PURESTORAGE

FA-420 SAS Cable Replacement Guide

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FA-420 SAS Cable Replacement Guide Steps

A ☎ icon preceding a step name indicates either a need for login access to an array or for Pure Storage Technical Support involvement in a procedure step.

Figures

Conventions and Guidelines

Document Conventions

Orange-bordered pages contain procedure steps. **Blue-bordered** pages contain supporting material.

Each note in this guide is preceded by one of the following icons:

Symbol	Meaning
	Best practice
	Supplementary instruction
	Potential for injury, physical damage, or loss of data or array configuration information
	Background information
	Indicates either a need for login access to an array or for Pure Storage Technical Support involvement in a procedure step.

Handling and Safety Guidelines

- If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- Avoid contact with backplane components and connectors.
- Disconnect all power cords before moving controllers and shelves or performing any powered-off service operation.
- Verify that rack electrical distribution systems meet all safety requirements of UL 60950-1 and IEC 60950-1 when fully populated, and that they provide adequate 100-240V 50-60Hz AC power, overcurrent protection, and electrical ground for all installed equipment.
- If bifurcated (‘Y’) power cords are used, they must be connected to a 200-240V external power supply.
- Verify that all electrical connections are grounded before powering on.
- Do not open controller or shelf enclosures, or any component such as a PCM, PSU, or drive carrier, unless you are a qualified service representative performing a service procedure in accordance with instructions published by Pure Storage.
- Do not use controller PSU or storage shelf PCM handles to lift chassis. The center handles in the rear of FA-420 and FA-450 controllers may be used for lifting.
- When servicing rack-mounted equipment, extend only one chassis at a time.
- Do not replace batteries due to risk of explosion if handled incorrectly. Dispose of batteries according to battery manufacturers' instructions.
- Do not insert anything into any FlashArray jack or socket except as specified in installation or repair instructions.
- Ensure that all components, including PSUs, PCMs, and blank panels are in place before powering on or operating an array.
- Leave failed components (e.g., PSUs, SSDs, etc.) in place until replacements are available.

Preparations for Installation and Service

FlashArray controllers and storage shelves weigh up to 20kg (44lb) each. Make arrangements for safe lifting during installation.

Ensure that the rack can support the total weight of all installed equipment (including cables and rails), and that the total weight is within the floor loading limit.

Have all necessary Fibre Channel and Ethernet cables (not supplied by Pure Storage) available.

Verify that front and rear rack mounting posts are between 61cm and 91cm (24-36in) apart, and that 2U (8.9cm or 3.5in) of vertical rack space is available for each FA-420 or FA-450 controller, and shelf, and that 1U (4.95cm or 1.75in) is available for each FA-405 controller.

Verify that the installation environment:

- Is within the operating temperature range of 10-35°C when rack is fully populated
- Does not have airflow ducts aimed directly at any FlashArray controller or shelf
- Exerts back pressure of less than 5 pascals (0.5mm water gauge) against controllers and shelves

Have a “local console” (VGA monitor+USB keyboard or a computer with terminal emulation capability) available in case it should be required for software configuration or diagnosis.

To ensure that cable lengths are adequate, mount controllers and shelves in a contiguous vertical stack, in the following bottom-to-top order: CT1, CT0, SH0, (SH1, …etc.).

Save all tools in FlashArray kits for future use.

Introduction

This guide describes replacement of a FA-420 FlashArray SAS cable.

Tools and Equipment (Supplied by Pure Storage)

1. Replacement SAS cable (1 meter)
2. Labels for replacement cable connectors and for new cable pair
3. Two flexible tie wraps for binding new cable pair
4. Temporary labels for disconnected cables.

May Be Required for Some Procedures; not Supplied by Pure Storage

1. Anti-static temporary work area large enough for a chassis, with electrical power available
2. ESD protection (e.g., wrist strap) for use while swapping PCIe cards
3. A local console (either a VGA monitor and USB keyboard, or a computer equipped with a serial-to-USB converter and terminal emulation software set to communicate at 115,200bps, no parity, 8 data bits, and one stop bit)
4. Jack or other assistance suitable for lifting up to 20kg (44lb) controller chassis
5. Incidental tools (e.g., pliers, wire cutter).

All replaced parts and unused parts and supplies must be returned to Pure Storage.

Array Power during Replacement

Because all FlashArray data connections between controllers and shelves are redundant, a SAS cable can be replaced while an array is operating, however Pure Storage recommends that hot replacements be done during less-critical times when I/O activity to the array is low.

If the customer requires complete array power off during component replacement, follow the instructions in Appendix A on page 13 for powering an array off and on.

Estimated Time for Replacement: 15 Minutes

Includes all necessary unbox, repair, and re-box tasks. Does not include any optional customer-requested operations such as array power off and on.

Step 1: Observe Failure Symptoms

This guide describes replacement of a single SAS cable (one member of a cable pair).

FlashArray SAS cables are typically replaced on the recommendation of Pure Storage Technical Support. The cables are bound in pairs with tie wraps and sleeves. Connector labels indicate the ports to which they should be connected. Each connector label matches a corresponding label on a controller or storage shelf port.

1.1. Request that the customer or Pure Storage Technical Support representative use the GUI or CLI to identify the suspect cable. Symptoms that suggest SAS cable failure are:

- Storage shelf IOM port LEDs not lit or partially lit.
- Two interconnected SAS ports reporting Disconnected (Figure 1).
- Two interconnected SAS ports reporting ok status with a speed other than 24Gbps (Figure 2).

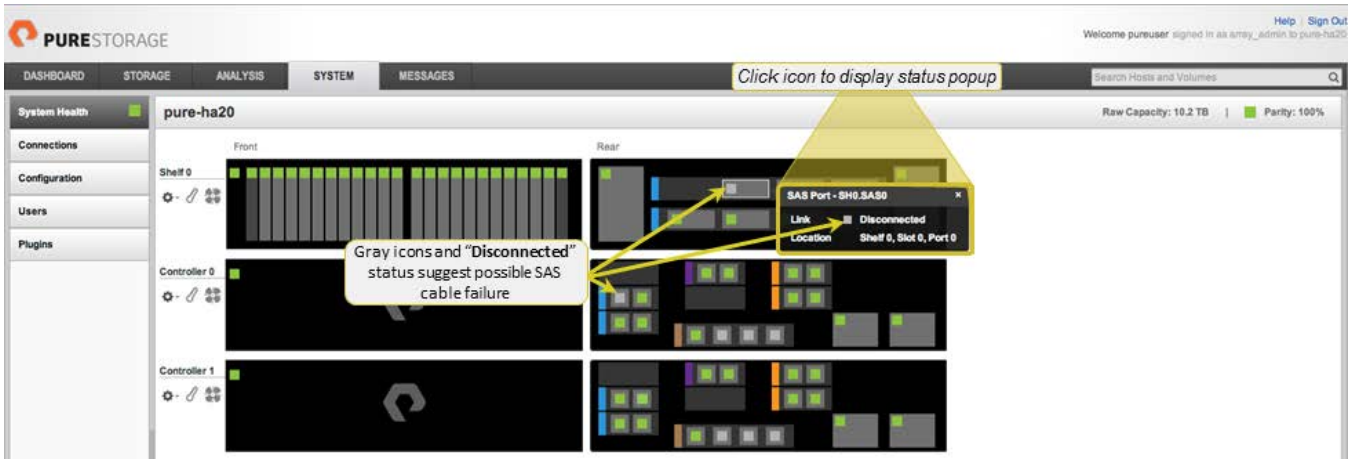

Figure 1: GUI Indication of Possible SAS Cable Failure

```
pureuser>purehw list --type sas
Name      Status    Identify  Slot  Index  Speed      Temperature
CT0.SAS0  failed    -         2     0      0.00bps    -           ◀
CT0.SAS1  ok        -         2     1      0.00bps    -
CT0.SAS2  ok        -         3     0      24.00Gbps  -
CT0.SAS3  ok        -         3     1      0.00bps    -
CT1.SAS0  ok        -         2     0      0.00bps    -
CT1.SAS1  ok        -         2     1      24.00Gbps  -
CT1.SAS2  ok        -         3     0      0.00bps    -
CT1.SAS3  ok        -         3     1      24.00Gbps  -
SH0.SAS0  failed    -         0     0      0.00bps    -           ◀
SH0.SAS1  ok        -         0     1      0.00bps    -
SH0.SAS2  ok        -         0     2      24.00Gbps  -
SH0.SAS3  ok        -         1     3      24.00Gbps  -
SH0.SAS4  ok        -         1     4      0.00bps    -
SH0.SAS5  ok        -         1     5      24.00Gbps  -
```

Figure 2: GUI Indication of Possible SAS Cable Failure

Step 2: Label and Separate Pair Containing Faulty Cable

If the customer requires complete array power off during SAS cable replacement, follow the instructions in Appendix A on page 13 for powering array components off.

2.1. View the GUI or CLI display (see page 7) to identify the ports connected by the faulty cable

Type-MR cable pairs interconnect two storage shelves. Other cable pair types connect a controller port to a storage shelf port.

2.2. Attach a temporary label near the storage shelf end of each cable in the pair containing the faulty one

2.3. Mark the failed cable to avoid inadvertent reuse

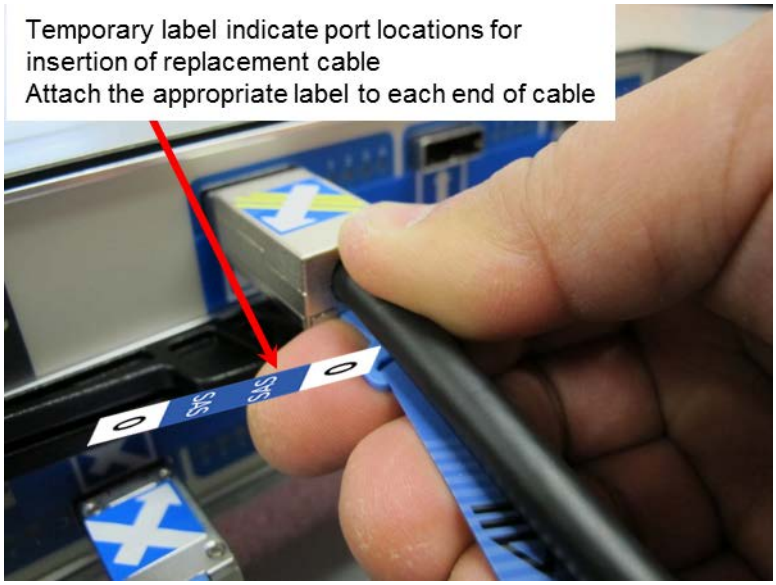

Figure 3: Labeling the Pair Containing the Faulty Cable

2.4. Use a wire cutter to cut the flexible tie wraps that bind the SAS cable pair.

2.5. If there is a braided sleeve around the cables, remove it and save it for later reuse.

2.6. Remove the cable and set it aside for return to Pure Storage.

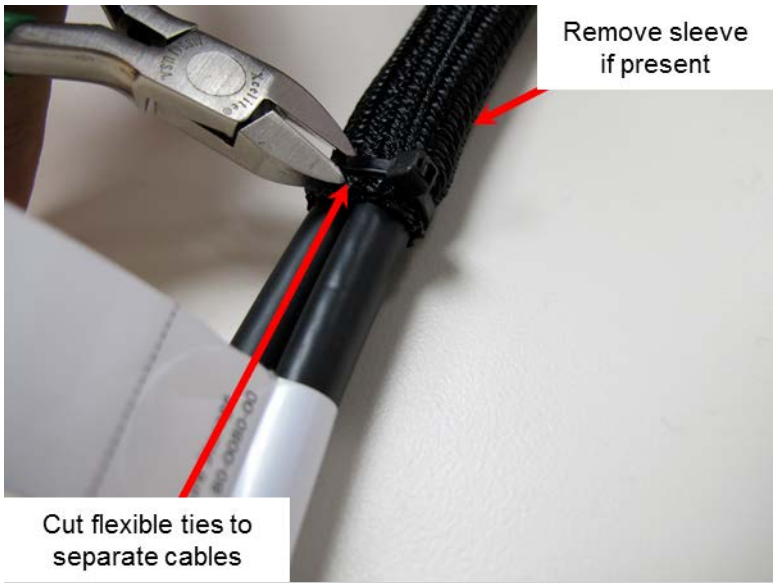

Figure 4: Cutting Tie on Pair Containing Faulty Cable

Step 3: Disconnect Faulty Cable

Both ends of a type-MR cable pair interconnect storage shelves.

3.1. At the storage shelf end of the faulty cable, pull the blue tab on the connector to release the latch

3.2. Maintaining tension on the blue tab, pull the connector outward to remove it from the I/O Module (IOM) port socket

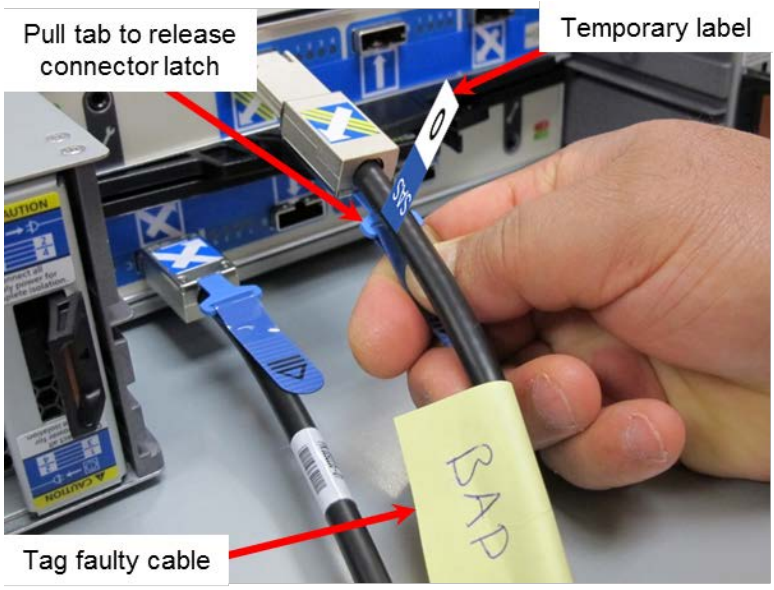

Figure 5: Disconnecting a SAS Cable from an IOM

3.3. At the controller end of the faulty cable, pull the blue tab on the connector to release the latch

3.4. Maintaining tension on the blue tab, pull the connector outward to remove it from the controller port socket.

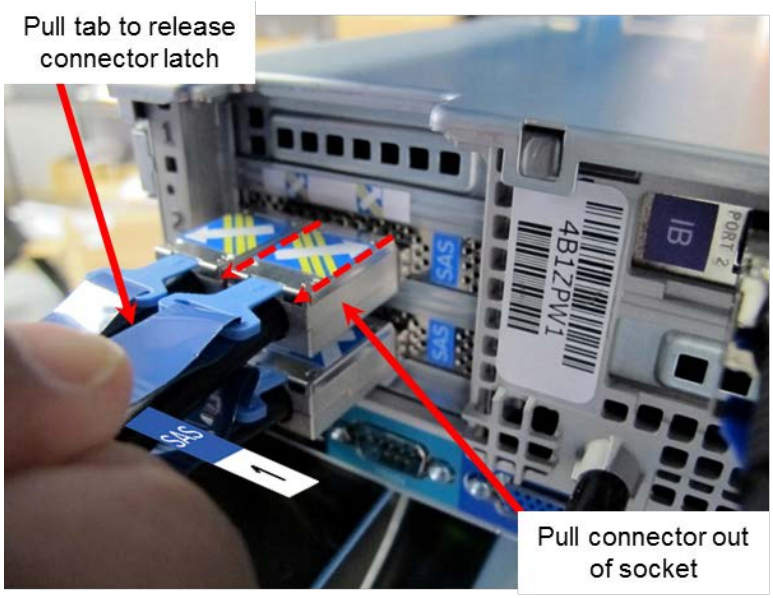

Figure 6: Disconnecting a SAS Cable From a FA-420 Controller Port

Step 4: Label New Cable

4.1. Attach "arrow" labels from the replacement kit to both surfaces of each connector on the new SAS cable.

- Labels must be the same as those on the corresponding connectors of the replaced cable.

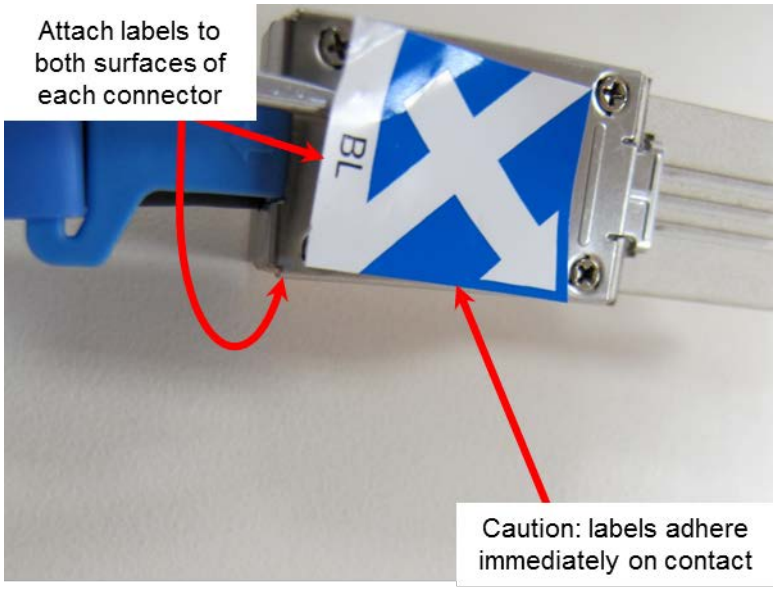

Figure 7: Labeling a New SAS Cable Connector

Step 5: Connect New Cable

- Both ends of a cable in a type-**MR** pair connect to storage shelf IOMs.

5.1. Match the pattern and orientation of the label on each of the new cable's connectors with the corresponding label near the controller or IOM port socket

5.2. Push connectors into sockets until connector latches engage

5.3. Verify that latches have engaged by pulling the cables gently outward until resistance is felt.

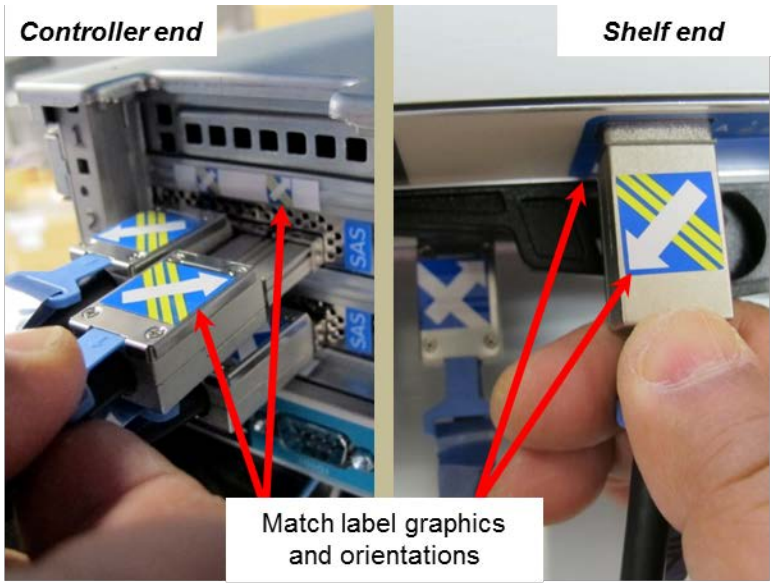

Figure 8: Connecting a SAS Cable

Step 6: Bind and Label Cable Pair

6.1. If a braided sleeve was removed earlier (see page 8), wrap it around the middle thirds of the old and new cables

6.2. Use flexible tie wraps from the kit to bind old and new cables into a pair. If a sleeve is used, position the tie wraps near the ends of the sleeve as shown in Figure 9

6.3. Trim the tie wrap ends as appropriate

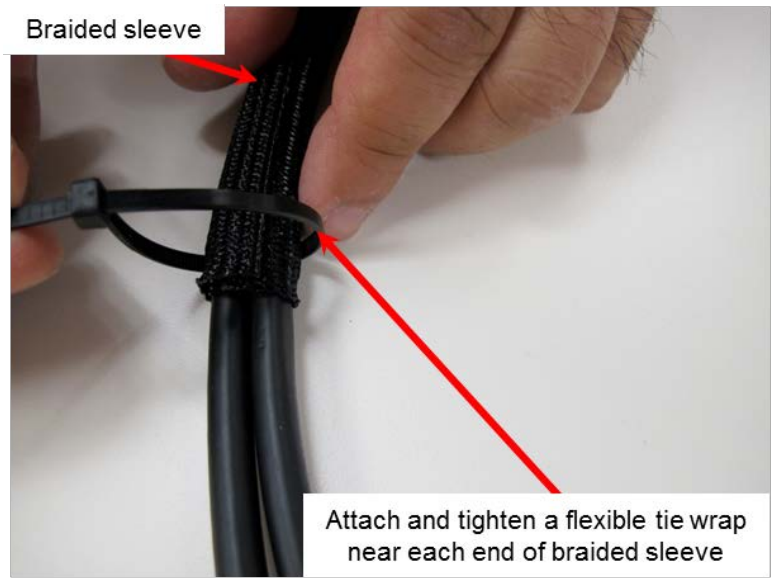

Figure 9: Binding Old and New Cables into a Pair

6.4. If no cable pair label (indicating cable type **BL**, **TR**, etc.) is attached to the pair, attach a label indicating the pair type near one of the tie wraps

6.5. Remove the temporary SAS port number labels from the new cable.

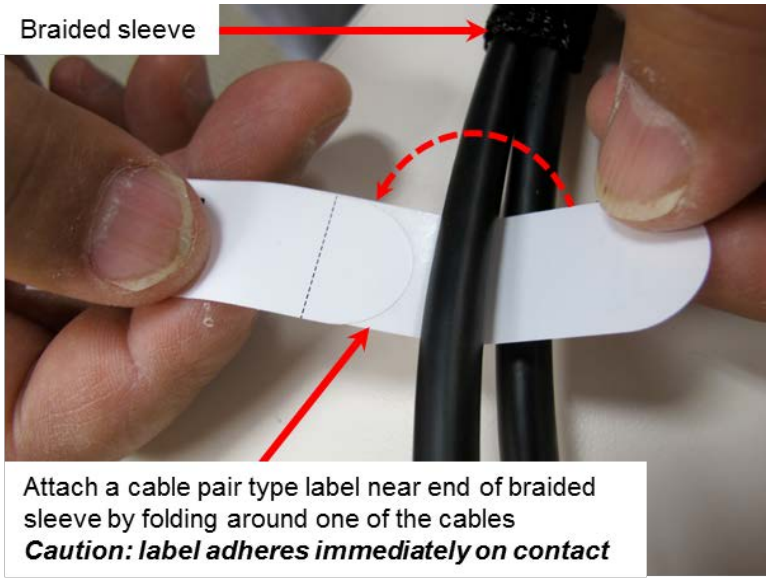

Figure 10: Labeling a Cable Pair

Step 7: Verify the Repair

If the array was powered off for controller PSU replacement, follow the instructions in Appendix A on page 13 to power it on.

7.1. Verify that the path connected by the new cable is functioning by inspecting the green LEDs on the IOM port to which it is connected. All four should be illuminated, and may blink if activity is occurring

7.2. Request that the customer or a Pure Storage Technical Support representative use the GUI or CLI to verify that the entire SAS path is functioning.

Allow about 30 seconds after replacing a SAS cable in a live array for display status to update.

Figures 11 and 12 show the GUI and CLI displays for properly functioning SAS paths.

Figure 11: GUI Indication of Functional SAS Path (including Cable)

```
pureuser>purehw list --type sas
Name      Status         Identify  Slot  Index  Speed       Temperature
CT0.SAS0  ok             -         2     0      24.00Gbps   -            ◀
CT0.SAS1  ok             -         2     1      0.00bps     -
CT0.SAS2  ok             -         3     0      24.00Gbps   -
CT0.SAS3  ok             -         3     1      0.00bps     -
CT1.SAS0  ok             -         2     0      0.00bps     -
                      etc.
SH0.SAS0  ok             -         0     0      24.00Gbps   -            ◀
SH0.SAS1  ok             -         0     1      0.00bps     -
SH0.SAS2  ok             -         0     2      24.00Gbps   -
SH0.SAS3  ok             -         1     3      24.00Gbps   -
SH0.SAS4  ok             -         1     4      0.00bps     -
SH0.SAS5  ok             -         1     5      24.00Gbps   -
```

Figure 12: CLI Indication of Functional SAS Path (including Cable)

If the GUI and CLI fail to indicate a functioning SAS path, recheck all installation steps before contacting Pure Storage Technical Support for further advice.

This completes FA-420 SAS cable replacement.

Appendix A: FlashArray Power Off and On

Most FlashArray service operations can be performed while the array is online. Some, however, require that the affected controller or array be powered off. In addition, a customer may require that arrays be powered off for service, whether or not this is strictly required. To power off a controller or an entire array for service, follow the procedures below.

- When powering off an array, power off controllers before storage shelves.
- When powering off an array, power secondary controller off first.
- When powering on an array, power on storage shelves and wait 10 seconds before powering on controllers.

Controller and Storage Shelf Power Off and Power On

To power off a controller:

1. Remove power plugs from both PSU sockets
2. If replacing power cords or controller chassis, unwrap hook-and-loop straps to release cords

- It is not necessary to shut Purity down or switch a controller off before removing the power plug.

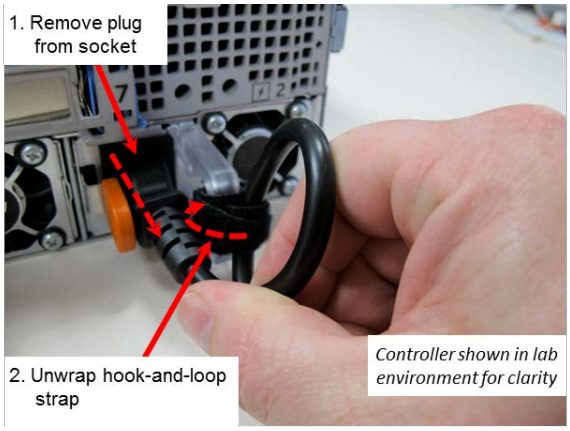

Figure A.1: FA-450 Controller Power (FA-420 & FA-405 are similar)

To power off a storage shelf:

1. Place both PCM rocker switches in the off (**0**) position.

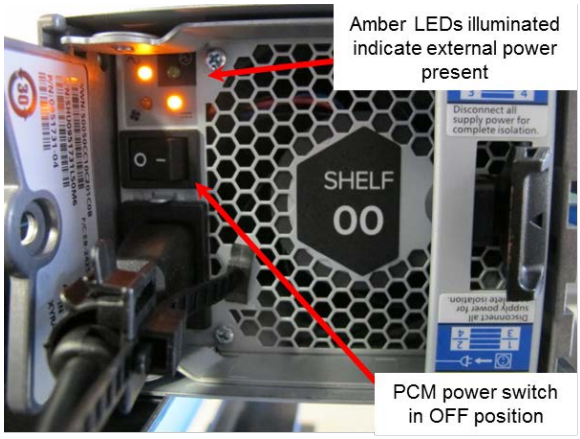

Figure A.2: Storage Shelf Power

To power on a controller:

1. If necessary, loop power cords near plug ends
2. Wrap captive hook-and-loop straps around loops in cords
3. Insert power plugs in PSU sockets.

To power on a storage shelf:

1. Place both PCM rocker switches in the on (|) position.

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