ST2501 M2 Drive Module
Initial Setup Guide

May 2011

51324-00, Rev. A

Revision History

Version and Date	Description of Changes
51324-00, Rev. A, May 2011	Initial release of the document.

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Contents

Step 1 – Preparing for an Installation

Use this document to install the ST2501 M2 drive module. Instructions for installing the ST2500 M2 array module are included in the *ST2500 M2 Array Module Initial Setup Guide*.

If you are adding the drive module to an existing storage array, look at the storage array profile for your storage array. The storage array profile shows information about the number of drives that are supported by your storage array. The storage array profile shows these numbers of drives:

- The number of drives that are currently attached to the storage array

- The number of drives that you are allowed to add to the storage array

Make sure that your storage array supports adding more drives.

ATTENTION   **Possible hardware damage** – To prevent electrostatic discharge damage to the tray, use proper antistatic protection when handling tray components.

Navigational Aid	
"Key Terms"	Page 2
"Gathering Items"	Page 2
"Things to Know – Taking a Quick Glance at the Hardware"	Page 5

Key Terms

drive module

One tray with drives, one or two environmental services monitors (ESMs), power supplies, and fans. A drive module does not contain controllers.

controller tray

One tray with one or two controllers. The controller tray also contains power supplies, fans, and other supporting components. The controller tray provides the interface between a host and a storage array. A controller tray does not have drives for storing data.

array module

One tray with drives, one or two controllers, fans, and power supplies. The array module provides the interface between a host and a storage array.

environmental services monitor (ESM)

A canister in the drive module that monitors the status of the components. An ESM also serves as the connection point to transfer data between the drive module and the controller.
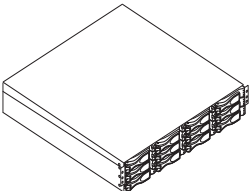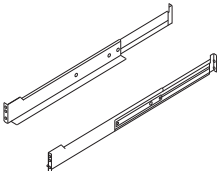
storage array

A collection of both physical components and logical components for storing data. Physical components include drives, controllers, fans, and power supplies. Logical components include volume groups and volumes. These components are managed by the storage management software.

Gathering Items
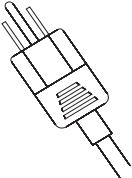
Before you start the installation, make sure that the hardware items and the software items have been approved by the original manufacturer. If you need more information, contact your Customer and Technical Support representative.
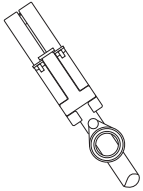
Basic Hardware

Basic Hardware and Tools	Item	Included with the Drive Module
	DE1600 drive module with end caps that are packaged separately.	✔
	Mounting rails, clip nuts, and screws The mounting rails that are available with the drive module are designed for an industry-standard cabinet.	✔

NOTE   Refer to the *ST2500 M2 Array Module Initial Setup Guide* for the other necessary items.
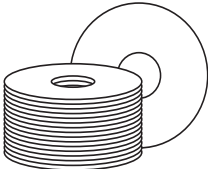
Cables and Connectors

	Item	Included with the Drive Module
	Power cords The power cords that are shipped with the drive module are for connection to an external power source, such as a wall plug. Your cabinet might have special power cords that you use instead of the power cords that are shipped with the drive module.	✔

	Item	Included with the Drive Module
	SAS cables (for connections within the storage array) • Two cables are included with the drive module. • Depending on your connection requirements, you might need to purchase additional cables or cables of different lengths.	✓

NOTE Refer to the *ST2500 M2 Array Module Initial Setup Guide* for the other necessary items.

Product DVDs

	Item	Included with the Drive Module
	Firmware DVD • Firmware is already installed on the controllers. • The DVD files are backup copies. SANtricity ES Storage Manager Installation DVD • SANtricity ES Storage Manager software • To access product documentation, use the documentation map file, `doc_launcher.html`, which is located in the `docs` directory.	✓

Tools and Other Items

• Labels – To help you to identify cable connections and to more easily trace cables

• A cart – To hold the drive module and its components

• A Phillips screwdriver

• A flat-blade screwdriver

• Antistatic protection

• A flashlight

Things to Know – Taking a Quick Glance at the Hardware

ATTENTION	**Risk of equipment malfunction** – To avoid exceeding the functional and environmental limits, install only drives that have been provided or approved by the original manufacturer. Drives might be shipped but not installed. System integrators, resellers, system administrators, or users can install the drives.

IMPORTANT	Each tray in the storage array must have a minimum of two drives for proper operation. If tray has fewer than two drives, a power supply error is reported.

Figure 1 ST2501 M2 Drive Module – Front View
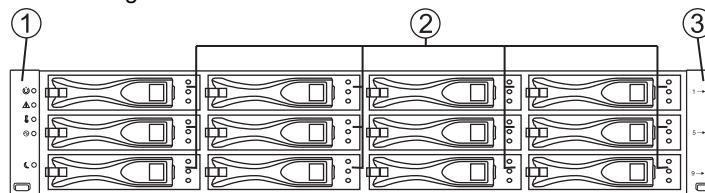
1 Left End Cap (has the drive module LEDs)
2 Drives
3 Right End Cap

Figure 2 ST2501 M2 Drive Module – Rear View
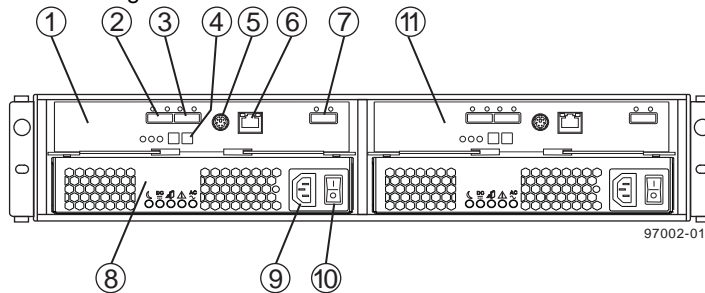
1 ESM A Canister
2 Host Connector 1
3 Host Connector 2
4 Seven-Segment Display Indicators
5 Serial Connector
6 Ethernet Connector
7 Expansion Port SFF-8088 Connector
8 Power-Fan Canister
9 Power Connector
10 Power Switch
11 ESM B Canister

Step 2 – Installing the Drive Module

Things to Know – General Installation

IMPORTANT If you are installing the drive module in a cabinet with other trays, make sure that the combined power requirements of the drive module and the other trays do not exceed the power capacity of your cabinet.

- Special site preparation is not required for this drive module beyond what is normally found in a computer lab environment.

- The power supplies meet standard voltage requirements for both domestic and worldwide operation.

- If you are installing drive modules and the array module at the same time, take these precautions:

  - Install the array module in a location within the cabinet that lets you evenly distribute the drive modules around the array module.

  - Keep as much weight as possible in the bottom half of the cabinet.

IMPORTANT	After you install the drive module, you might replace drives or install additional drives. If you replace or add more than one drive without powering down the drive module, install the drives one at a time. Wait 10 seconds after you insert each drive before inserting the next one.

ATTENTION	**Possible hardware damage** – To prevent electrostatic discharge damage to the tray, use proper antistatic protection when handling tray components.

For Additional Information

Refer to the *Storage System Site Preparation Guide* for important considerations about cabinet installation.

Steps to Install – Drive Module

WARNING	(W08) **Risk of bodily injury** –

>18 kg (39.7 lbs)

Two persons are required to safely lift the component.

WARNING	(W05) **Risk of bodily injury** – If the bottom half of the cabinet is empty, do not install components in the top half of the cabinet. If the top half of the cabinet is too heavy for the bottom half, the cabinet might fall and cause bodily injury. Always install a component in the lowest available position in the cabinet.

You can install the drive module into an industry standard cabinet.

This procedure describes how to install the mounting rails into an industry standard cabinet.

ATTENTION **Possible hardware damage** – To prevent electrostatic discharge damage to the tray, use proper antistatic protection when handling tray components.

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1 Make sure that the cabinet is in the final location. Make sure that you meet the clearance requirements shown in Figure 3.

Figure 3 Drive Module Airflow and Clearance Requirements

78014-02
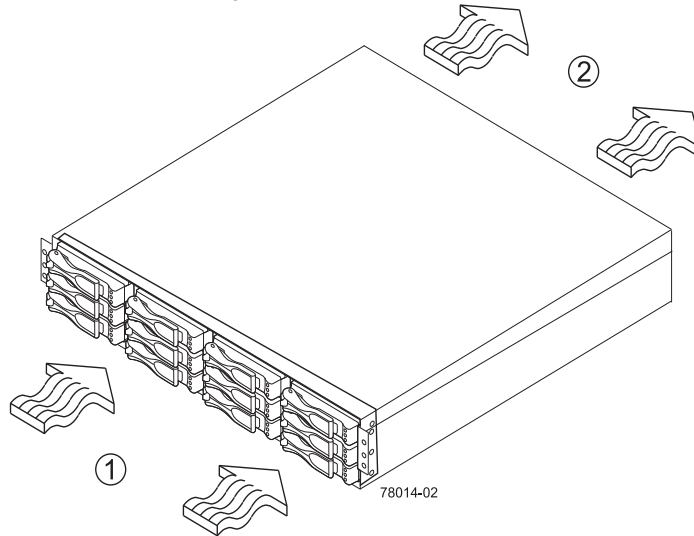
   1 76 cm (30 in.) clearance in front of the cabinet
   2 61 cm (24 in.) clearance behind the cabinet

NOTE   Fans pull air through the tray from front to back across the drives.

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2 Lower the feet on the cabinet to keep the cabinet from moving.

3 Remove the drive module and all contents from the shipping carton.

4 Position the mounting rails in the cabinet (Figure 4).

Figure 4 Positioning the Mounting Rails in the Cabinet
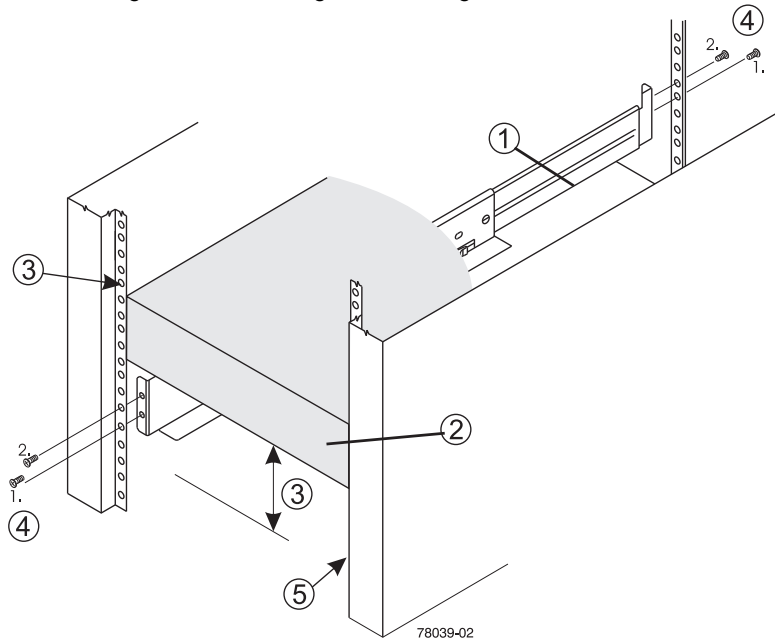
1 Mounting Rail
2 Existing Tray
3 Clearance Above and Below the Existing Tray
4 Screws for Securing the Mounting Rail to the Cabinet (Front and Rear)
5 Industry Standard Cabinet

- If you are installing the mounting rails above an existing tray, position the mounting rails directly above the tray.

- If you are installing the mounting rails below an existing tray, allow 8.8-cm (3.5-in.) vertical clearance for a drive module or an array module.

5 Attach the mounting rails to the cabinet by performing these substeps (Figure 5):

a Make sure that the adjustment screws on the mounting rail are loose so that the mounting rail can extend or contract as needed.

Figure 5 Attaching the Mounting Rails to the Cabinet

78039-03
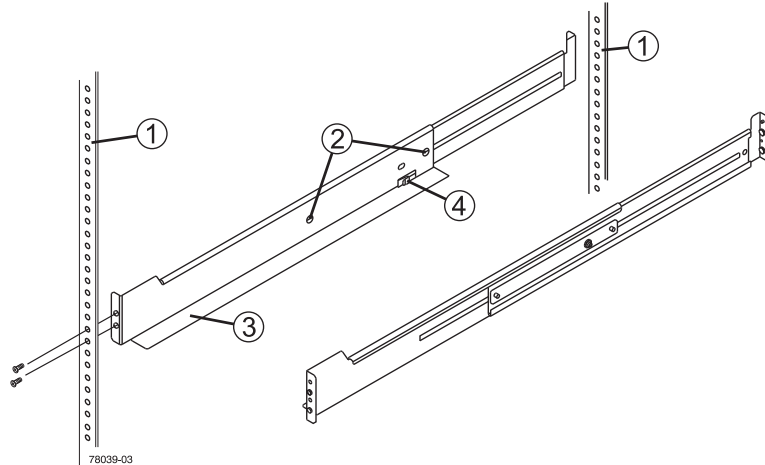
1 Cabinet Mounting Holes
2 Adjustment Screws for Locking the Mounting Rail Length
3 Mounting Rails
4 Clip for Securing the Rear of the Drive Module

b Place the mounting rail inside the cabinet, and extend the mounting rail until the flanges on the mounting rail touch the inside of the cabinet.

c Make sure that the alignment spacers on the front flange of the mounting rail fit into the mounting holes in the cabinet (Figure 6 on page 12).

The front flange of each mounting rail has two alignment spacers. The alignment spacers are designed to fit into the mounting holes in the cabinet. The alignment spacers help position and hold the mounting rail.

Figure 6 Alignment Spacers on the Mounting Rail

78039-04
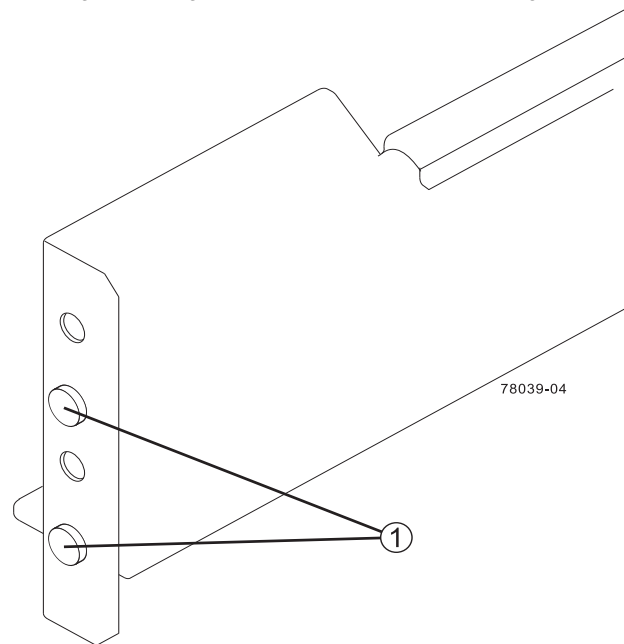
1 Alignment Spacers

d Insert one M5 screw through the front of the cabinet and into the top captured nut in the mounting rail. Tighten the screw.

e Insert two M5 screws through the rear of the cabinet and into the captured nuts in the rear flange in the mounting rail. Tighten the screw.

f Tighten the adjustment screws on the mounting rail.

g Repeat substep a through substep f to install the second mounting rail.

6 With the help of one other person, slide the rear of the drive module onto the mounting rails. The rear edge of the drive module must fit into the clip on the mounting rail. The drive module is correctly aligned when these conditions are met:

- The mounting holes on the front flanges of the drive module align with the mounting holes on the front of the mounting rails.

- The rear edge of the drive module sheet metal fits into the clip on the mounting rail (Figure 7).

- The holes in the drive module sheet metal for the rear hold-down screws align with the captured nuts in the side of the mounting rails.

Figure 7   Sliding the Drive Module into the Clip on the Mounting Rail

78039-01
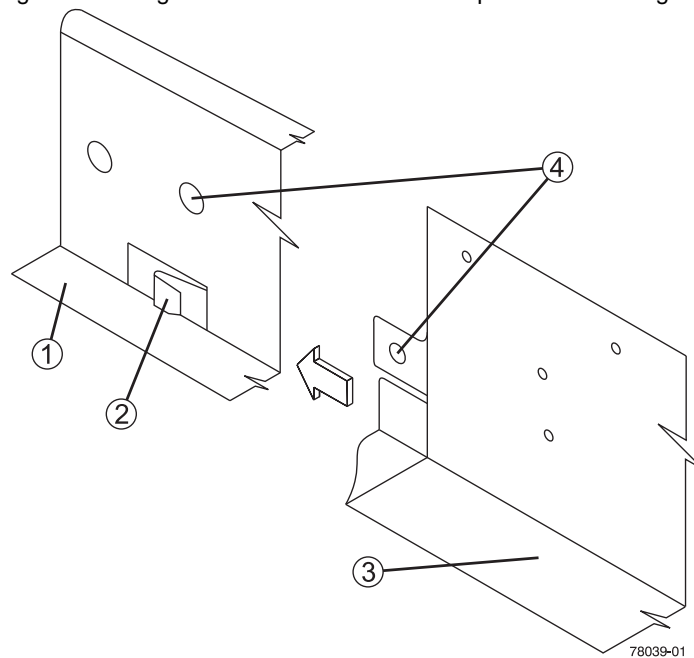
1 Mounting Rail
2 Clip
3 Partial View of the Drive Module Rear Sheet Metal
4 Align the hole in the Drive Module sheet metal with the captured nut in
the mounting rail.

7 Secure the front of the drive module to the cabinet. Use the two screws to attach the flange on each side of the front of the drive module to the mounting rails (Figure 8).

   a Insert one M5 screw through the bottom hole of a flange on the drive module so that the screw goes through the cabinet rail and engages the bottom captured nut in the mounting rail. Tighten the screw.

   b Repeat substep a for the second flange.

Figure 8 Attaching the Front of the Drive Module
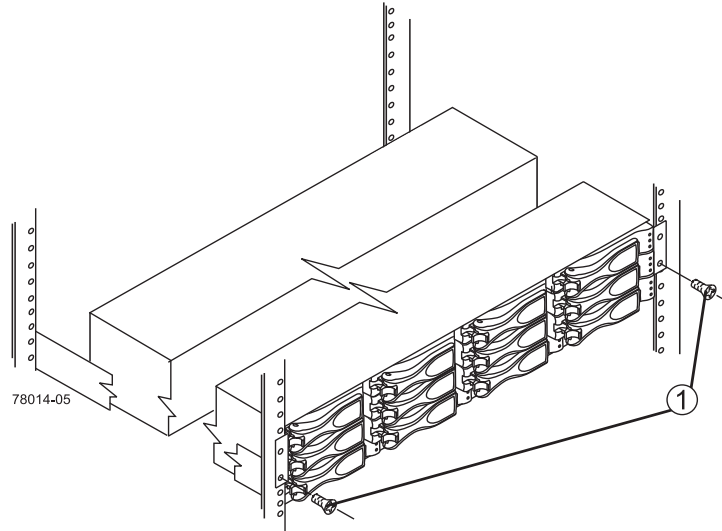
   1 Screws for Securing the Front of the Drive Module

8 Secure the side of the drive module to the mounting rails by performing these substeps:

   a Insert one M4 screw through the side sheet metal of the drive module into the captured nut on the side of the mounting rail. Tighten the screw.

   b Repeat substep a for the other side.

9 Attach the plastic end caps onto the front of the drive module (Figure 9).

    a Put the top of the end cap on the hinge tab that is part of the drive module mounting flange.

    b Gently press on the bottom of the end cap until it snaps into place over the retainer on the bottom of the drive module mounting flange.

Figure 9 Attaching the End Caps to the DE1600 Drive Module
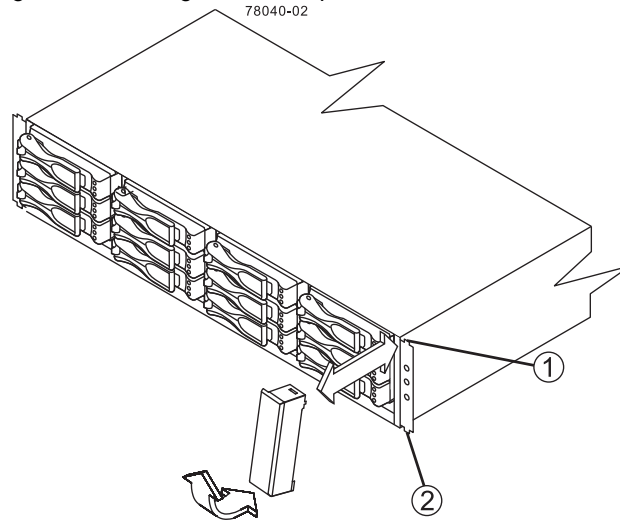
1 Hinge Tab
2 Retainer

Steps to Install – Drives

In some situations, the drive module might be delivered without the drives installed. Follow the steps in this procedure to install the drives. If your drive module already has drives installed, you can skip this step and go to "Things to Know – Connecting the Power Cords" on page 16.

ATTENTION   **Risk of equipment malfunction** – To avoid exceeding the functional and environmental limits, install only drives that have been provided or approved by the original manufacturer. Drives might be shipped but not installed. System integrators, resellers, system administrators, or users can install the drives.

NOTE   The installation order is from top to bottom and left to right. The installation order is important because the drives might already contain configuration information that depends upon the correct sequence of the drives in the tray.

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1 Beginning with the first drive slot in the upper-left side of the drive module, place the drive on the slot guides, and slide the drive all the way into the slot.

2 Push the drive handle to the right to lock the drive securely in place.

Figure 10 Installing a Drive
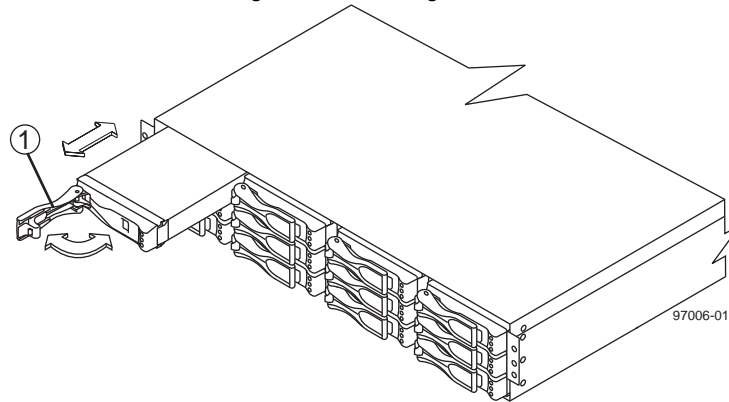
1 Drive Handle

NOTE   In some applications, the drive handle might have the hinge on the right.

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3 Install the second drive to the right of the first drive.

4 Install the other drives from left to right and, as you fill each drive row, top to bottom.

Things to Know – Connecting the Power Cords

• For each AC power connector on the drive module, make sure that you use a separate power source in the cabinet. Connecting to independent power sources maintains power redundancy.

• To ensure proper cooling and assure availability, the drive module always uses two power supplies.

• You can use the power cords shipped with the drive module with typical outlets used in the destination country, such as a wall receptacle or an uninterruptible power supply (UPS). These power cords, however, are not intended for use in most EIA-compliant cabinets.

IMPORTANT   Make sure that you do not turn on the power to the drive module until this initial setup guide instructs you to do so. For the correct procedure for turning on the power, see "Steps to Turn On – Power" on page 31.

Steps to Connect – Power Cords

1 Make sure that the circuit breakers in the cabinet are turned off.

2 Make sure that both of the Power switches on the drive modules are turned off.

3 Connect the primary power cords from the cabinet to the external power source.

4 Connect a cabinet power ladder (or power cords specific to your particular cabinet) to the AC power connector on each power-fan canister in the drive module.

5 If you are installing other drive modules in the cabinet, connect a power cord to each power-fan canister in the drive modules.

ST2501 M2 Drive Module Initial Setup Guide

Step 3 – Connecting the Drive Module to the Array Module

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Key Terms

drive channel

The path for the transfer of data between the controllers and the drives in the storage array.

Things to Know – ST2500 M2 Array Modules

The ST2501 M2 drive module connects to a ST2500 M2 Array Module.

Figure 11 shows the location of the expansion connectors on the controllers in a ST2500 M2 array module.

Figure 11 Drive Expansion Connectors on the Controllers in a ST2500 M2 Array Module
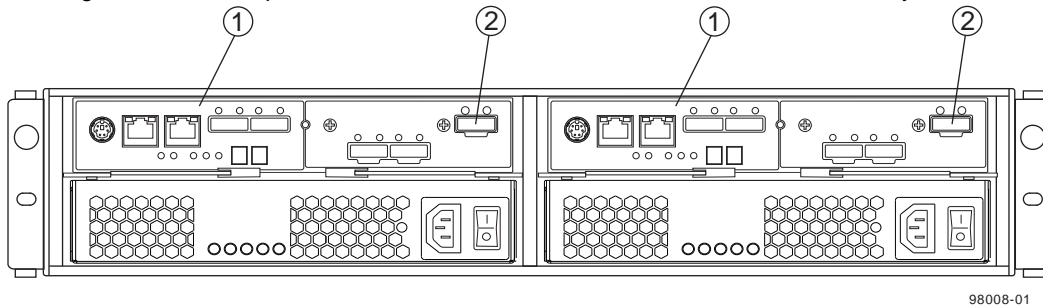
1 Controllers
2 SAS Drive Expansion Connectors

- Each controller has one drive expansion connector. You connect drive modules to your array module through the drive expansion connector.

- The cables from the controllers in the array module to the drive modules are SAS cables.

- Controller A contains drive channel 1.

- Controller B contains drive channel 2.

Things to Know – Drive Module

IMPORTANT If you add more drive modules than the storage array supports, the storage array becomes invalid. You cannot perform configuration operations, but you can continue to transfer I/O data to the existing volumes.

Each storage array supports a specific number of drive modules. See "Things to Know – Storage Array Configuration Specifications" on page 22 for the number of drive modules that the storage array supports. If you are setting up a new storage array, refer to the *ST2500 M2 Array Module Initial Setup Guide*.

If you are adding the drive module to an existing storage array, look at the storage array profile for your storage array. The storage array profile shows information about the number of drive modules that are supported by your storage array. The storage array profile shows this information:

- The number of drive modules that are currently attached to the storage array

- The number of drive modules that you are allowed to add to the storage array

Things to Know – Connecting the Drive Module to an Array Module

You can connect a drive module to a new array module or to an existing array module. Before you connect a drive module to an existing array module, you must answer these questions:

- How many drive modules does this array module support? See "Things to Know – Storage Array Configuration Specifications" on page 22.

- What is the cabling configuration for the storage array? See "Things to Know – Basic Cabling Configurations" on page 25.

- Is the storage array receiving power? No, see "Things to Know – General Installation" on page 7.

- Is the storage array transferring I/O data? Yes, see "Things to Know – Connecting the Power Cords" on page 16.

Things to Know – Connecting the Drive Module to Another Drive Module

Each ESM in a drive module has three SAS connectors. Below two of the connectors is an arrow pointing up. Below the expansion connector on the far right is an arrow pointing down. When connecting from an ESM in one drive module to an ESM in another drive module, make sure that you use connectors with arrows pointing in opposite directions.

Things to Know – Storage Array Configuration Specifications

Item	Specification
Number of controllers	One or two
Number of host connectors	Two SAS host connectors for the following: • ST2500 M2 array module with 12 drives • ST2500 M2 array module with 24 drives
Number of drive modules	Up to seven additional drive modules, depending on the number of drives (12 or 24) in the ST2500 M2 array module
Maximum number of drives	• 96 (12 or 24 drives in the array module and 12 drives in each of six or seven drive modules) in a duplex configuration • 36 (24 drives in the array module) in a simplex configuration
Maximum number of volumes per storage array	1024
Maximum number of storage partitions	64
Maximum number of volumes per storage partition	256
Cluster support	Windows Server 2003 SP2, R2 and Windows Server 2008 operating systems: MSCS Linux SLES 10 sp3, SLES 11, and Open-iscsi operating systems: SteelEye; SUSE OES v2 (with SLES 10 sp3 only) Linux Red Hat 4.8 and Red Hat 5.4 operating systems (SteelEye is not supported with Red Hat Version 4.0 IA64): Red Hat native (Heartbeat) HP-UX v11.23, and HP-UX v11.31 (PA-RISC and IA64) operating systems: MC Service Guard Solaris 10 and Solaris 11 (x86) operating systems: Sun Cluster
Maximum number of snapshot copies per volume	8
Maximum number of snapshot copies per storage array	256

Things to Know – Drive Module Cable Labeling

Labels for the drive cables identify which controller ports and which ESM connections in a drive module that you use when you attach cables between a controller and the drive module. Cable labels are useful if you need to disconnect cables to service a controller. Attach a label to each end of the cable. Use this design to create labels for drive cables:

- Controller ID (for example, controller A)

- Drive channel number and port ID in the controller (for example, drive channel 1, port 4)

- ESM ID (for example, ESM A)

- ESM port ID (for example, 1A or 1B)

- Drive module ID

In this example, the cable connection has the following characteristics:

- Controller A, drive channel 1

- Controller A, port 1

- Drive module 1

- ESM A (which is the left ESM), out port

Using this design, the label should include this information:

```
CtA-Dch1, Dm1-ESM_A (left), 1A
```

Steps to Connect – Drive Modules with the Power Off

1 If a black, plastic plug is in the drive expansion connector of controller A in the array module, remove it.

2 Plug one end of the cable into the drive expansion connector on the array module.

3 Plug the other end of the cable into the connector with an up arrow on the ESM in the drive module.

4 Are you adding more drive modules?

- **Yes** – Continue with step 5.

- **No** – Continue with step 8 on page 24.

5 From the first drive module, plug one end of the cable into the connector with the down arrow.

> **IMPORTANT** Each ESM in the drive module has three SAS connectors. Two connectors show an up arrow; the other connector shows a down arrow. When connecting from an ESM in one drive module to an ESM in another drive module, connect from a down arrow to an up arrow. If the cable is plugged into two connectors with arrows pointing in the same direction, communication between the two drive modules is lost.

6 Plug the other end of the cable into the connector with an up arrow on the next drive module.

7 Repeat step 5 on page 23 through step 6 for each drive module that you intend to add to the storage array.

8 Repeat step 1 on page 23 through step 7 for controller B.

Steps to Connect – Drive Module with the Power On

1 Is the storage array transferring I/O data?

- ▪ **Yes** – Go to step 2.

- ▪ **No** – Go to step 5.

2 Can you stop transferring all I/O data to the storage array?

- ▪ **Yes** – Go to step 3. Supervision from your Customer and Technical Support representative is not required.

- ▪ **No** – Contact your Customer and Technical Support representative before connecting a drive module to a storage array that is transferring I/O data. The Customer and Technical Support representative will help you connect the drive module to a storage array that is transferring I/O data.

3 Stop all I/O activity to the storage array.

4 Are you adding the drive module to a storage array with existing drive modules?

- ▪ **Yes** – Go to step 5.

- ▪ **No** – Go to step 8 on page 25.

5 Plug one end of the cable into the drive expansion connector on the array module.

> **IMPORTANT** Each ESM in the drive module has three SAS connectors. Two connectors show an up arrow; the other connector shows a down arrow. When connecting from an ESM in one drive module to an ESM in another drive module, connect from a down arrow to an up arrow. If the cable is plugged into two connectors with arrows pointing in the same direction, communication between the two drive modules is lost.

6 Plug the other end of the cable into the connector with an up arrow on the ESM in the drive module.

7 Are you adding more drive modules?

- **Yes** – Go to step 5.

- **No** – Go to step 8.

8 From the first drive module, plug one end of the cable into the connector with the down arrow.

9 Plug the other end of the cable into the connector with an up arrow on the next drive module.

10 Repeat step 8 through step 9 for each drive module that you intend to add to the storage array.

11 Repeat step 5 through step 10 for controller B.

Things to Know – Basic Cabling Configurations

You have many options for attaching cables in your storage array configuration. Use these basic configurations as a guide to configure your storage array.

Depending on the number of drive modules that you need to connect, see the applicable figure listed in Table 1.

Table 1 Cabling Configurations

Cabling Configuration	Figure
Array module above one drive module	Figure 12 on page 26
Array module between two drive modules	Figure 13 on page 26
Array module with three drive modules	Figure 14 on page 26
Maximum configuration with tray loss protection	Figure 15 on page 27

Figure 12 Array Module Above the Drive Module
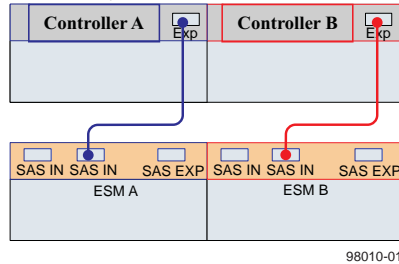

98010-01

Figure 13 Array Module Between Two Drive Modules
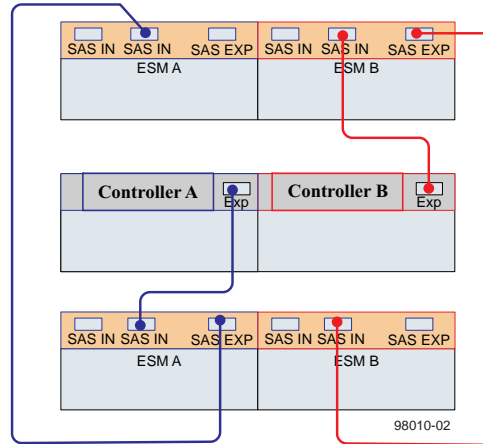

98010-02
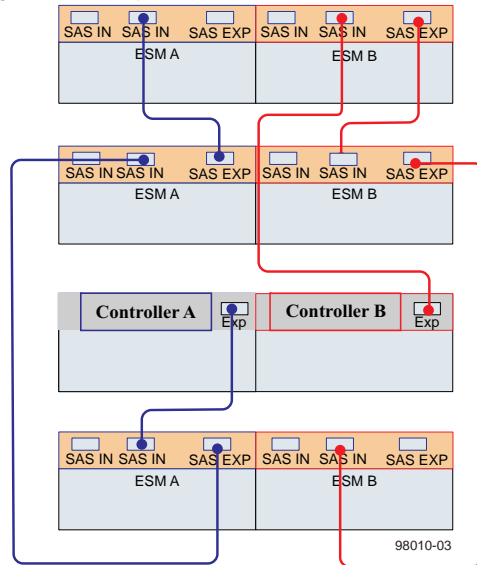
Figure 14 Array Module With Three Drive Modules

98010-03

Figure 15 Maximum Configuration with Tray Loss Protection

The number of drive trays may vary as long as the maximum number of drives is not exceeded.
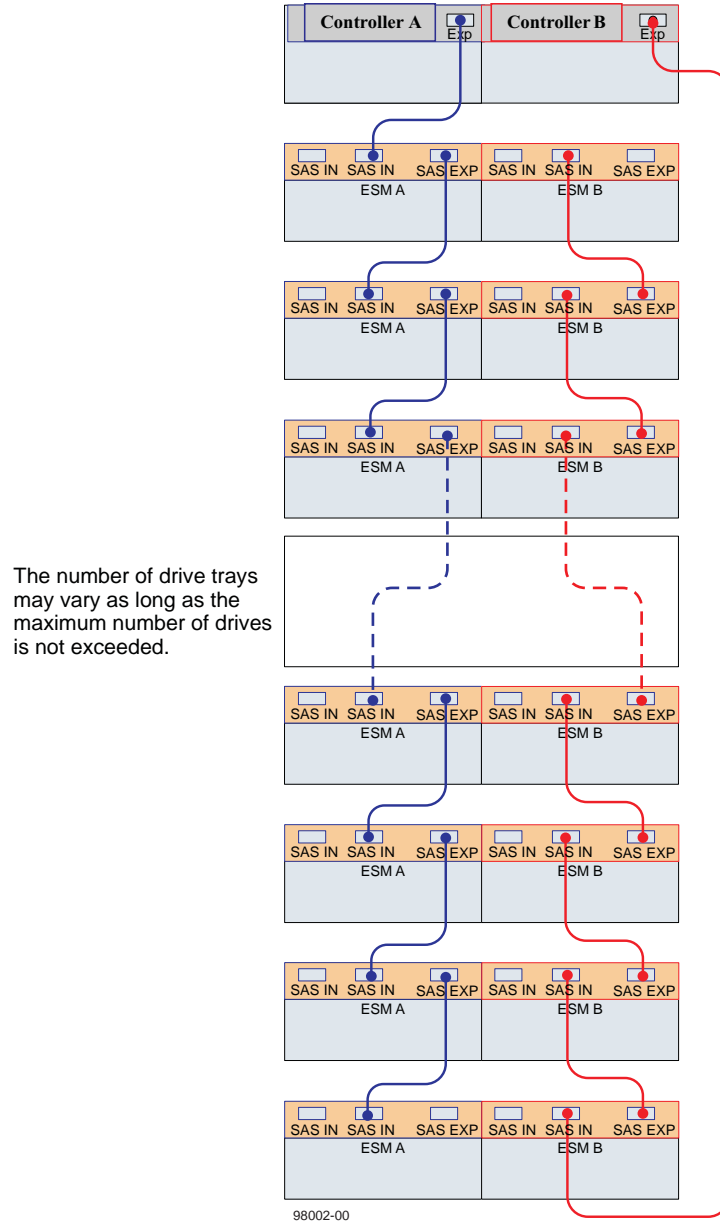
Step 4 – What to Do Next

If you are adding a drive module to a new storage array, make sure you complete these tasks by using the storage management software:

- Set a password

- Configure the email alerts and the Simple Network Management Protocol (SNMP) alerts

- Enable the premium features

- Configure the hosts

- Configure the storage

If you are adding a drive module to an existing storage array, make sure you complete these tasks by using the storage management software:

- Check the ESM firmware level on the new drive module. If the ESM firmware level is different from the ESM firmware level on the existing drive modules, use the storage management software to upgrade the ESM firmware level to the highest available level for the type of ESM.

- Add the free capacity (new drives) to your storage array.

- Configure the storage.

For more information, refer to the online help topics in the storage management software or to the *ST2500 M2 Array Module Initial Setup Guide*.

ST2501 M2 Drive Module Initial Setup Guide

Step 5 – Turning on the Power and Checking for Problems

Steps to Turn On – Power

IMPORTANT   You must turn on the power to all connected drive modules before you turn on the power to the array module. Performing this action ensures that the controllers recognize each attached drive module.

Access the Power switches from the rear of the storage array.

1 Turn off the Power switches on each power-fan canister in all of the newly installed drive modules.

2 Make sure that all of the power cords are connected.

3 If the main circuit breaker switches in the cabinet are not already turned on, turn on the circuit breaker switches now.

4 Turn on the Power switch on each power-fan canister in all of the newly installed drive modules.

Figure 16 Location of the Power Switches on the Drive Module

97002-03
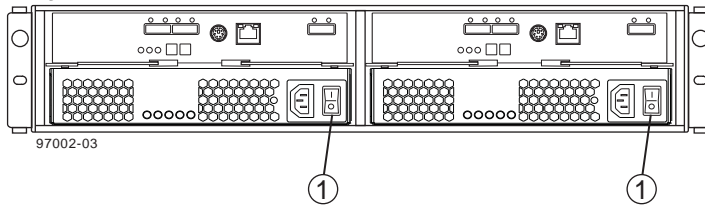
1 Power Switches

While power is being applied to the drive modules, the LEDs on the front and the rear of the drive modules turn on and turn off intermittently.

The drive modules might take several minutes to turn on completely. Wait until the drive modules are completely turned on before turning on the power to the array module.

5 Turn on the Power switch on each power-fan canister in the array module.

Steps to Check for Problems – Drive Module

Refer to the following figures for the location of the LEDs on the canisters:

- Figure 17, "LEDs on the Left End Cap" on page 33
- Figure 18, "LEDs on the Drive" on page 34
- Figure 19, "LEDs on the ESM Canister" on page 35
- Figure 20, "LEDs on the Power-Fan Canister" on page 37

The LEDs let you know that your hardware devices are fully operational or whether a fault condition exists.

1 Make sure that all of the LEDs show normal operation. See "Things to Know – LEDs on the Drive Module" on page 33 for a description of the LEDs on the drive module.

2 Do you see any amber LEDs on the drive module?

- **Yes** – Review the installation steps that you have performed to this point. Make sure you have performed the steps correctly. If necessary, contact your Customer and Technical Support representative for assistance.

- **No** – Go to "What to Do Next" on page 29.

NOTE	The ESM links have four PHYs. As long as any one PHY is operational, the green ESM Link LED comes on. If any one PHY becomes nonoperational, the amber ESM Link Fault LED comes on. It is possible for both the ESM Link LED and the ESM Link Fault LED to be on at the same time.

Things to Know – LEDs on the Drive Module

Figure 17 LEDs on the Left End Cap

97004-00
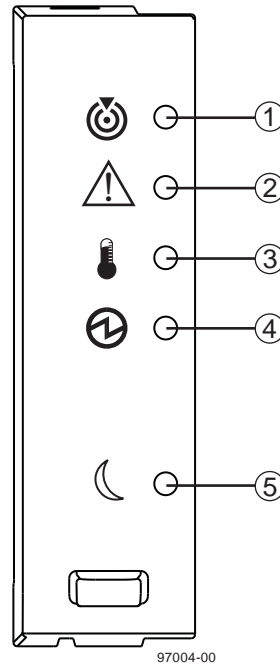
1 Drive Module Locate LED
2 Service Action Required LED
3 Drive Module Over-Temperature LED
4 Power LED
5 Standby Power LED

Table 2 LEDs on the Left End Cap

Location	LED	Color	On	Off
1	Drive Module Locate	White	Identifies a drive module that you are trying to find.	Normal status.
2	Service Action Required	Amber	A component within the drive module needs attention.	Normal status.
3	Drive Module Over-Temperature	Amber	The temperature of the drive module has reached an unsafe level.	Normal status.

Location	LED	Color	On	Off
4	Power	Green	Power is present.	Power is not present.
5	Standby Power	Green	The drive module is in Standby Power mode.	The drive module is not in Standby Power mode.

Figure 18 LEDs on the Drive
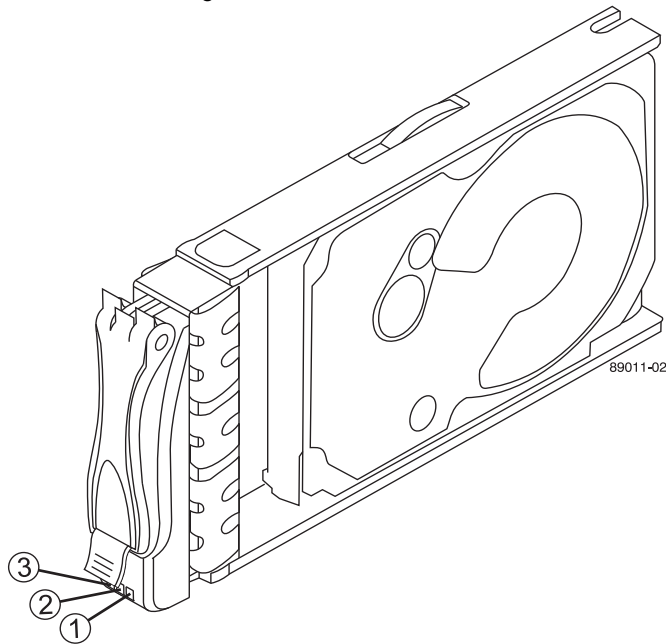
1 Drive Power LED
2 Drive Service Action Required LED
3 Drive Service Action Allowed LED

Table 3 LEDs on the Drive

Location	LED	Color	On	Blinking	Off
1	Drive Power	Green	The power is turned on, and the drive is operating normally.	Drive I/O activity is taking place.	The power is turned off.
2	Drive Service Action Required	Amber	An error has occurred.		Normal status.
3	Drive Service Action Allowed	Blue	The drive canister can be removed safely from the drive module.		The drive canister cannot be removed safely from the drive module.

Table 4 Drive State Represented by LEDs

Drive State	Drive Power LED (Green)	Drive Service Action Required LED (Amber)
Power is not applied.	Off	Off
Normal operation – The power is turned on, but drive I/O activity is not occurring.	On	Off
Normal operation – Drive I/O activity is occurring.	Blinking	Off
Service action required – A fault condition exists, and the drive is offline.	On	On

Figure 19 LEDs on the ESM Canister
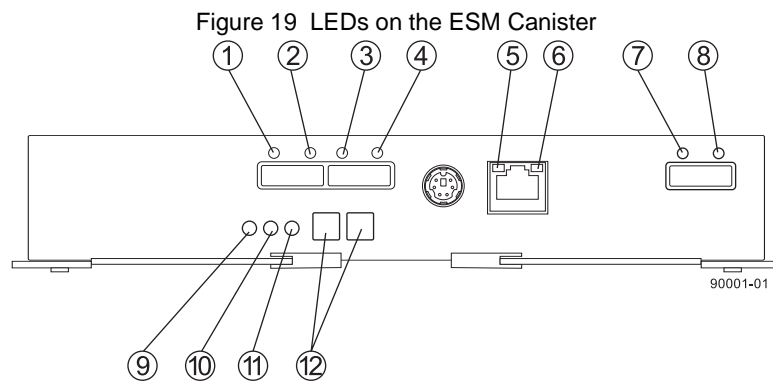
1 Host Link 1 Fault LED
2 Host Link 1 Active LED
3 Host Link 2 Fault LED
4 Host Link 2 Active LED
5 Ethernet Link Active LED
6 Ethernet Link Rate LED
7 ESM Expansion Link Fault LED
8 ESM Expansion Link Active LED
9 ESM Service Action Allowed LED
10 ESM Service Action Required LED
11 ESM Power LED
12 Seven-Segment Tray ID

Table 5 LEDs on the ESM Canister

Location	LED	Color	On	Off
1	Host Link 1 Fault	Amber	At least one PHY of the four connectors is working, but another PHY cannot establish the same link to the device connected to the Host IN port connector.	No link error has occurred.

Location	LED	Color	On	Off
2	Host Link 1 Active	Green	At least one of the four PHYs in the IN port is working, and a link exists to the device connected to the Host IN connector.	A link error has occurred.
3	Host Link 2 Fault	Amber	At least one PHY of the four connections is working, but another PHY cannot establish the same link to the device connected to the Host IN port connector	No link error has occurred.
4	Host Link 2 Active	Green	At least one of the four PHYs in the IN port is working, and a link exists to the device connected to the Host IN connector.	A link error has occurred.
5	Ethernet Link Active	Green	The link is up. (The LED blinks when there is activity.)	The link is not active.
6	Ethernet Link Rate	Green	There is a 100BASE-T rate.	There is a 10BASE-T rate.
7	ESM Expansion Link Fault	Amber	At least one of the four PHYs in the OUT port is working, but another PHY cannot establish the same link to the Expansion OUT connector.	Normal status.
8	ESM Expansion Link Active	Green	At least one of the four PHYs in the OUT port is working, and a link exists to the device connected to the Expansion OUT connector.	A link error has occurred.
9	ESM Service Action Allowed	Blue	The ESM can be removed safely from the drive module.	The ESM cannot be removed safely from the drive module.
10	ESM Service Action Required	Amber	A fault exists within the ESM. (This LED defaults on at power up. This LED turns off after the software has completed its power up self-test sequence.)	Normal status.
11	ESM Power	Green	12V power to the ESM is present.	Power is not present to the ESM.

Location	LED	Color	On	Off
12	Seven-Segment Tray ID	Green	See note.	Not applicable.

*For more information about the Seven-Segment Tray IDs, see "Tray ID Diagnostic Codes on the Seven-Segment Display" on page 38.

Figure 20 LEDs on the Power-Fan Canister

97003-01

①②③④⑤
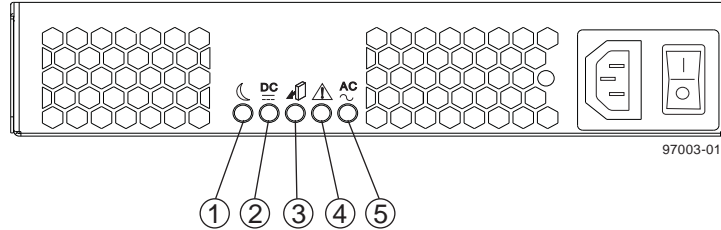
1 Standby Power LED
2 Power-Fan DC Power LED
3 Power-Fan Service Action Allowed LED
4 Power-Fan Service Action Required LED
5 Power-Fan AC Power LED

Table 6 LEDs on the Power-Fan Canister

Location	LED	Color	On	Off
1	Standby Power	Green	The drive module is in Standby mode, and DC power is not available.	The drive module is not in Standby mode, and DC power is available.
2	Power-Fan DC Power	Green	DC power from the power-fan canister is available.	DC power from the power-fan canister is not available.
3	Power-Fan Service Action Allowed	Blue	The power-fan canister can be removed safely from the drive module.	The power-fan canister cannot be removed safely from the drive module.
4	Power-Fan Service Action Required	Amber	A fault exists within the power-fan canister.	Normal status.
5	Power-Fan AC Power	Green	AC power to the power-fan canister is present.	AC power to the power-fan canister is not present.

Tray ID Diagnostic Codes on the Seven-Segment Display

During normal operation, the tray ID display on each ESM displays the drive module ID. The Diagnostic LED (lower-digit decimal point) comes on when the display is used for diagnostic codes and goes off when the display is used to show the tray ID.

NOTE	If a power-on or reset occurs, the Diagnostic LED, the Heartbeat LED (upper-digit decimal point), and all seven segments of both digits come on. The Diagnostic LED remains on until the drive module ID appears.

Table 7 Supported Diagnostic Codes

Diagnostic Code	ESM State	Description
.8, 8., or 88	Suspended	This ESM is being held in reset by another ESM.
L0	Suspended	The ESM types are mismatched.
L2	Suspended	A persistent memory error has occurred.
L3	Suspended	A persistent hardware error has occurred.
L9	Suspended	An over-temperature condition has been detected in either the ESM or the power supply.
LL	Suspended	The midplane SBB VPD EEPROM cannot be accessed.
Ln	Suspended	The canister is not valid for this drive module.
LP	Suspended	Drive port mapping tables are not found.
H0	Suspended	An ESM Fibre Channel interface failure has occurred.
H1	Suspended	An SFP transceiver speed mismatch (a 2-Gb/s SFP transceiver is installed when the drive module is operating at 4 Gb/s) indicates that an SFP transceiver must be replaced. Look for the SFP transceiver with a blinking amber LED.
H2	Suspended	The ESM configuration is invalid or incomplete, and it operates in a Degraded state.
H3	Suspended	The maximum number of ESM reboot attempts has been exceeded.
H4	Suspended	This ESM cannot communicate with the alternate ESM.
H5	Suspended	A midplane harness failure has been detected in the drive module.
H6	Suspended	An ESM firmware failure has been detected.
H8		SFP transceivers are present in currently unsupported ESM slots, either 2A or 2B. Secondary trunking SFP transceiver slots 2A and 2B are not supported. Look for the SFP transceiver with the blinking amber LED, and remove it.
H9		A non-catastrophic hardware failure has occurred. The ESM is operating in a Degraded state.
J0	Suspended	The ESM canister is incompatible with the drive module firmware.

General Behavior of the LEDs

Table 8 LED Symbols and General Behavior

LED	Symbol	Location	General Behavior
Power		Drive module ESM canister Power-fan canister	**On** – Power is applied to the drive module or the canister. **Off** – Power is not applied to the drive module or the canister.
Locate		Front bezel on the drive module	**On or blinking** – Indicates the drive module that you are trying to find.
Over-Temperature		Front bezel on the drive module	**On** – The temperature of the drive module has reached an unsafe condition. **Off** – The temperature of the drive module is within operational range.
Standby Power		Front bezel on the drive module	**On** – The drive module is in Standby mode, and the main DC power is off. **Off** – The drive module is not in Standby mode, and the main DC power is on.
Service Action Allowed		ESM canister Power-fan canister Drive	**On** – It is safe to remove the ESM canister, the power-fan canister, or the drive. **Off** – Do not remove the ESM canister, the power-fan canister, or the drive. The drive has an LED but no symbol.
Service Action Required (Fault)		ESM canister Power-fan canister Drive	**On** – When the drive module LED is on, a component within the drive module needs attention. **On** – The ESM canister, the power-fan canister, or the drive needs attention. **Off** – The ESM canister, the power-fan canister, and the drive are operating normally. The drive has an LED but no symbol.
AC Power	AC $\sim$	ESM canister Power-fan canister	**On** – AC power is present. **Off** – AC power is not present.
DC Power	DC ---	Power-fan canister	**On** – Regulated DC power from the power canister and the fan canister is present. **Off** – Regulated DC power from the power-fan canister is not present.

LED	Symbol	Location	General Behavior
Link Service Action Required (Fault)	⚠	ESM canister	**On** – The cable is attached and at least one lane has a link-up status, but one lane has a link-down status. **Off** – The cable is not attached, the cable is attached and all lanes have a link-up status, or the cable is attached and all lanes have a link-down status.
Link Up	Two LEDs above each expansion connector	ESM canister	**On** – The cable is attached and at least one lane has a link-up status. **Off** – The cable is not attached, or the cable is attached and all lanes have a link-down status.

Service Action LEDs

ATTENTION **Possible loss of data access** – Never remove any canister unless the appropriate Service Action Allowed LED is turned on.

Each canister in the drive module has two service action LEDs.

- **Service Action Required LED** – This LED comes on to indicate that a condition exists that requires service.

- **Service Action Allowed LED** – This LED comes on when it is safe to remove a failed canister. If there are data availability dependencies or other conditions that dictate that a canister should not be removed, the Service Action Allowed LED stays off. The Service Action Allowed LED automatically comes on or goes off as conditions change.

IMPORTANT If the Service Action Required LED is on but the Service Action Allowed LED is off for a particular canister, you might need to service another canister first. Check your storage management software to determine the action that you should take.

NOTE In most cases, the Service Action Allowed LED comes on when the Service Action Required LED is on for a canister.

Regulatory Compliance Statements

FCC Radio Frequency Interference 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 Federal Communications Commission (FCC) Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

LSI Corporation, and Sun Microsystems, Inc. are not responsible for any radio or television interference caused by unauthorized modification of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by LSI and Sun. It is the user's responsibility to correct interference caused by such unauthorized modification, substitution, or attachment.

Laser Products Statement

This equipment uses Small Form-factor Pluggable (SFP) optical transceivers, which are unmodified Class 1 laser products pursuant to 21 CFR, Subchapter J, Section 1040.10. All optical transceivers used with this product are required to be 21 CFR certified Class 1 laser products. For outside the USA, this equipment has been tested and found compliant with Class 1 laser product requirements contained in European Normalization standard EN 60825-1 1994+A11. Class 1 levels of laser radiation are not considered to be hazardous and are considered safe based upon current medical knowledge. This class includes all lasers or laser systems which cannot emit levels of optical radiation above the exposure limits for the eye under any exposure conditions inherent in the design of the laser products.

LSI and Sun are not responsible for any damage or injury caused by unauthorized modification of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by LSI and Sun. It is the user's responsibility to correct interference caused by such unauthorized modification, substitution, or attachment.

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classé A respecte toutes les exigences du Règlement sure le matèriel brouilleur du Canada.

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