115V 1.49A at 230V SSD (175W) 1.52A at 115V 0.80A at 230V
Maximum heat dissipation	1127 BTU/hr
AC plug type	Two IEC 320 connections

Brick Regulatory Agency Compliance

Pillar Axiom 600 Bricks comply with the following regulatory agency requirements.

Table 101 Brick safety and quality standards

Logo	Standard
	FCC (United States). This device complies with FCC Rules Part 15. Operation is subject to the following two conditions: 1 This device may not cause harmful interference and 2 This device must accept any interference that maybe received, including interference that may cause undesired operation.
	CB Scheme by IECEE standard IEC 60950, Third Edition (1999)
CE	Conformite Europeenne /DoC
cULus	UL and CSA under UL (cUL)
TUV/GS	TUV/GS

Table 101 Brick safety and quality standards (continued)

Logo	Standard
	ISO 9001:2000 Registered manufacturing process

Brick Packaging and Transportation

Packaging meets the following requirements:

- For packages under 150 lb—International Safe Transit Association (ISTA 2A) Procedures 1 and 2.

- For packages over 150 lb—Network Equipment Building System (NEBS) core standards.

  GR-63-CORE, Packaged Equipment Shock (4.3.1), Office Vibration (4.4.3) and Transportation Vibration (4.4.4)

Pillar Axiom 600 PDU Hardware Specification

If you install non-Pillar PDUs, they must meet the Pillar Axiom 600 PDU specification, as outlined below.

When you intend to use non-Pillar PDUs, check first with your Pillar Account Representative to ensure you do not jeopardize your system warranty by installing the non-Pillar PDUs.

Table 102 PDU specifications

Criteria	20A single-phase	30A single-phase	3-phase
Form factor	EIA Rack Mountable Height: 1U, or 1.75 inches (4.45 centimeters) Depth: < 8 inches (20.3 centimeters)	EIA Rack Mountable Height: 1U, or 1.75 inches (4.45 centimeters) Depth: < 8 inches (20.3 centimeters)	EIA Rack Mountable Height: 2U, or 3.5 inches (8.9 centimeters) Depth: 9.5 inches (24.13 centimeters)
Receptacles IEC 60320	C13, 12 receptacles minimum. Mounted on rear of chassis (opposite circuit breakers).	C13, 12 receptacles minimum. Mounted on rear of chassis (opposite circuit breakers).	C13, 24 receptacles (8 per phase) minimum. Mounted on back of chassis (opposite circuit breakers).
Inlet cable	15 feet (4.572 meters) minimum Plug options: L6-20P, L5-20P IEC 2P+E 16A	15 feet (4.572 meters) minimum Plug options: L6-30P, L5-30P IEC 2P+E 32A	15 feet (4.572 meters) minimum NEMA L21-30P IEC 3P+N+E 16A 6H
Voltage input	100–240VAC	100–240VAC	120/208VAC, 230/400VAC, both Wye Configuration
Voltage output	100–240VAC	100–240VAC	120V 1-phase, 230V 1-phase

Table 102 PDU specifications (continued)

Criteria	20A single-phase	30A single-phase	3-phase
Circuit breakers (CB)	Two, 10A each. Each circuit breaker controls half of the outlet receptacles.	Two, 15A each. Each circuit breaker controls half of the outlet receptacles.	One main, 30A Three secondary, 20A each
Receptacle retention device	All receptacles have a plug retention device.	All receptacles have a plug retention device.	All receptacles have a plug retention device.
Inlet cable retention device	If a detachable inlet cable is provided, a cable retention device is included.	N/A	N/A
EMI (RFI) filter	Common mode insertion loss: 10 db @ 1MHz, Differential mode: 30 db @ 1MHz. MHz/db: .15/6, .50	Common mode insertion loss: 10 db @ 1MHz, Differential mode: 30 db @ 1MHz. MHz/db: .15/6, .50	Common mode insertion loss: 25 db @ 1MHz. Differential mode: 22 db @ 1MHz. MHz/db: .15/6, .50
Surge suppression	270VAC	320VAC	275VAC

Pillar Rack Hardware Specification

A Pillar Axiom 600 42U rack can contain any combination of:

- One Pilot.

- One to four Slammers, which can be a mix of network attached storage (NAS) and storage area network (SAN) Slammers.

- One to 16 Bricks.

  Note: A second cabinet can hold up to 19 Bricks (no Slammers or Pilot)

- One to four power distribution units (PDUs).

Table 103 Rack specifications for a Pillar Axiom 600 system

Criteria	Pillar rack	Non-Pillar rack (minimum requirements)
Height (inside)	42U or 73.5 inches (186.7 centimeters)	- Pillar Axiom 600 systems: 42U to hold one Pilot, one to four Slammers, or up to 16 Bricks
Height (outside)	78.7 inches (199.9 centimeters)	N/A
Width (inside)	17.7 inches (45 centimeters)	- 19 inches (48.26 centimeters) panel - 17.7 inches (45 centimeters) rail-to-rail
Width	- 23.8 inches (60.48 centimeters) overall - 17.7 inches (45 centimeters) rail-to-rail - 19 inches (48.26 centimeters) panel	N/A
Depth (inside)	- 35 inches (88.9 centimeters) - 26–30 inches (66–76.2 centimeters) rail-to-rail	- 35 inches (88.9 centimeters) overall - 26–30 inches (66–76.2 centimeters) rail-to-rail

Table 103 Rack specifications for a Pillar Axiom 600 system (continued)

Criteria	Pillar rack	Non-Pillar rack (minimum requirements)
Depth (outside)	39.5 inches (100.3 centimeters)	43 inches (109.2 centimeters) maximum
Front door	- Vented - Light-tint Plexiglas 1.5 inches (3.81 centimeters) deep - Lockable - Open left/right 1 inches (2.54 centimeters) clearance between front vertical channel and inside of frame	- Vented 1 inches (2.54 centimeters) deep minimum 1 inches (2.54 centimeters) clearance between front vertical channel and inside of frame
Rear door	- Vented - Lockable - Open left/right	Vented
Sides	- Solid - Removable - Lockable 1 inches (2.54 centimeters) between side and frame	N/A
Vertical channels	- Square hole, unthreaded 26 inches (66 centimeters) apart	- EIA spacing - Front-to-rear mounting - Cage nuts - Square EIA-standard mounting holes required We recommend that Pillar racks be used to install Pillar Axiom 600 hardware components.
Vents	- Front and back doors - Top	- Front and back doors - Top
PDU	4 PDUs 90–240VAC, 50-60Hz 20-30A	- Redundant power 90–240VAC, 50–60Hz - Wattage: 8350W

Table 103 Rack specifications for a Pillar Axiom 600 system (continued)

Criteria	Pillar rack	Non-Pillar rack (minimum requirements)
	• 64 outlets (for single phase PDU) **Note:** 48 outlets (for three phase PDUs) with two maximum PDUs (115/208V 30A for US and 230/400V 16A for EU). • Horizontal mount	
Heat dissipation	• Pillar Axiom 600 systems: 28,500BTU/hr	• Pillar Axiom 600 systems: 28,500BTU/hr
Frame thickness	N/A	12 gauge to 14 gauge
Loaded weight	• Pillar Axiom 600 systems: 1505 pounds (683 kilograms)	• Pillar Axiom 600 systems: 1505 pounds (683 kilograms)

The center of gravity of a populated Pillar 42U rack is toward the front. The threshold tilt angle depends on whether the front or back of the rack faces down the slope:

- Front faces downward: 12° maximum slope.

- Back faces downward: 24° maximum slope.

Figure 97 Maximum tilt angles for stationary Pillar 42U racks

Index