6580/6780 Controller Module Installation Guide

Version 10.77

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51341-00, Rev. A

Revision History

Version and Date	Description of Changes
51341-00, Rev. A May 2011	Initial release of the document.

Table of Contents

Step 1 – Preparing for a 6580/6780 Controller Module Installation

This topic provides basic information for installing the 6580/6780 controller module and the CSM200 drive module in a storage array. After you have completed these tasks, you will continue onto the *Initial Configuration and Software Installation* electronic document topics or the PDF on the SANtricity ES Storage Manager Installation DVD.

The 6580/6780 storage array consists of a 6580/6780 controller module and one or more drive modules in a cabinet. Use this initial setup guide to install the 6580/6780 controller module. This document includes instructions for installing the CSM200 drive module.

Key Terms

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 pools and volumes. These components are managed by the storage management software.

controller module

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

controller

A circuit board and firmware that is located within a controller module or an array module. A controller manages the input/output (I/O) between the host system and data volumes.

drive module

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

environmental services monitor (ESM)

A CRU 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.

Small Form-factor Pluggable (SFP) transceiver

A component that enables Fibre Channel duplex communication between storage array devices. SFP transceivers can be inserted into host bus adapters (HBAs), controllers, and environmental services monitors (ESMs). SFP transceivers can support either copper cables (the SFP transceiver is integrated with the cable) or fiber-optic cables (the SFP transceiver is a separate component from the fiber-optic cable).
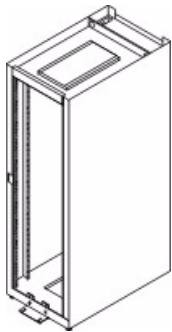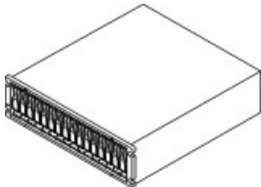
Gathering Items

Before you start installing the controller module, you must have installed the cabinet in which the controller module will be mounted.

Use the tables in this section to verify that you have all of the necessary items to install the controller module.
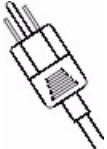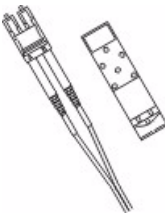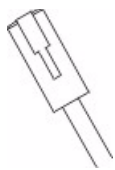
Basic Hardware for 6580/6780 Configurations

Table 1 Basic Hardware

	Item	Included with the Controller Module
	Cabinet ■ Make sure that your cabinet meets the installation site specifications of the various 6580/6780 storage array components. Refer to the *Storage System Site Preparation Guide* on the SANtricity ES Storage Manager Installation DVD for more information. ■ Depending on the power supply limitations of your cabinet, you might need to install more than one cabinet to accommodate the different components of the 6580/6780 storage array. Refer to the installation guide for your cabinet for instructions on installing the cabinet.	
	Mounting rails and screws	✓
	CSM200 drive module with end caps that are packaged separately.	
	Fibre Channel switch (optional)	
	Host with Fibre Channel host bus adapters (HBAs)	
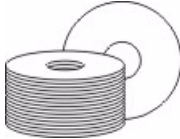
Cables and Connectors for a 6580/6780 Controller Module Configuration

Table 2 Cables and Connectors

	Item	Included with the Controller Module
	AC power cords The array module and the drive modules ship with power cords for connecting 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 ship with the array module and the drive modules.	✔
	Use fiber-optic cables for Fibre Channel connections to the drive modules. For the differences between the fiber-optic cables and the copper Fibre Channel (FC) cables, see Things to Know – SFP Transceivers, Fiber-Optic Cables, and Copper Cables.	
	Small Form-factor Pluggable (SFP) transceivers ■ The SFP transceivers connect fiber-optic cables to host ports and drive ports. ■ Four or eight SFP transceivers are included with the controller module; one for each of the host channel ports on the controllers. ■ Depending on your connection requirements, you might need to purchase additional SFP transceivers (two SFP transceivers for each fiber-optic cable). ■ Depending on the configuration of your storage array, you might need to use three different types of SFP transceivers: 10-Gb/s iSCSI, 8-Gb/s Fibre Channel, and 4-Gb/s Fibre Channel. ■ You must purchase *only* Restriction of Hazardous Substances (RoHS)-compliant SFP transceivers.	✔
	Copper Fibre Channel cables (optional) Use these cables for connections within the storage array. For the differences between the fiber-optic cables and the copper Fibre Channel cables, see the Deciding on the Management Method topic in either the *Initial Configuration and Software Installation* electronic topics or the PDF on the SANtricity ES Storage Manager Installation DVD.	
	Fiber-optic InfiniBand cables Use these cables (or copper InfiniBand cables) with InfiniBand switches for InfiniBand connections between a controller module and the hosts.	
	Ethernet cable This cable is used for out-of-band storage array management and for 1-Gb/s iSCSI connections. For information about out-of-band storage array management, see the "Deciding on the Management Method" topic in either the *Initial Configuration and Software Installation* electronic topics or the PDF on the SANtricity ES Storage Manager Installation DVD.	

Product DVDs

Table 3 Product DVDs

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

Tools and Other Items

Table 4 Tools and Other Items

	Item	Included with the Module
	Labels Help you to identify cable connections and lets you more easily trace cables from one module to another	
	A cart Holds the module and components	
	A mechanical lift (optional)	
	A Phillips screwdriver	
	A flat-blade screwdriver	
	Anti-static protection	
	A flashlight	

Use the Compatibility Matrix, at the following website, to obtain the latest hardware compatibility information.

http://www.lsi.com/compatibilitymatrix/

Things to Know – SFP Transceivers, Fiber-Optic Cables, and Copper Cables

The following figures show two types of cables and SFP transceivers for Fibre Channel connections. Your SFP transceivers and cables might look slightly different from the ones shown. The differences do not affect the performance of the SFP transceivers. Host connections that use 8-Gb/s Fibre Channel connections require a different type of SFP transceiver from that required by either 4-Gb/s Fibre Channel connections or 10-Gb/s iSCSI connections.

WARNING (W03) **Risk of exposure to laser radiation** – Do not disassemble or remove any part of a Small Form-factor Pluggable (SFP) transceiver because you might be exposed to laser radiation.

Figure 1 Fiber-Optic Cable Connection

1. Active SFP Transceiver
2. Fiber-Optic Cable
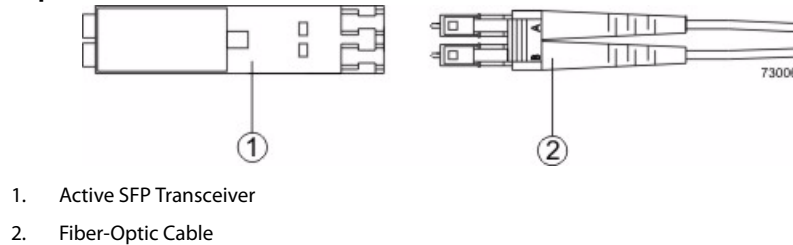
Figure 2 Copper Fibre Channel Cable Connection

1. Copper Fibre Channel Cable
2. Passive SFP Transceiver
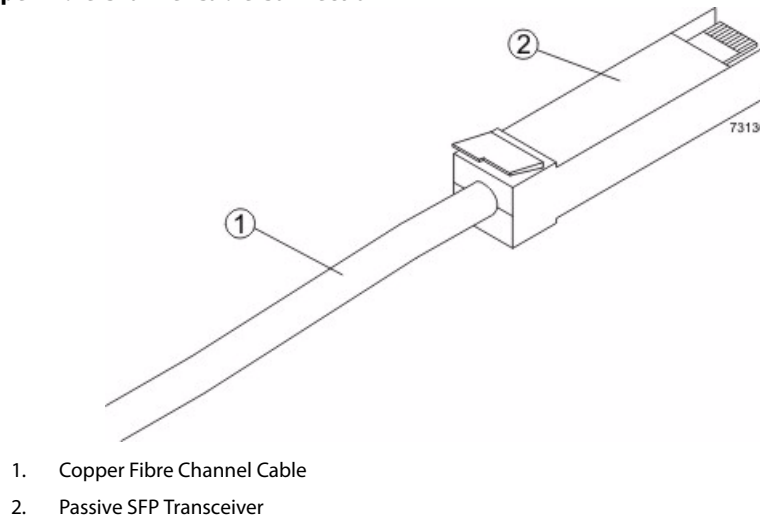
Host connections with iSCSI require a copper cable with RJ-45 connectors as shown in the following figure. Connections using iSCSI do not require SFP transceivers.

Figure 3 iSCSI Cable with an RJ-45 Connector

1. RJ-45 Connector
2. iSCSI Cable
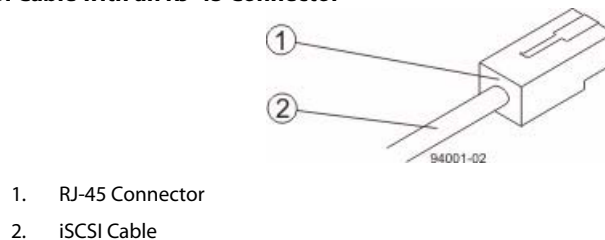
Host connections with InfiniBand require a fiber-optic cable with InfiniBand connectors as shown in the following figure. Connections using InfiniBand do not require SFP transceivers.

Figure 4 InfiniBand Cable with Built-In Connectors
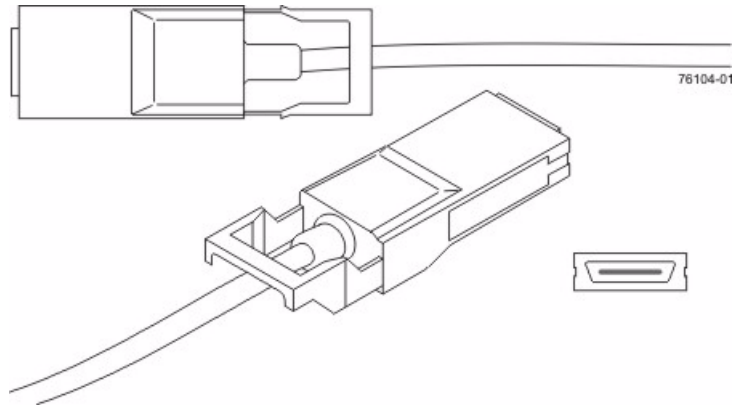
Things to Know – Taking a Quick Glance at the 6580/6780 Configuration Hardware

Characteristics of the 6580/6780 Controller Module

- The top controller, controller A, is inverted from the bottom controller, controller B.
- The top of the controller module is the side with labels.

Figure 5 6580/6780 Controller Module – Front View and Rear View
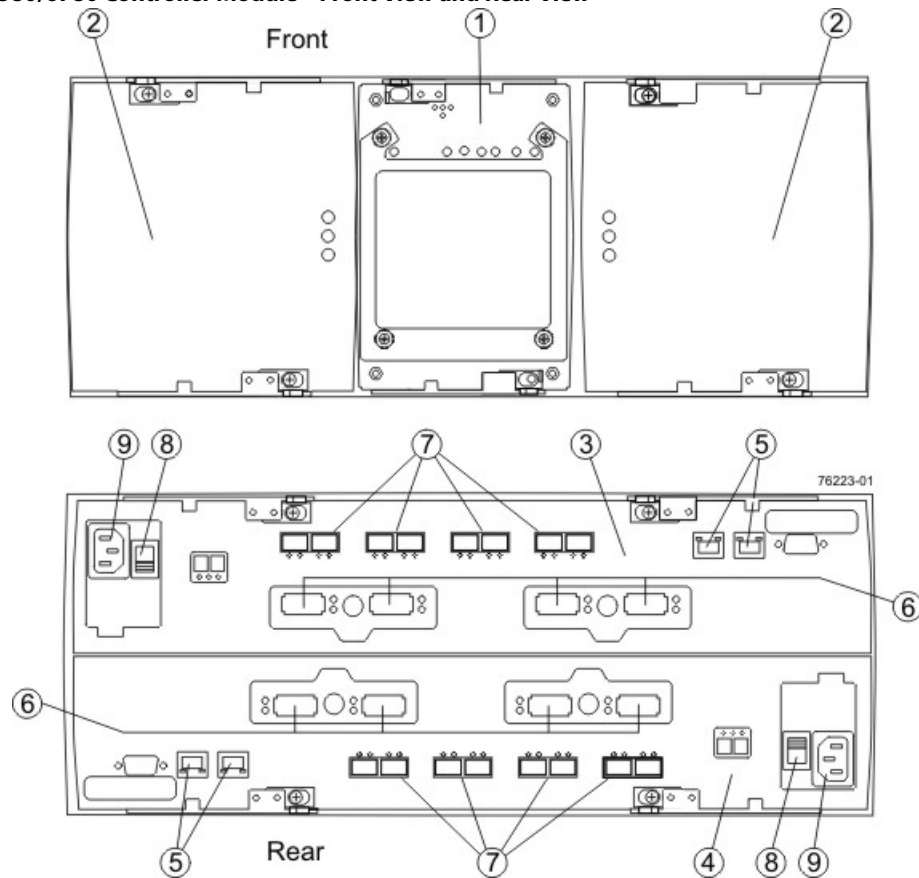
1. (Front View) Interconnect-Battery CRU
2. Power-Fan CRUs
3. (Rear View) Controller A (Inverted)
4. Controller B
5. Ethernet Ports
6. Host Channels
7. Dual-Ported Drive Channels
8. AC Power Switch
9. AC Input

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 You must use the current drive CRUs in the drive module to ensure proper performance. Using older or "legacy" drives might damage the connectors. Additionally, the latch might not hold the drive in place, which causes the drive to be disconnected and taken offline. For more information on supported drives, contact a Sun Customer Care Center representative.

Characteristics of the CSM200 Drive Module

- The top-left ESM is inverted from the bottom-right ESM.
- The top-right power-fan CRU is inverted from the bottom-left power-fan CRU.
- The drive module is in the correct (top) orientation when the lights of the drives are at the bottom (Figure

NOTE The CSM200 drive module is available in rackmount models and deskside models. The components for the deskside model are identical to the components of the rackmount model. The deskside model is situated as if the rackmount model is sitting on its left side.

NOTE Each CSM200 drive module in the storage array must have a minimum of two drives for proper operation. If the module has fewer than two drives, a power supply error is reported.

Figure 6 CSM200 Drive Module – Front View
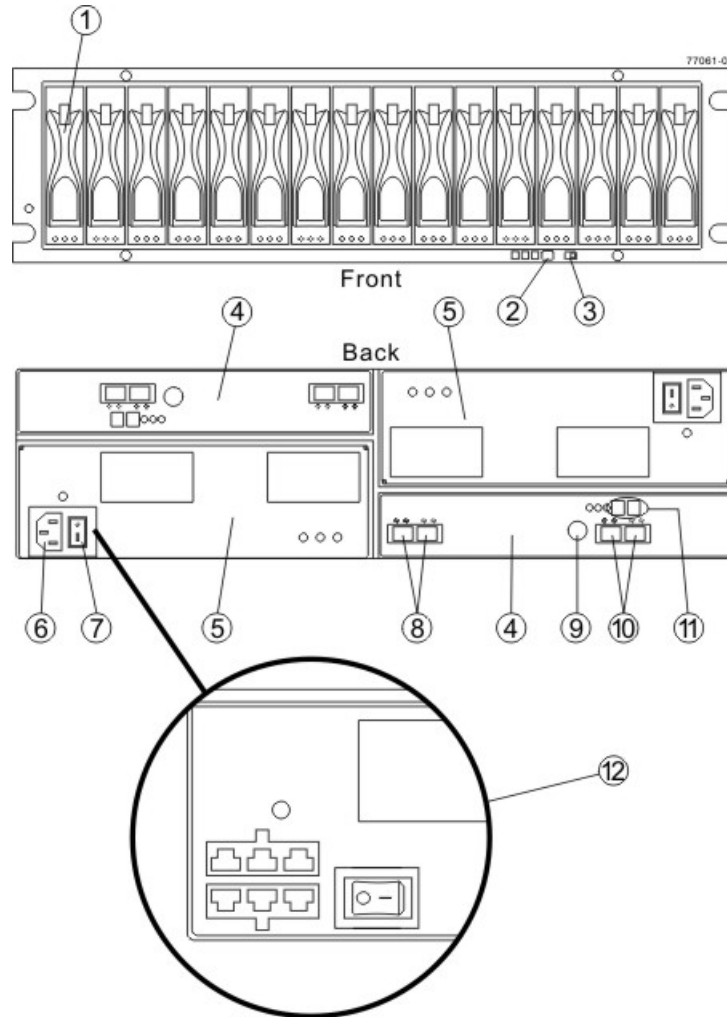
1. Drive CRU
2. Alarm Mute Button
3. Link (Data) Rate Switch (4 Gb/s or 2 Gb/s)
4. ESM CRU
5. Power-Fan CRU
6. AC Power Connector

7.   AC Power Switch

8.   In/Out Ports

9.   Serial Port

10. In/Out Ports (Reserved for future use)

11. Tray ID / Seven-Segment Diagnostic Display

12. (Optional) DC Power Connectors and DC Power Switch

NOTE The DC Power Option is not available within the 6580/6780 Controller Module Configuration.

For Additional Information on the 6580/6780 Array Module Configuration

Refer to the *Storage System Site Preparation Guide* on the SANtricity ES Storage Manager Installation DVD for information about the installation requirements of the various 6580/6780 storage array components.

Step 2 – Installing and Configuring the Switches

Things to Know – Switches

NOTE Most of the switches, as shipped from the vendor, require an update to their firmware to work correctly with the storage array.

Depending on the configuration of your storage array, you might use Fibre Channel switches and iSCSI switches.

The switches in the following table are certified for use with a ST2500 M2 storage array, a CDE2600-60 storage array, a 6180 storage array, and a 6580/6780 storage array, which all use SANtricity ES Storage Manager Version 10.77.

Table 5 Supported Switches

Vendor	Model	Fibre Channel	iSCSI	SAS
Brocade	200E	Yes	No	No
	3200	Yes	No	No
	3800	Yes	No	No
	3900	Yes	No	No
	3950	Yes	No	No
	12000	Yes	No	No
	3850	Yes	No	No
	3250	Yes	No	No
	24000	Yes	No	No
	4100	Yes	No	No
	48000	Yes	No	No
	5000	Yes	No	No
	300	Yes	No	No
	5100	Yes	No	No
	5300	Yes	No	No
	7500	Yes	No	No
	7800	Yes	No	No
	DCX	Yes	No	No
	FCOE	No	Yes	No

Vendor	Model	Fibre Channel	iSCSI	SAS
Cisco	9506	Yes	No	No
	9509	Yes	No	No
	9216	Yes	No	No
	9216i	Yes	No	No
	9120	Yes	No	No
	914x	Yes	No	No
	9513	Yes	No	No
	9020	Yes	No	No
	MDS9000	Yes	No	No
	9222i	Yes	No	No
	9134	Yes	No	No
	Catalyst 2960	No	Yes	No
	Catalyst 3560	No	Yes	No
	Catalyst 3750G-24TS	No	Yes	No
LSI	6160	No	No	Yes
McData	3232	Yes	No	No
	3216	Yes	No	No
	4300	Yes	No	No
	4500	Yes	No	No
	6064	Yes	No	No
	6140	Yes	No	No
	4400	Yes	No	No
	4700	Yes	No	No
QLogic	6140	No	Yes	No
	6142	No	Yes	No
	SANbox2-8	Yes	No	No
	SANbox2-16	Yes	No	No
	SANbox5200	Yes	No	No
	SANbox3600	Yes	No	No
	SANbox3800	Yes	No	No
	SANbox5208	Yes	No	No
	SANbox5600	Yes	No	No
	SANbox5800	Yes	No	No
	SANbox9000	Yes	No	No
PowerConnect	5324	No	Yes	No
	6024	No	Yes	No

If required, make the appropriate configuration changes for *each* switch that is connected to the storage array.

Refer to the switch's documentation for information about how to install the switch and how to use the configuration utilities that are supplied with the switch.

Procedure – Installing and Configuring Switches

1. Install your switch according to the vendor's documentation.
2. Use the Compatibility Matrix at the website http://www.lsi.com/compatibilitymatrix/ to obtain this information:
    —   The latest hardware compatibility information
    —   The models of the switches that are supported
    —   The firmware requirements and the software requirements for the switches
3. Update the switch's firmware by accessing it from the applicable switch vendor's website.

    This update might require that you cycle power to the switch.
4. Find your switch in the following table to see whether you need to make further configuration changes. Use your switch's configuration utility to make the changes.

Table 6 Supported Switch Vendors and Required Configuration Changes

Switch Vendor	Configuration Changes Required?	Next Step
Brocade	Yes Change the In-Order Delivery (IOD) option to ON.	Make the change, and go to .Step 3 – Installing the Host Bus Adapters for the 6580/6780 Controller Module.
Cisco	Yes Change the In-Order Delivery (IOD) option to ON.	Make the change, and go to Step 3 – Installing the Host Bus Adapters for the 6580/6780 Controller Module.
McData	No	Step 3 – Installing the Host Bus Adapters for the 6580/6780 Controller Module.
QLogic	No	Step 3 – Installing the Host Bus Adapters for the 6580/6780 Controller Module.
PowerConnect	No	Step 3 – Installing the Host Bus Adapters for the 6580/6780 Controller Module.

Step 3 – Installing the Host Bus Adapters for the 6580/6780 Controller Module

Key Terms

HBA host port

The physical and electrical interface on the host bus adapter (HBA) that provides for the connection between the host and the controller. Most HBAs will have either one or two host ports. The HBA has a unique World Wide Identifier (WWID) and each HBA host port has a unique WWID.

HBA host port world wide name

A 16-character unique name that is provided for each port on the host bus adapter (HBA).

host bus adapter (HBA)

A physical board that resides in the host. The HBA provides for data transfer between the host and the controllers in the storage array over the I/O host interface. Each HBA contains one or more physical ports.

Things to Know – Host Adapters

Host connections might be Fibre Channel connections through host bus adapters (HBAs), InfiniBand connections through host channel adapters (HCAs), or iSCSI connections through Ethernet adapters. The 6580/6780 controller module can have host interface cards (HICs) for any of these types of connections. The type of a host adapter installed in a host must match the type of the HIC to which it connects. When host connections are made through switches, the switches must support the speed and protocol of the connection.

- For maximum hardware redundancy, you must install a minimum of two host adapters in each host. Dual-ported host adapters provide two paths into the storage array but do not ensure redundancy if the entire host adapter fails.

- Most of the host adapters, as shipped from the vendor, require updated firmware and software drivers to work correctly with the storage array. For information about the updates, refer to the web site of the vendor for the host adapter.

    NOTE You can use the Compatibility Matrix to obtain information about the supported models of the host adapters and their requirements. Go to the web page at http://www.lsi.com/CompatibilityMatrix/. In the search form, choose Host Adapter from the Product drop-down list. Use the search form to make sure you have an acceptable configuration.

- For best performance, cable an 8-Gb/s Fibre Channel HIC to an 8-Gb/s HBA. If the data rate for the HBA is lower, the data transfer will occur at the lower rate. For instance, if you cable an 8-Gb/s Fibre Channel HIC to a 4-Gb/s HBA, the data transfer rate is 4 Gb/s.

- You cannot mix InfiniBand connections with other types of connections.

It is possible for a host to have both iSCSI (Ethernet) and Fibre Channel (HBA) adapters for connections to a storage array that has a mix of HICs. Several restrictions apply to such configurations.

- The root boot feature is not supported for hosts with mixed connections to one storage array.
- Cluster configurations are supported for hosts with mixed connections to one storage array.
- When the host operating system is VMware, mixing of connection types within a partition is not supported.
- When the host operating system is Windows, mixing of connection types within a storage partition is not supported. A single server that attaches to multiple storage partitions on a single array must not have any overlap in LUN number assignments given to the volumes.
- For other operating systems, mixed connection types from a host to a single storage array are not supported.

Procedure – Installing Host Bus Adapters

1. Go to http://www.lsi.com/compatibilitymatrix/, and select the desired Developer Partner Program link. Check its Compatibility Matrix to make sure you have an acceptable configuration.

   The Compatibility Matrix provides this information:
   — The latest hardware compatibility information
   — The models of the HBAs that are supported
   — The firmware requirements and the software requirements for the HBAs

2. Install your HBA according to the vendor documentation.

NOTE If your operating system is Windows Server 2008 Server Core, you might have additional installation requirements. Refer to the Microsoft Developers Network (MSDN) for more information about Windows Server 2008 Server Core. You can access these resources from www.microsoft.com.

3. Install the latest version of the firmware for the HBA. You can find the latest version of the firmware for the HBA at the HBA vendor website.

   NOTE The remaining steps are general steps to obtain the HBA host port World Wide Name from the HBA BIOS utility. If you have installed the host context agent on all of your hosts, you do not need to perform these steps. If you are performing these steps, the actual prompts and screens vary depending on the vendor that provides the HBA. Also, some HBAs have software utilities that you can use to obtain the world wide name for the port instead of using the BIOS utility.

4. Reboot or start your host.
5. While your host is booting, look for the prompt to access the HBA BIOS utility.
6. Select each HBA to view its HBA host port world wide name.
7. Record the following information for each host and for each HBA connected to the storage array:
   — The name of each host
   — The HBAs in each host
   — The HBA host port world wide name of each port on the HBA

   The following table shows examples of the host and HBA information that you must record.

Table 7 Examples of HBA Host Port World Wide Names

Host Name	Associated HBAs	HBA Host Port World Wide Name
ICTENGINEERING	Vendor x, Model y (dual port)	37:38:39:30:31:32:33:32
		37:38:39:30:31:32:33:33
	Vendor a, Model y (dual port)	42:38:39:30:31:32:33:42
		42:38:39:30:31:32:33:44
ICTFINANCE	Vendor a, Model b (single port)	57:38:39:30:31:32:33:52
	Vendor x, Model b (single port)	57:38:39:30:31:32:33:53

Step 4 – Installing the Controller Module

Things to Know – General Installation

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

NOTE Make sure that the combined power requirements of your modules do not exceed the power capacity of your cabinet.

Steps to Install – 6580/6780 Controller Module

1. Make sure that the cabinet is in the final location. Make sure that the cabinet installation site meets the clearance requirements.

   Figure 7 Airflow Direction Through and Clearance Requirements for the Controller Module
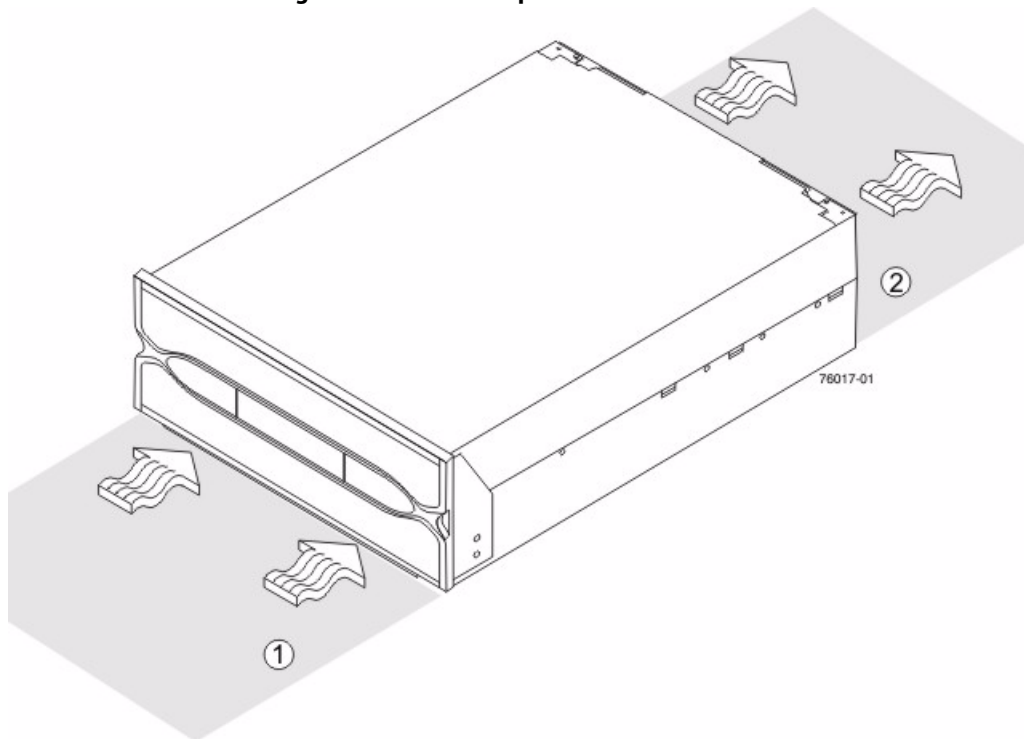
   1. 76-cm (30-in.) clearance in front of the cabinet
   2. 61-cm (24-in.) clearance behind the cabinet

2. Lower the feet on the cabinet, if required, to keep it from moving.

3. Install the mounting rails in the cabinet. For more information, refer to the installation instructions that are included with your mounting rails.

   — If you are installing the mounting rails above an existing module, position the mounting rails directly above the module.

   — If you are installing the mounting rails below an existing module, allow 17.8-cm (7.00-in.) clearance below the existing module.

NOTE If you are installing only CSM200 drive modules, make sure that you place the controller module in the middle portion of the cabinet while allowing room for drive modules to be placed above and below the controller module. As you add drive modules, position them below and above the controller module, starting below and alternating so that the cabinet does not become top heavy.

WARNING (W09) **Risk of bodily injury** –

>35 kg (70.5 lbs)

WARNING Three persons are required to safely lift the component.

4. With the help of two other persons, slide the rear of the controller module onto the mounting rails, and make sure that the top mounting holes on the controller module align with the mounting rail holes of the cabinet.

    The rear of the controller module slides into the slots on the mounting rails.

NOTE The rear of the controller module contains two controllers. The top of the controller module is the side with the labels.

Figure 8 Securing the Controller Module to the Cabinet
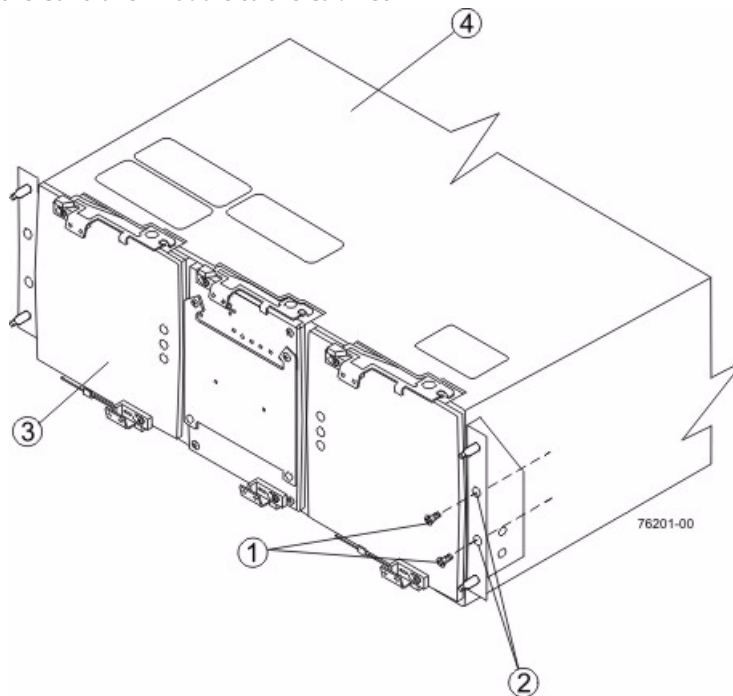
1. Screws
2. Mounting Holes
3. Front

4.   Top (with Labels)

5.   Secure screws in the top mounting holes and the bottom mounting holes on each side of the controller module.

6.   Install the bezel on the front of the controller module.

7.   Install the drive modules. Refer to Step 7 – Connecting the Controller Module to the Drive Modules for information about installing the CSM200 drive module.

Step 5 – Connecting the Controller Module to the Hosts

Key Terms

access volume

A special volume that is used by the host-agent software to communicate management requests and event information between the management station and the storage array. An access volume is required only for in-band management.

direct topology

A topology that does not use a switch.

Dynamic Host Configuration Protocol (DHCP)

CONTEXT [Network] An Internet protocol that allows nodes to dynamically acquire ('lease') network addresses for periods of time rather than having to pre-configure them. DHCP greatly simplifies the administration of large networks, and networks in which nodes frequently join and depart. (*The Dictionary of Storage Networking Terminology*)

in-band management

A method to manage a storage array in which a storage management station sends commands to the storage array through the host input/output (I/O) connection to the controller.

out-of-band management

A method to manage a storage array in which a storage management station sends commands to the storage array through the Ethernet connections on the controller.

stateless address autoconfiguration

A method for setting the Internet Protocol (IP) address of an Ethernet port automatically. This method is applicable only for IPv6 networks.

switch topology

A topology that uses a switch.

topology

The logical layout of the components of a computer system or network and their interconnections. Topology deals with questions of what components are directly connected to other components from the standpoint of being able to communicate. It does not deal with questions of physical location of components or interconnecting cables. (*The Dictionary of Storage Networking Terminology*)

World Wide Identifier (WWID)

CONTEXT [Fibre Channel] A unique 64-bit number assigned by a recognized naming authority (often using a block assignment to a manufacturer) that identifies a node process or node port. A WWID is assigned for the life of a connection (device). Most networking physical transport network technologies use a world wide unique identifier convention. For example, the Ethernet Media Access Control Identifier is often referred to as the MAC address. (*The Dictionary of Storage Networking Terminology*)

Things to Know – Host Channels on the 6580/6780 Controller Module

- Each controller has four dual-ported host channels.
- Each group of two channels is associated with one host interface card.
- Controller A is inverted from controller B, which means that its host channels are upside-down and numbered in reverse order.

Figure 9 Host Channels on the Controllers – Rear View
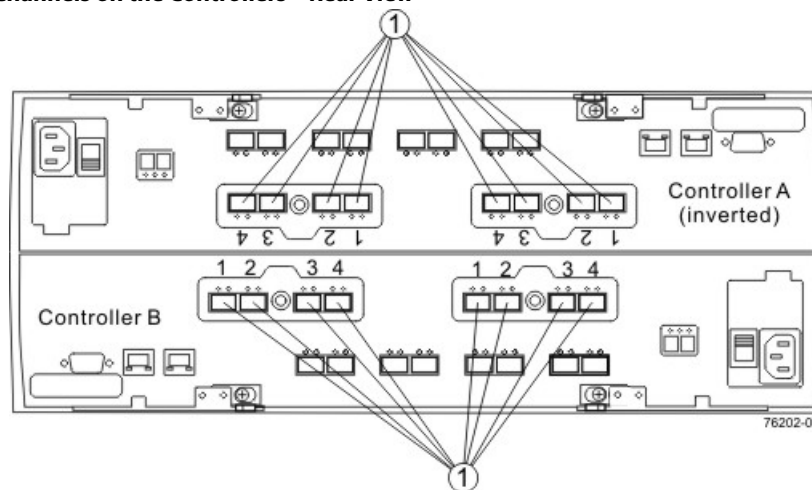
1.   Host Channels

⚠

WARNING (W03) **Risk of exposure to laser radiation** – Do not disassemble or remove any part of a Small Form-factor Pluggable (SFP) transceiver because you might be exposed to laser radiation.

ATTENTION Possible hardware damage – To prevent electrostatic discharge damage to the module, use proper antistatic protection when you handle module components.

Things to Know – Host Interface Cards

The 6580/6780 controller module supports several types of host interface cards (HICs) for different speeds an protocol. Keep these guidelines in mind:

- 20-Gb/s InfiniBand
- 10-Gb/s iSCSI
- 8-Gb/s Fibre Channel
- 4-Gb/s Fibre Channel
- 1-Gb/s iSCSI
- A 6580/6780 controller module with InfiniBand HICs must have only InfiniBand HICs.
- If you connect a 4-Gb/s Fibre Channel HIC with an 8-Gb/s HBA on a host, the data transfer rate is 4 Gb/s.
- A controller might have a mix with one 4-Gb/s Fibre Channel HIC and one 8-Gb/s Fibre Channel HIC or it might have a mix with one Fibre Channel HIC and one 1-Gb/s iSCSI HIC or one 10-Gb/s iSCSI HIC.
- When HICs are mixed, each controller in a duplex system must have the exact same HIC configuration.
- When Fibre Channel HICs with different data rates are mixed and you are cabling for redundancy, cable the HBAs on the host to the HICs with the same data rate, one on controller A and one on controller B.

Procedure – Connecting Host Cables on the 6580/6780 Controller Module

Make sure that you have installed your host adapters. Refer to the documentation for your host adapters for information about how to install the host adapter and how to use the supplied configuration utilities.

The figures in this section show Fibre Channel connections as examples and identify HBA1 and HBA2 as connecting points on the hosts. For other configurations, these connecting points might be host channel adapters (HCAs) for InfiniBand connections, Ethernet adapters for iSCSI connections, or a combination of one HBA and one iSCSI Ethernet adapter.

Fibre Channel and InfiniBand connections require fiber-optic cables. Connections for iSCSI require copper cables with RJ-45 connectors. The cabling patterns are the same for all types of cables and connectors.

NOTE Small Form-factor Pluggable (SFP) transceivers are required for Fibre Channel and InfiniBand host connections for 20-Gb/s InfiniBand, 10-Gb/s iSCSI, 8-Gb/s Fibre Channel, and 4-Gb/s Fibre Channel connections, each requires a different type of SFP transceiver. Be sure to use SFP transceivers that match the data rate and protocol for the connection that you are making.

This procedure is for a direct topology as shown in Figure 10. See Figure 11 and Figure 12 for examples of cabling patterns for fabric and mixed topologies. A Fibre Channel host connections require SFP transceivers in the HIC and in the HBA.

1. If you are cabling a Fibre Channel connection, make sure that an SFP transceiver is inserted into the host port on the HIC and the corresponding port on the HBA in the host. Make sure that any black plastic plugs that might be present are removed from the SFP transceivers.
2. Starting with the first host channel of each controller, perform one of these actions:
   — For a Fibre Channel or an InfiniBand connection, plug one end of the cable into the SFP transceiver in a port.
   — For an iSCSI connection, plug the RJ-45 connector on one end of the cable directly into a port.

3. Plug the other end of the cable into one of the host adapter ports in the host.

— For a Fibre Channel or an InfiniBand connection, plug one end of the cable into the SFP transceiver in a port.

— For an iSCSI connection, plug the RJ-45 connector on one end of the cable directly into a port.

Make sure that the speed and protocol used by the host adapter match those used by the HIC.

4. Affix a label to each end of the cable with the following information. A label is very important if you need to disconnect cables to service a controller.

— The host name and the host adapter port

— The controller ID (for example, controller A)

— The host channel ID (for example, host channel 1)

Example label abbreviation – Assume that a cable is connected between port 1 in HBA 1 of a host named Engineering and host channel 1 of controller A.


```
Heng-HBA1/P1, CtA-Hch1
```

NOTE If you are cabling for a fabric or mixed topology, include the appropriate switch name and port number on the label.

5. Repeat step 1 through step 4 for each controller and host channel that you intend to use.

NOTE If you do not use a host channel, remove the SFP transceiver. You can use a 4-Gb/s SFP transceiver in a drive channel port or in an ESM on the drive module.

Figure 10 Direct Topology – One Host and a Dual-Controller Controller Module
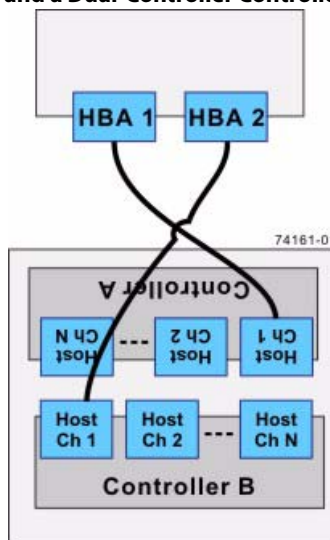
The box on the top in the preceding figure is the host, and the box on the bottom is the controller module.

Figure 11 Fabric Topology – One Host and a Dual-Controller Controller Module with a Switch
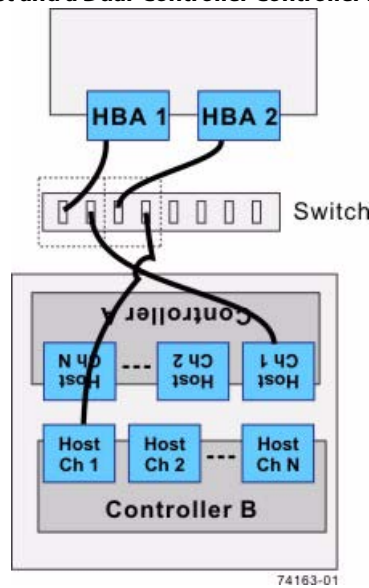
The box on the top of the switch in the preceding figure is the host, and the box on the bottom is the controller module.

Figure 12 Mixed Topology – Three Hosts and a Dual-Controller Controller Module
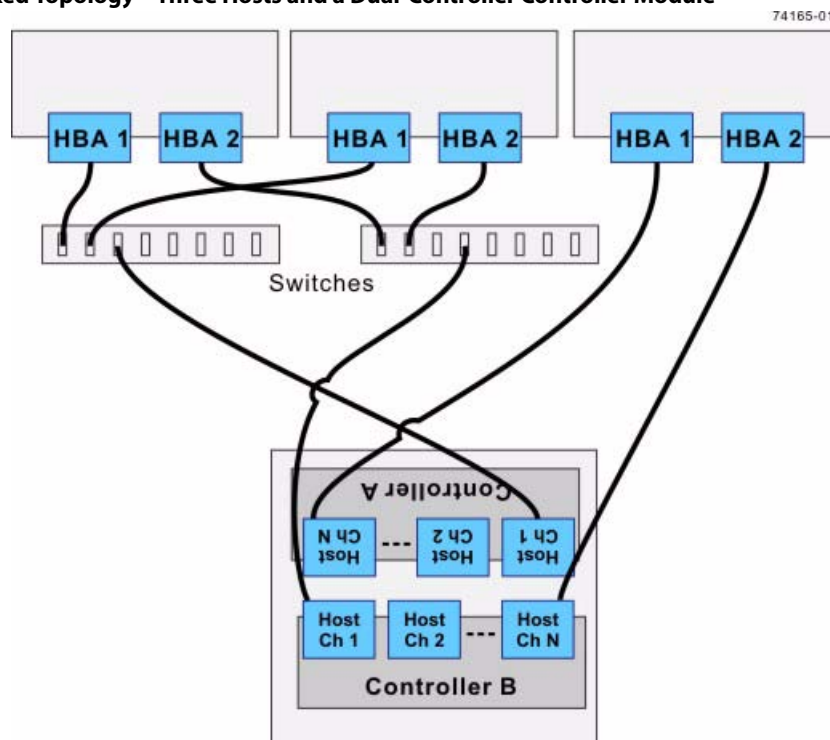
The boxes on the top of the switch in the preceding figure are the hosts, and the box on the bottom is the controller module.

NOTE The highest numbered host channel might be reserved for use with the Data Replicator Software premium feature. If Data Replicator Software connections are required, do not connect a host to the highest-numbered host channel.

Step 6 – Installing the Drive Modules for the 6580/6780 Controller Module Configurations

Things to Know – General Installation of the 6580/6780 Controller Module

- Special site preparation is not required for these modules beyond what is normally found in a computer lab environment.
- The power supplies meet standard voltage requirements for both domestic and worldwide operation.

  NOTE If you are installing the 6580/6780 controller module in a cabinet with other drive modules, make sure that the combined power requirements of the controller module and the other drive modules do not exceed the power capacity of your cabinet.

Things to Know – General Installation of the CSM200 Drive Module

NOTE 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.

- If you are installing CSM200 drive modules and the 6580/6780 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.

ATTENTION Potential damage to drives – Turning the power off and on without waiting for the drives to spin down can damage the drives. Always wait at least 60 seconds from when you turn off the power until you turn on the power again.

For Additional Information on Drive Module Installation

Refer to the *Storage System Site Preparation Guide* on the SANtricity ES Storage Manager Installation DVD for important considerations about cabinet installation.

Procedure – Installing the CSM200 Drive Module

⚠ WARNING (W09) **Risk of bodily injury** –

WARNING Three 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.

Install the CSM200 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.

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

Figure 13 Drive Module Airflow and Clearance Requirements
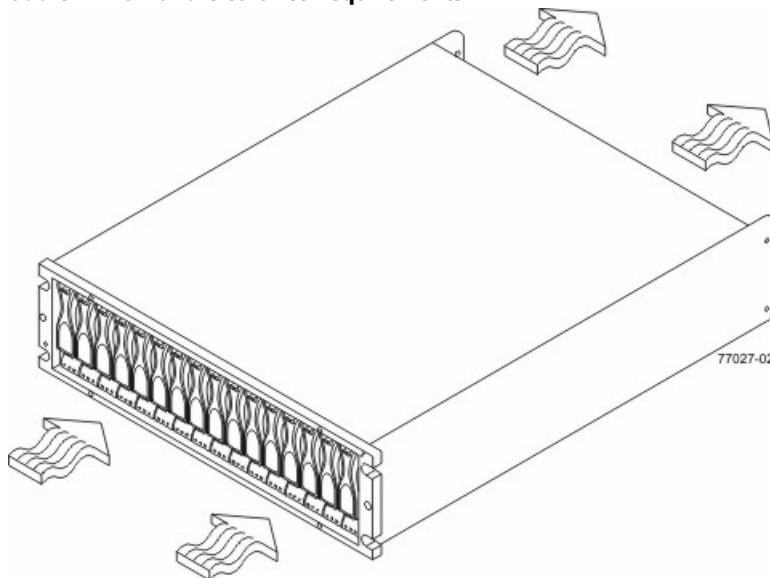
1. 76 cm (30 in.) clearance in front of the cabinet
2. 61 cm (24 in.) clearance behind the cabinet

NOTE Fans pull air through the module from front to rear across the drives.

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.

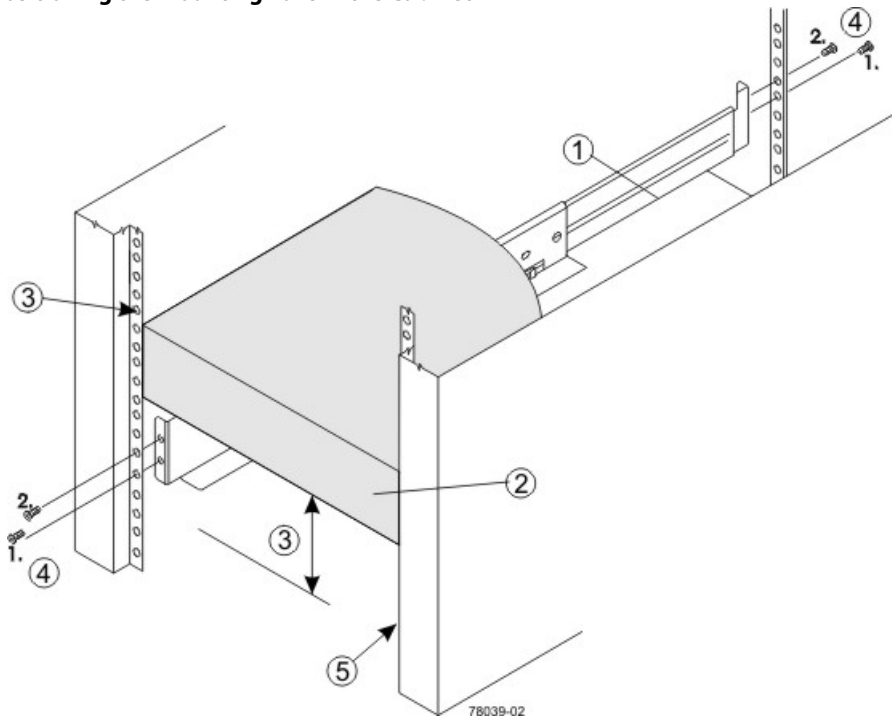4. Position the mounting rails in the cabinet.

Figure 14 Positioning the Mounting Rails in the Cabinet

    1.   Mounting Rail

    2.   Existing Module

    3.   Clearance Above and Below the Existing Module

    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 module, position the mounting rails directly above the module.

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

5. Attach the mounting rails to the cabinet by performing these substeps:

   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 15 Attaching the Mounting Rails to the Cabinet
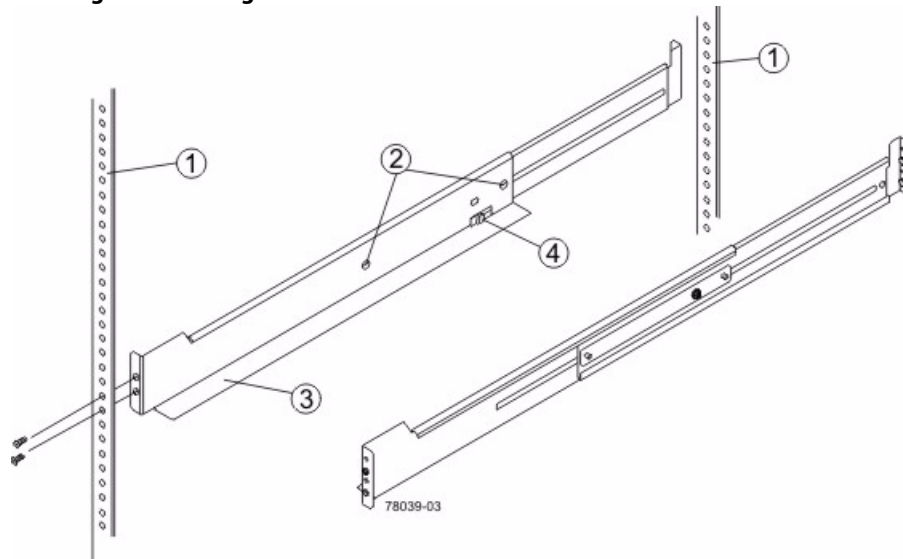
1.   Cabinet Mounting Holes
2.   Adjustment Screws for Locking the Mounting Rail Length
3.   Mounting Rails
4.   Clip for Securing the Rear of the Drive Module

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.

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 16 Alignment Spacers on the Mounting Rail
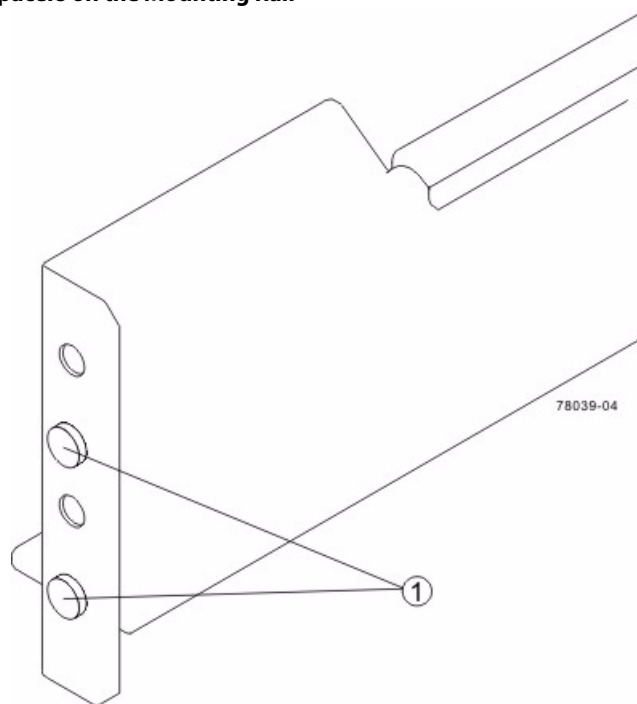
            1.   Alignment Spacers

    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 screws.

    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 two other persons, slide the rear of the drive module onto the mounting rails.

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

7.   Secure the front of the drive module to the cabinet by using four screws.

Figure 17 Attaching the Front of the Drive Module
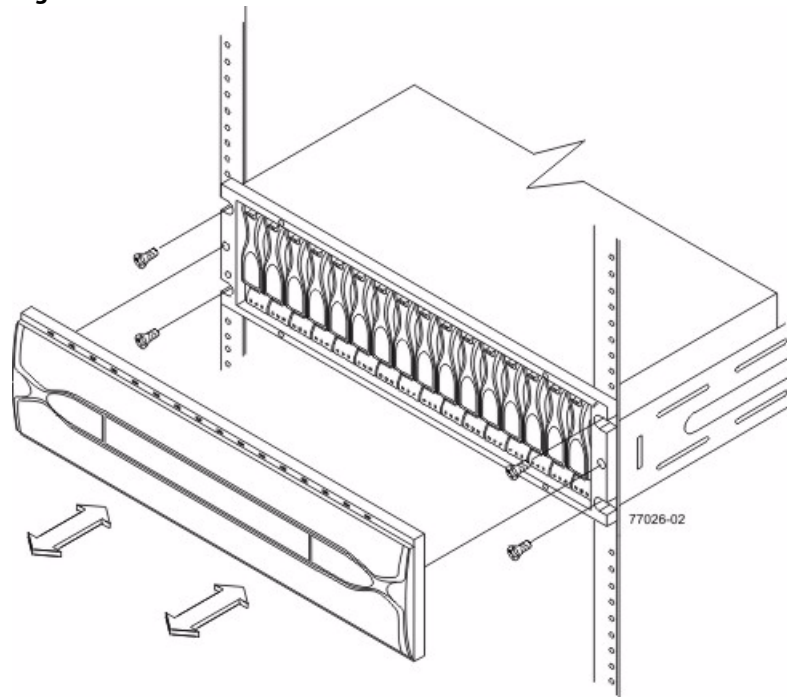
1.   Screws for Securing the Front of the Drive Module

8.   Using two screws, attach the flange on each side of the rear of the drive module to the mounting rails.


Procedure – Installing Drives for the CSM200 Drive Module

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 – AC Power Cords".

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 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 module.

1.   Beginning with the first drive slot in the 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 down to lock the drive securely in place.

Figure 18 Installing a Drive in a CSM200 Drive Module
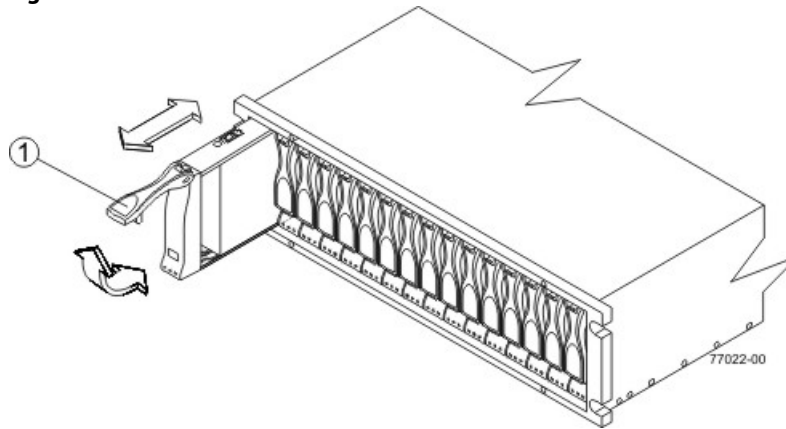

1. Drive Handle

3. Install the second drive to the right of the first drive.
4. Install each drive to the right of the last installed drive.

Things to Know – Link Rate Switch on the CSM200 Drive Module

NOTE Change the Link Rate switch only when the power is not turned on to the drive module.

- Use the Link Rate switch to select the data transfer rate between the ESMs, the drives, and the controllers. The Link Rate switch is located on the rear of the drive module on the ESMs.
- All drive modules that are connected to the same drive channel must be set to operate at the same data transfer rate (speed).
- The drives in the drive module must support the selected link rate speed.
- The setting of the Link Rate switch determines the speed of the drives.
- If a drive in the drive module does not support the link rate speed, the drive will show up as a bypassed drive in the storage management software.

NOTE Change the Link Rate switch only when no power is applied to the drive module.

Figure 19 Setting the Link Rate Switch on the CSM200 Drive Module – Front View
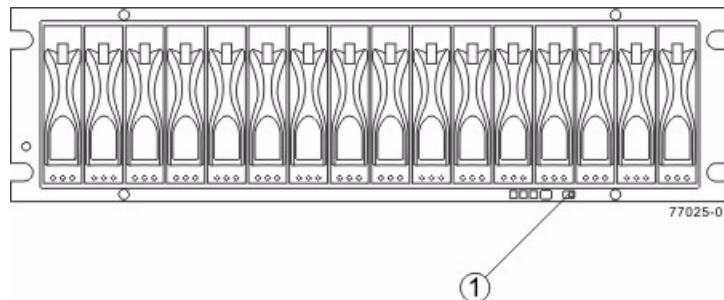
1. Link Rate Switch (4 Gb/s or 2 Gb/s)

Figure 20 Link Rate LEDs on the CSM200 Drive Module – Rear View
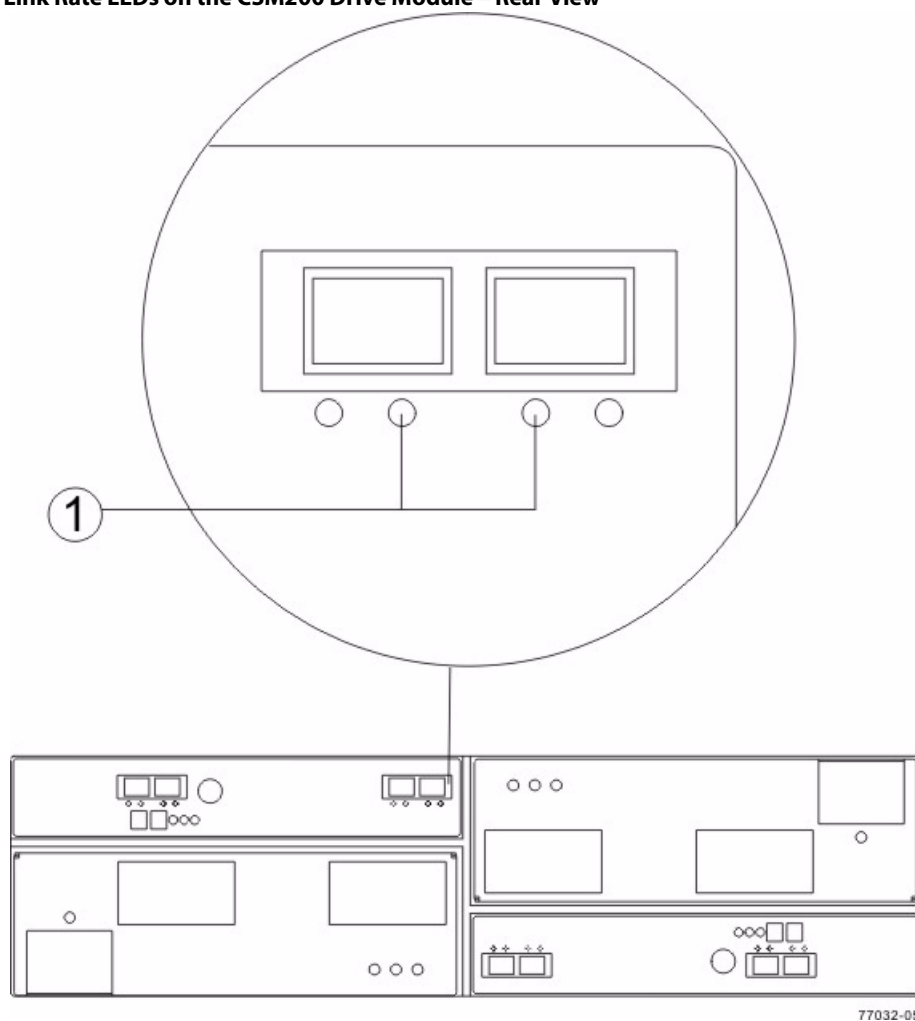
1.   Link Rate LEDs Right On = 2 Gb/s Left and Right On = 4 Gb/s

Procedure – Setting the Link Rate Switch on the CSM200 Drive Module

1. Check to see if the Link Rate switch is set to the 4-Gb/s data transfer rate.
   — If the link rate is set to 4-Gb/s, you do not need to change the setting.
   — If the link rate is set to 2-Gb/s, go to step 2.

2. Make sure that no power is applied to the drive module.
3. Move the switch to the 4-Gb/s (left) position.

Step 7 – Connecting the Controller Module to the Drive Modules

Key Terms

drive channel

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

Things to Know – 6580/6780 Controller Module

WARNING (W03) **Risk of exposure to laser radiation** – Do not disassemble or remove any part of a Small Form-factor Pluggable (SFP) transceiver because you might be exposed to laser radiation.

ATTENTION Possible hardware damage – To prevent electrostatic discharge damage to the module, use proper antistatic protection when you handle module components.

- The 6580/6780 controller module supports only CSM200 drive modules. You cannot connect any other type of drive module to the controller module.
- Each controller has four drive channels, and each drive channel has two ports, so each controller has eight drive ports.
- Controller A is inverted from controller B, which means that its drive channels are upside-down and numbered in reverse.

Figure 21 Drive Channel Ports on the Controller Module – Rear View
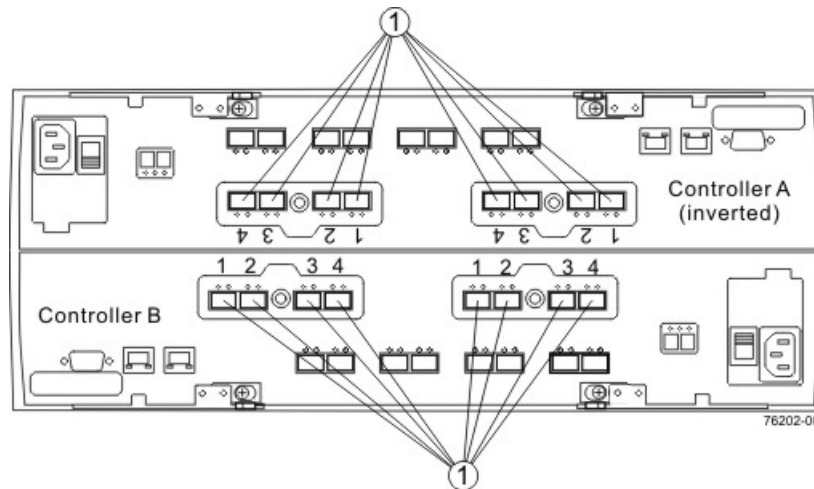
1. Drive Channel Ports

- A controller module has eight redundant path pairs that are formed using one drive channel of controller A and one drive channel of controller B. The following figure shows the redundant pairs in a controller module. The following table lists the numbers of the redundant path pairs and the drive ports of the drive channels from which the redundant path pairs are formed.

> **NOTE** To maintain data access in the event of the failure of a controller, an ESM, or a drive channel, you must connect a drive module or a string of drive modules to both drive channels on a redundant path pair.

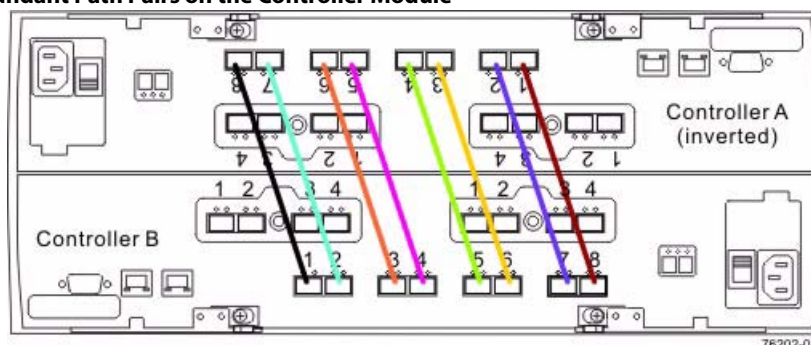**Figure 22 Redundant Path Pairs on the Controller Module**

**Table 8 Redundant Path Pairs on a Controller Module**

Drive Ports on Controller A	Drive Channels on Controller A	Drive Ports on Controller B	Drive Channels on Controller B
Port 8	Channel 1	Port 1	Channel 5
Port 7	Channel 1	Port 2	Channel 5
Port 6	Channel 2	Port 3	Channel 6
Port 5	Channel 2	Port 4	Channel 6
Port 4	Channel 3	Port 5	Channel 7
Port 3	Channel 3	Port 6	Channel 7
Port 2	Channel 4	Port 7	Channel 8
Port 1	Channel 4	Port 8	Channel 8

Things to Know – CSM200 Drive Module

- Each CSM200 drive module can contain a maximum of 16 drives.
- The ESMs on the CSM200 drive module contain two sets of In and Out ports (labeled 1A and 1B and 2A and 2B). *Use only port 1A and port 1B.* Port 2A and port 2B are reserved for future use.

> **NOTE** Make sure that an SFP transceiver is not inserted into port 2A or port 2B of the ESMs. The amber LED on the ESM comes on if an SFP transceiver is inserted in any of these ports.

- ESM B is installed right-side-up, and ESM A is installed upside-down. Keep this in mind when you connect cables to this drive module.

Figure 23 CSM200 Drive Module – Rear View
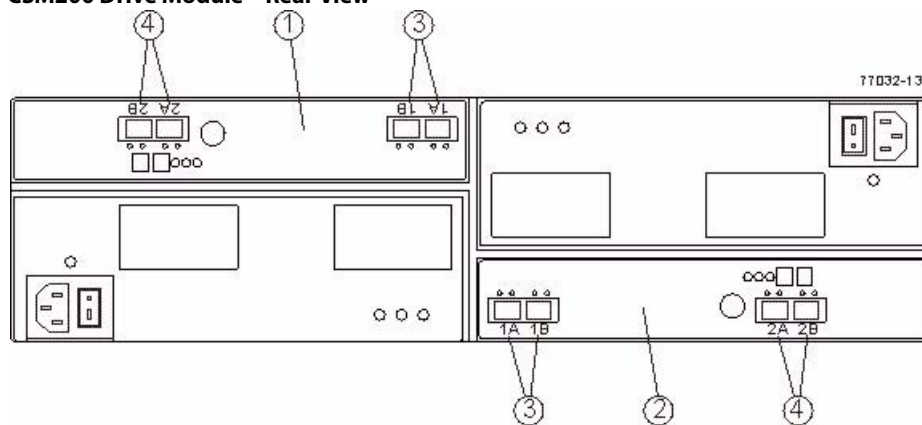
1. ESM A (Inverted)
2. ESM B
3. Port 1A (In) and Port 1B (Out)
4. Port 2A and Port 2B (Reserved)

Things to Know – Connecting the Drive Modules

Cable drive modules to the controller module by using fiber-optic cables with Small Form-factor Pluggable (SFP) transceivers for 4-Gb/s Fibre Channel connections.

You can cable the CE7900 controller tray to DC4600 drive trays, or a combination of the two. No more than seven FC4600 drive trays may be cabled to one loop pair and no more than 28 total FC4600 drive trays may be cabled to the controller tray.

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

NOTE Do not add more drive modules than the storage array supports. Adding more drive modules makes the storage array invalid. You cannot perform configuration operations, but you can continue to transfer I/O data to the existing volumes.

HotScale™ technology lets you configure, reconfigure, add, or relocate storage array capacity without interrupting user access to data. Contact a Customer and Technical Support representative before proceeding.

ATTENTION Possible loss of data access – Contact a Customer and Technical Support representative if you plan to add a drive tray to an existing storage array under either of the following conditions: The power is not turned off to the controller tray, or data transfer continues to the storage array.

Procedure – Connecting CSM200 Drive Modules to the 6580/6780 Controller Module

NOTE This procedure describes standard cabling for the CSM200 drive module.

1. Insert an SFP transceiver into the drive channel port, and plug one end of the fiber-optic cable into the drive channel port.

NOTE Before you use an SFP transceiver, if a black, plastic plug is in the port where the SFP transceiver will be inserted, remove the plug.

2. Insert an SFP transceiver into the applicable In (1A) port or Out (1B) port on the ESM in the drive module, and plug the other end of the fiber-optic cable into the applicable In (1A) port or Out (1B) port.
3. Affix a label to each end of the cable using this recommended scheme. A label is useful if you need to disconnect cables later to service a controller.
    —   The controller ID (for example, controller A)
    —   The drive channel number and the port ID (for example, drive channel 1, port 4)
    —   The ESM ID (for example, ESM A)
    —   The ESM port ID (for example, 1A or 1B)
    —   The drive module ID

    Example label abbreviation– Assume that a cable is connected between drive channel 1, port 4, of controller A to the Out (1B) port of the left ESM (A) in drive module 1. A label abbreviation could be as follows.

    `CtA-Dch1/P4, Dm1-ESM_A(left), IB`
4. Repeat step 1 through step 3 for each controller and drive channel that you intend to use.

NOTE You must connect the cables from one drive module to the next (daisy-chaining), starting with the ninth CSM200 drive module.

In the cabling configuration figures that follow, the controller module is placed in the center, and the controllers are labeled as A and B. The CSM200 drive modules are placed above the controller module and below the controller module. The drive modules are labeled as 1, 2, 3, and so on.

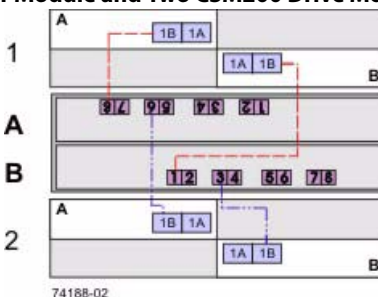**Figure 24 One 6580/6780 Controller Module and Two CSM200 Drive Modules**

Figure 25 One 6580/6780 Controller Module and Four CSM200 Drive Modules
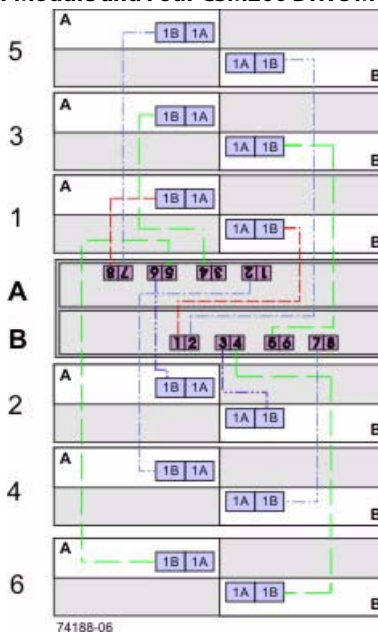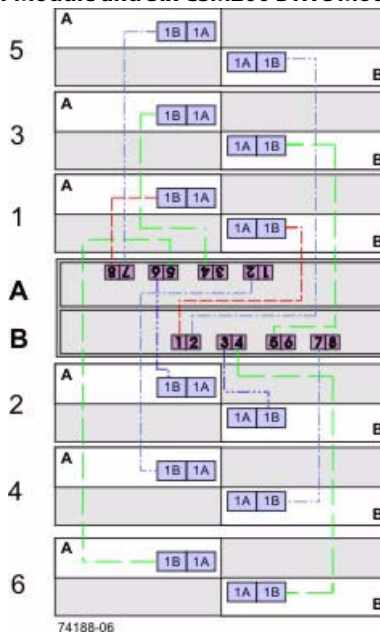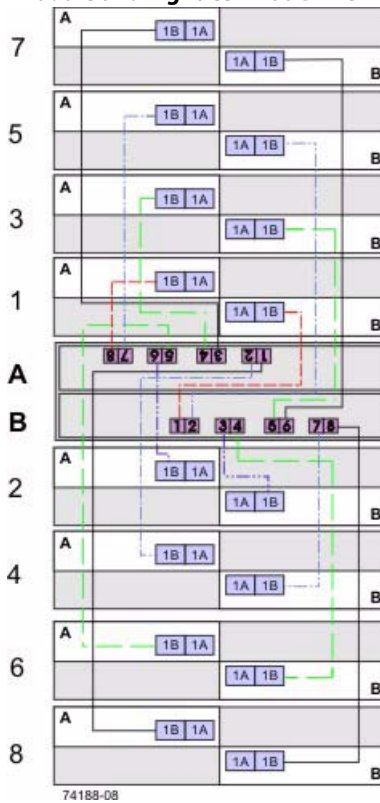
Figure 26 One 6580/6780 Controller Module and Six CSM200 Drive Modules

Figure 27 One 6580/6780 Controller Module and Eight CSM200 Drive Modules
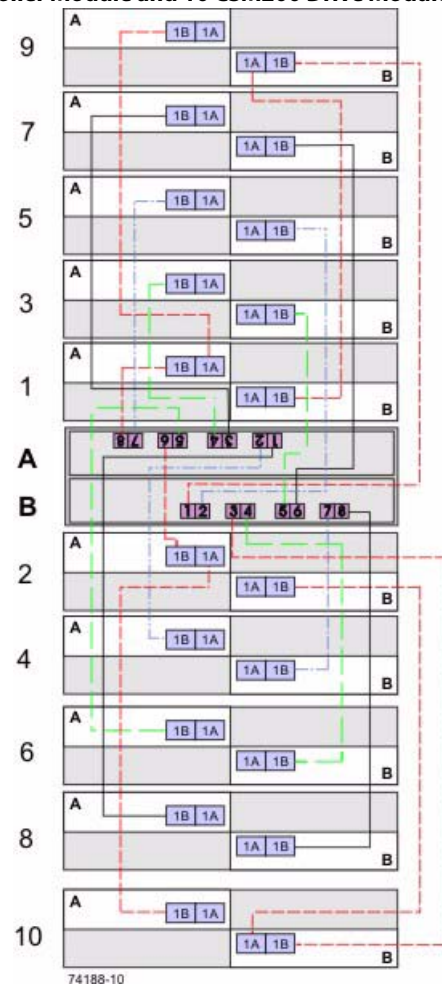
Figure 28 One 6580/6780 Controller Module and 10 CSM200 Drive Modules
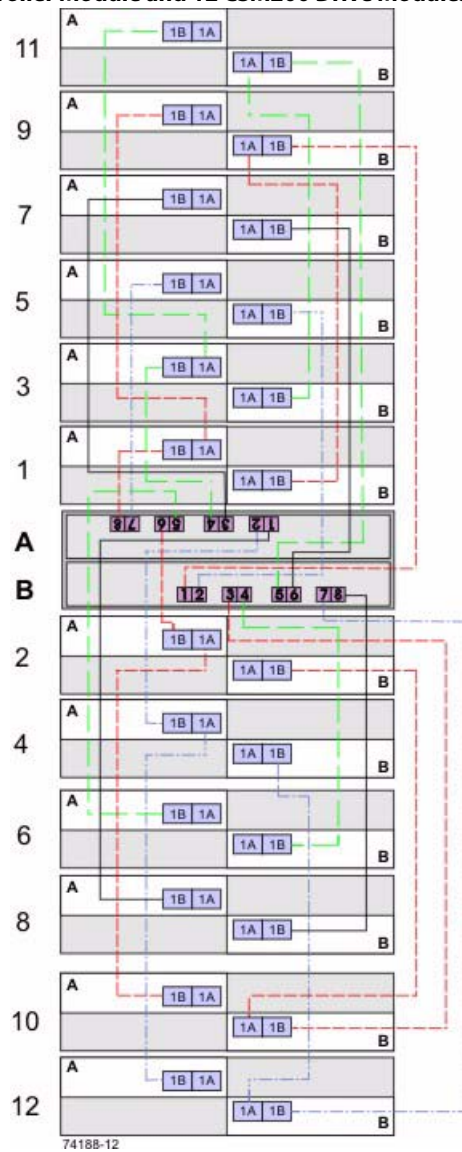
Figure 29 One 6580/6780 Controller Module and 12 CSM200 Drive Modules

Figure 30 One 6580/6780 Controller Module and 14 CSM200 Drive Modules
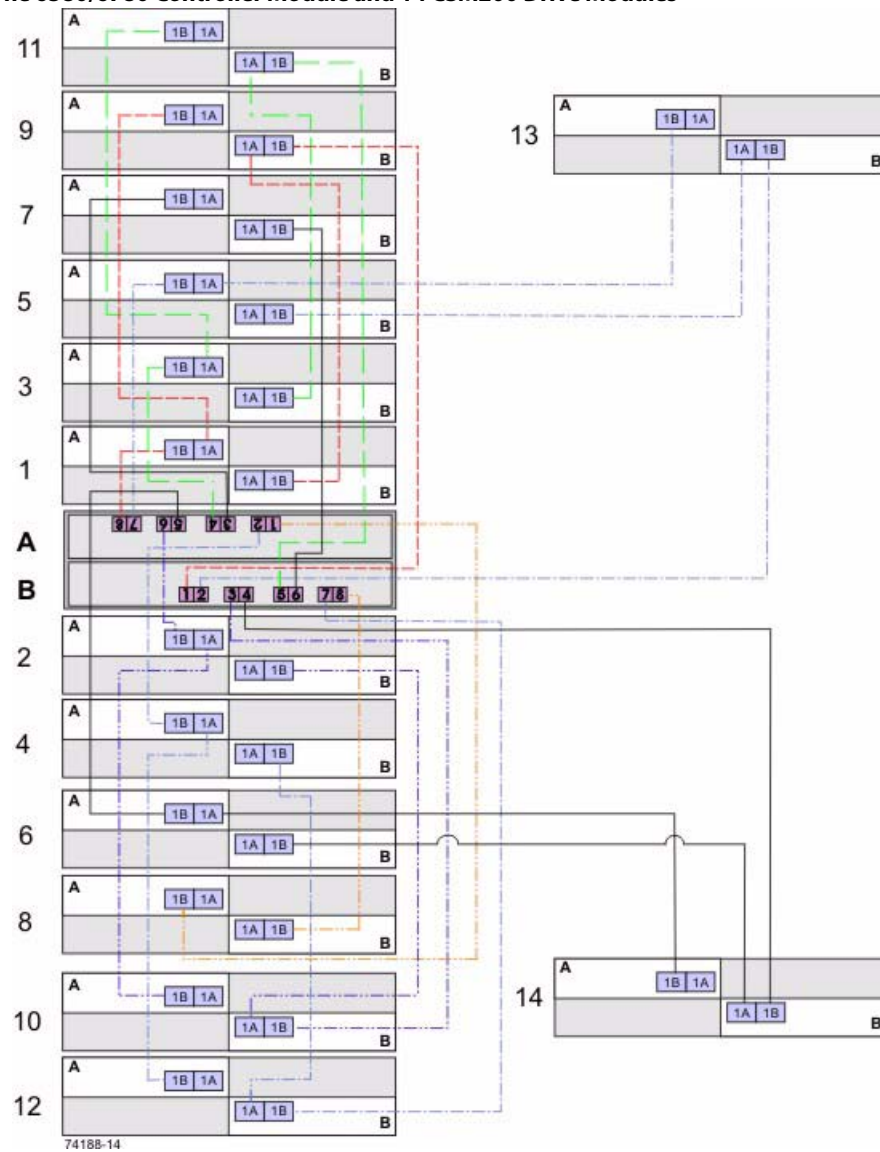
Figure 31 One 6580/6780 Controller Module and 16 CSM200 Drive Modules
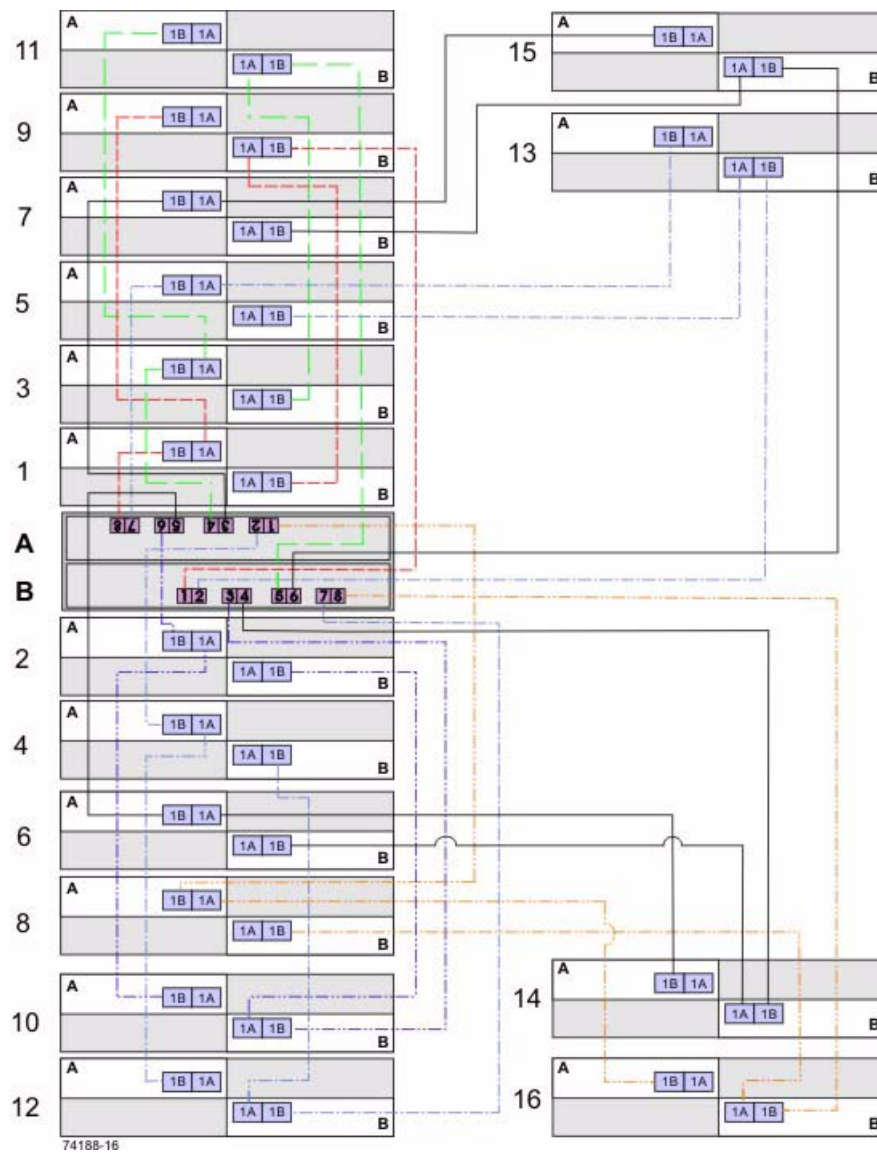
You can add drive modules in series to each redundant pair of drive ports up to 28 drive modules. In a configuration with 28 drive modules, four of the port pairs will have four drive modules each, while the other four will have three drive modules each. Figure 32 shows this arrangement schematically. The physical arrangement of the drive modules in cabinets will depend on your particular installation.

Figure 32 One 6580/6780 Controller Module and 28 CSM200 Drive Modules
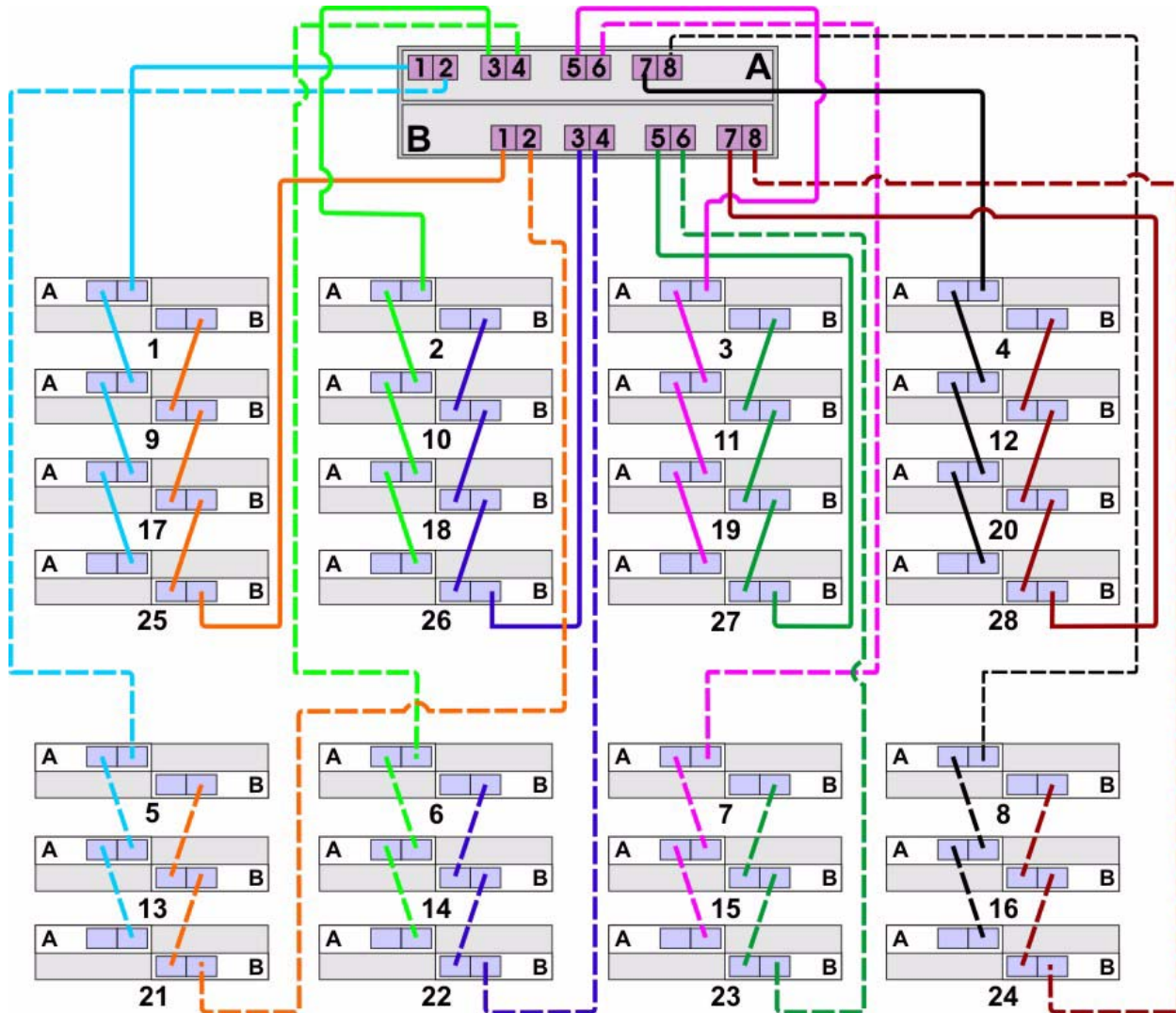
Step 8 – Connecting the Ethernet Cables

Key Terms

in-band management

A method to manage a storage array in which a storage management station sends commands to the storage array through the host input/output (I/O) connection to the controller.

out-of-band management

A method to manage a storage array in which a storage management station sends commands to the storage array through the Ethernet connections on the controller.

Things to Know – Connecting Ethernet Cables

ATTENTION Risk of security breach – Connect the Ethernet ports on the controller module to a private network segment behind a firewall. If the Ethernet connection is not protected by a firewall, your storage array might be at risk of being accessed from outside of your network.

- These Ethernet connections are intended for out-of-band management and have nothing to do with the iSCSI host interface cards (HICs), whether 1Gb/s or 10Gb/s.
- Ethernet port 2 on each controller is reserved for access by your Sun Customer Care Center representative.
- In limited situations in which the storage management station is connected directly to the controller module, you must use an Ethernet crossover cable. An Ethernet crossover cable is a special cable that reverses the pin contacts between the two ends of the cable.

Procedure – Connecting Ethernet Cables

Perform these steps to connect Ethernet cables for out-of-band management. If you use only in-band management, skip these steps.

1. Connect one end of an Ethernet cable into the Ethernet port 1 on controller A.
2. Connect the other end to the applicable network connection.
3. Repeat step 1 through step 2 for controller B.

Step 9 – Connecting the Power Cords in a 6580/6780 Controller Module Configuration

The 6580/6780 controller module, and the CSM200 drive module have standard power connections to an AC power source.

NOTE Make sure that you do not turn on the power to the controller module or the connected drive modules until this documentation instructs you to do so. For the correct procedure for turning on the power, see "Step 10 – Turning on the Power and Checking for Problems in a 6580/6780 Controller Module Configuration".

Things to Know – AC 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 modules always use 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.

Procedure – Connecting AC 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 interconnect power cord (or power cords specific to your particular cabinet) to the AC power connector on each power CRU in the drive module.
5. If you are installing other drive modules in the cabinet, connect a power cord to each power CRU in the drive modules.

Step 10 – Turning on the Power and Checking for Problems in a 6580/6780 Controller Module Configuration

Once you complete this task, you can install the begin to install the software and perform basic configuration tasks on your storage array. Continue with the *Initial Configuration and Software Installation* in these electronic document topics or through the PDF that is available on the SANtricity ES Storage Manager Installation DVD.

Procedure – Turning on the Power to the Storage Array and Checking for Problems

NOTE You must turn on the power to all of the connected drive modules before you turn on the power for the controller module. Performing this action makes sure that the controllers recognize each attached drive module.

NOTE While the power is being applied to the modules, the LEDs on the front and the rear of the modules come on and go off intermittently.
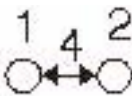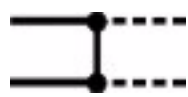
1. Turn on both Power switches on each drive module that is attached to the controller module. Depending on your configuration, it can take several minutes for each drive module to complete the power-on process.

NOTE Before you go to step 2, check the LEDs on the drive module to verify that the power was successfully applied to all of the drive modules. Wait 30 seconds after turning on the power to the drive module before turning on the power to the controller module.

2. Turn on both Power switches on the rear of the controller module. Depending on your configuration, it can take several minutes for the controller module to complete the power-on process.
3. Check the LEDs on the front and the rear of the controller module and the attached drive modules (see "Things to Know – LEDs on the 6580/6780 Controller Module" and "LEDs on the CSM200 Drive Module").
4. If you see any amber LEDs, make a note of their location.

Things to Know – LEDs on the 6580/6780 Controller Module

Table 9 LEDs on the Controller Module

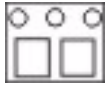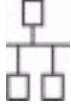| LED	Symbol	Location (CRUs)	Function
Power		Power-fan Interconnect-battery	■ On – The CRU has power. ■ Off – The CRU does not have power. **NOTE** – The controller CRUs do not have a Power LED. They receive their power from the power supplies inside the power-fan CRUs.
Battery Needs Attention		Interconnect-battery	On – A problem exists with the battery.
Service Action Allowed		Power-fan Controller Interconnect-battery	On – You can remove the CRU safely. See "Things to Know – Service Action Allowed LEDs."
Service Action Required (Fault)		Power-fan Controller Interconnect-battery	On – A problem exists with the CRU.
Locate		Interconnect-battery	On – A module is located.
Host Channel Speed (8-Gb/s Fibre Channel Host Interface Card)		Controller	The speed of the host channel is indicated: ■ Left LED on – 2 Gb/s ■ Right LED on – 4 Gb/s ■ Left LED and right LED on – 8 Gb/s
Host Channel Speed (4-Gb/s Fibre Channel Host Interface Card)		Controller	The speed of the host channel is indicated: ■ Left LED on – 1 Gb/s ■ Right LED on – 2 Gb/s ■ Left LED and right LED on – 4 Gb/s
Drive Port Bypass		Controller	On – A bypassed port is indicated.
Drive Channel Speed		Controller	The speed of the drive channel is indicated: ■ Right LED on – 2 Gb/s ■ Left LED and right LED on – 4 Gb/s

LED	Symbol	Location (CRUs)	Function
Cache Active		Controller	The activity of the cache is indicated: ■ Blinking – Data is in cache. ■ Off – No data is in cache.
Module ID Numeric Display and Diagnostic Display		Controller	The module ID or a diagnostic code is indicated (see the "Supported Diagnostic Codes" table that follows at the end of this section). For example, if some of the cache memory dual in-line memory modules (DIMMs) are missing in a controller, error code L8 appears in the diagnostic display.
Ethernet Speed and Ethernet Activity		Controller	The speed of the Ethernet ports and whether a link has been established are indicated: ■ Left LED on – 1000BASE-T speed ■ Left LED off – 100BASE-T or 10BASE-T speed ■ Right LED on – A link is established. ■ Right LED off – No link exists. ■ Right LED blinking – Activity is occurring.

Table 10 Supported Diagnostic Codes

Diagnostic Code	Description
L0	The controller types are mismatched.
L1	The interconnect-battery CRU is missing.
L2	A persistent memory error has occurred.
L3	A persistent hardware error has occurred.
L4	A persistent data protection error has occurred.
L5	The auto-code synchronization (ACS) has failed.
L6	An unsupported host interface card is installed.
L7	The sub-model identifier is not set or is mismatched.
L8	A memory configuration error has occurred.
L9	A link speed mismatch has occurred.
LA	Reserved.
Lb	Host card configuration error has occurred.
LC	Persistent cache backup configuration error has occurred.
Ld	Mixed cache memory DIMMs exist.
LE	Uncertified cache memory DIMM sizes exist.
LF	Lockdown with limited SYMbol support exists exist.
LH	Controller firmware mismatch has occurred.

Things to Know – Service Action Allowed LED

Each controller CRU, power-fan CRU, and interconnect-battery CRU has a Service Action Allowed LED, which is a blue LED. The Service Action Allowed LED lets you know when you can remove a CRU safely.

ATTENTION Possible loss of data access – Never remove a controller CRU, a power-fan CRU, or an interconnect-battery CRU unless the Service Action Allowed LED is on.

If a controller CRU, a power-fan CRU, or a interconnect-battery CRU fails and must be replaced, the Service Action Required (Fault) LED (an amber LED) on that CRU comes on to indicate that service action is required. The Service Action Allowed LED also comes on if it is safe to remove the CRU. If data availability dependencies exist or other conditions that dictate a CRU 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. In most cases, the Service Action Allowed LED comes on when the Service Action Required (Fault) LED comes on for a CRU.

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

General Behavior of the LEDs on the Drive Modules

Table 11 LED Symbols and General Behavior on the Drive Modules

LED	Symbol	Location	General Behavior
Power		Drive module ESM CRU Power-fan CRU	**On** – Power is applied to the drive module or the CRU. **Off** – Power is not applied to the drive module or the CRU.
Service Action Allowed		ESM CRU Power-fan CRU Drive	**On** – It is safe to remove the ESM CRU, the power-fan CRU, or the drive. **Off** – Do not remove the ESM CRU, the power-fan CRU, or the drive. The drive has an LED but no symbol.
Service Action Required (Fault)		ESM CRU Power-fan CRU Drive	**On** – When the drive module LED is on, a component within the drive module needs attention. **On** – The ESM CRU, the power-fan CRU, or the drive needs attention. **Off** – The ESM CRU, the power-fan CRU, and the drive are operating normally. The drive has an LED but no symbol.
Locate		Front bezel on the drive module	**On or blinking** – Indicates the drive module that you are trying to find.

LED	Symbol	Location	General Behavior
Drive Port Bypass		ESM CRU	Indicates if a port has been bypassed.
Drive Channel Speed		ESM CRU	Indicates the speed of the drive channel: If the right LED is **On** -- 2 Gb/s If both LED are **Off** -- 4 Gb/s
AC Power		ESM CRU Power-fan CRU **Note** LED is directly above or below AC Power Switch and AC Power Connectors	**On** – AC power is present. **Off** – AC power is not present.
DC Power		Power-fan CRU	Indicates the power supply is outputting DC power

Service Action LEDs on the Drive Module

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

Each CRU 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 CRU. If data availability dependencies or other conditions exist that dictate that a CRU 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.

NOTE If the Service Action Required LED is on but the Service Action Allowed LED is off for a particular CRU, you might need to service another CRU 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 CRU.

Things to Know – LEDs on the CSM200 Drive Module

The following topics describe the LEDs that are available on CSM200 drive module.

LEDs on the CSM200 Drive Module

Figure 33 LEDs on the CSM200 – Front View

1. Drive Module Locate LED
2. Drive Module Service Action Required LED
3. Power LED
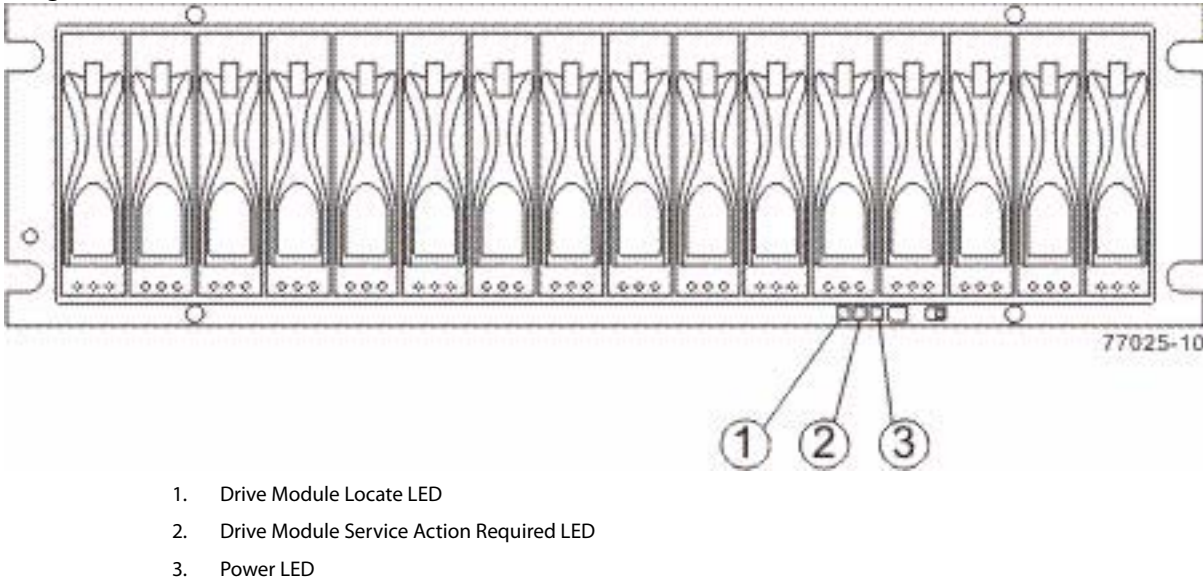
Table 12 LEDs on the CSM200 Left End Cap

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	Power	Green	Power is present.	Power is not present.

Figure 34 LEDs on the CSM200 ESM CRU

1. ESM Link Fault LED (Port 1A Bypass)
2. ESM Link LED (Port 1A Data Rate)
3. ESM Link LED (Port 1B Data Rate)
4. ESM Link Fault LED (Port 1B Bypass)
5. ESM Service Action Allowed LED
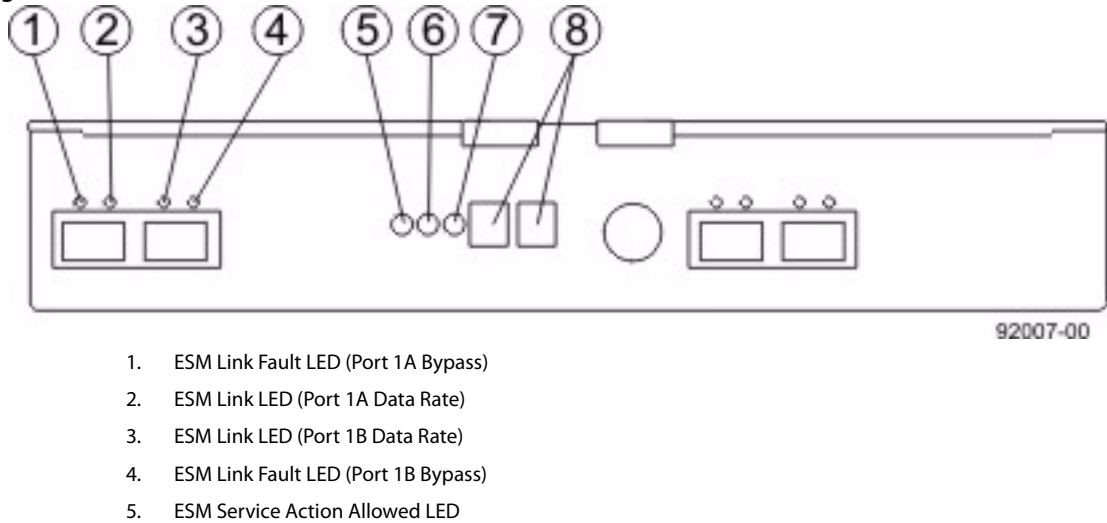
6. ESM Service Action Required LED

7. ESM Power LED

8. Seven-Segment Module ID

Table 13 LEDs on the CSM200 ESM CRU

Location	LED	Color	On	Off
1	ESM Link Fault (Port 1A Bypass)	Amber	A link error has occurred.	No link error has occurred.
2	ESM Link (Port 1A)	Green	The link is up.	A link error has occurred.
3	ESM Link (Port 1B Bypass)	Green	The link is up.	A link error has occurred.
4	ESM Link Fault (Port 1B)	Amber	A link error has occurred.	No link error has occurred.
5	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.
6	ESM Service Action Required	Amber	A fault exists within the ESM.	Normal status.
7	ESM Power	Green	Power to the ESM is present.	Power is not present to the ESM.
8	Seven-Segment Module ID	Green	For more information, see "Supported Diagnostic Codes on the Seven-Segment Display".	Not applicable.

Figure 35 LEDs on the CSM200 Power CRU

1. Power AC Power LED

2. Power Service Action Allowed LED

3. Power Service Action Required LED

4. Power DC Power LED
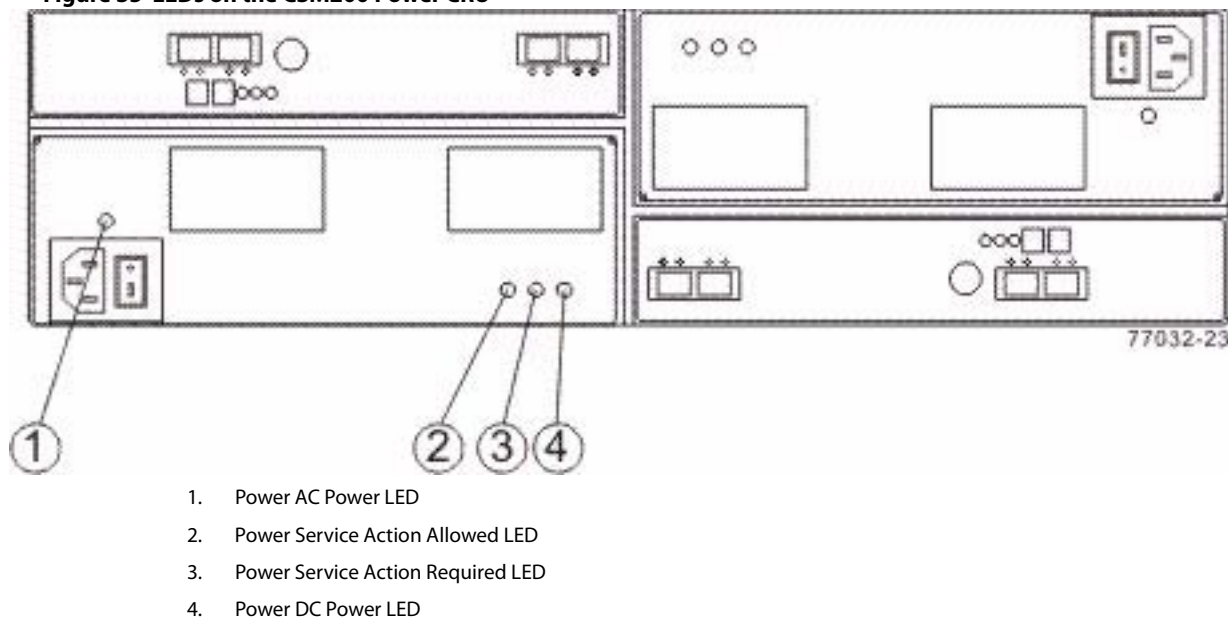
Table 14 LEDs on the CSM200 Power CRU

Location	LED	Color	On	Off
1	Power AC Power	Green	AC power to the power CRU is present.	AC power to the power CRU is not present.
2	Power Service Action Allowed	Blue	The power CRU can be removed safely from the drive module.	The power CRU cannot be removed safely from the drive module.
3	Power Service Action Required	Amber	A fault exists within the power CRU.	Normal status.
4	Power DC Power	Green	DC power from the power CRU is available.	DC power from the power CRU is not available.

LEDs on the CSM200 Drives

Figure 36 LEDs on the CSM200 Drive

1. Drive Power LED
2. Drive Service Action Required LED
3. Drive Service Action Required LED

Table 15 LEDs on the Drives

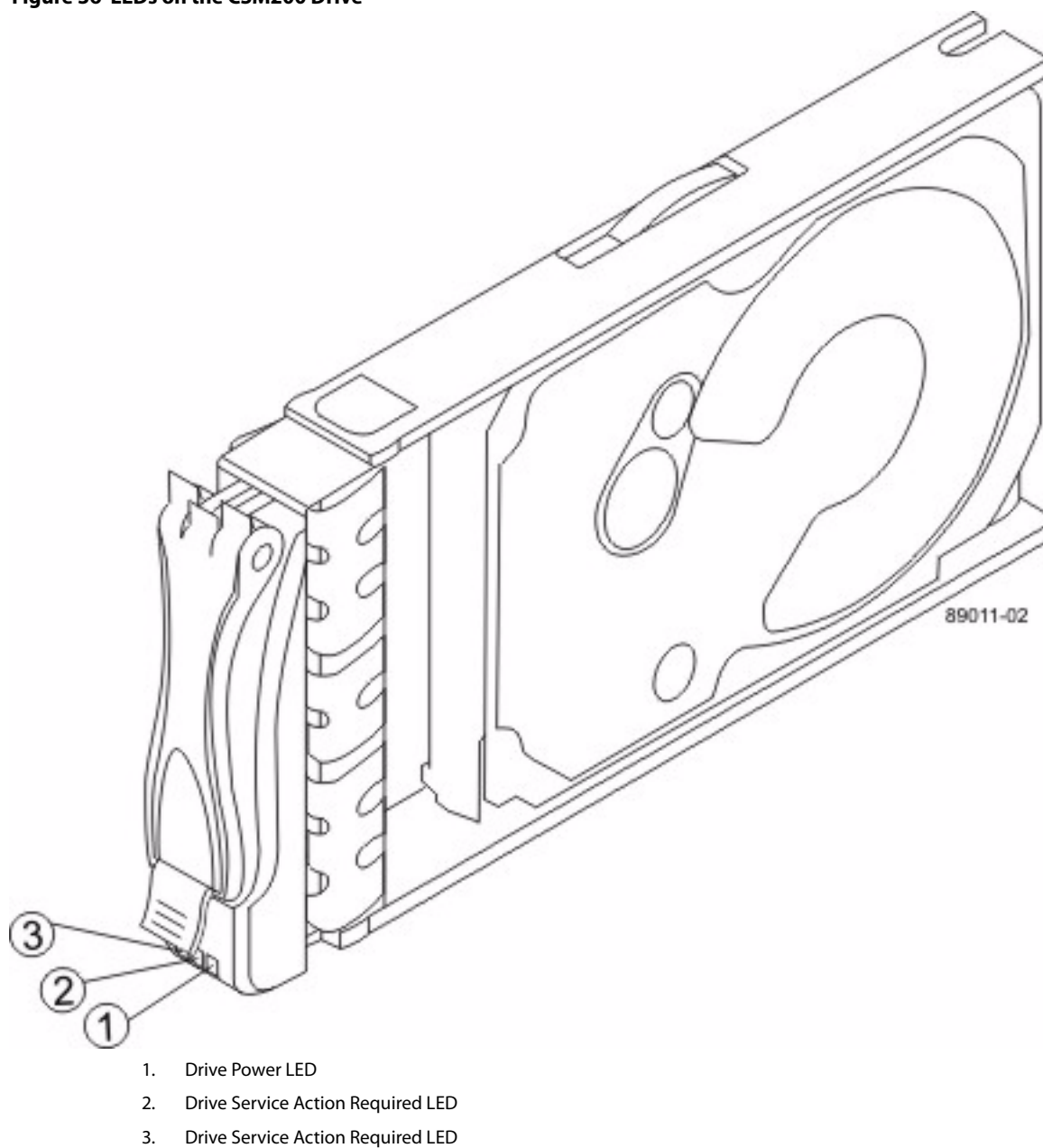| Location	LED	Color	On	Blinking	Off
1	Drive Power	Green	The power is turned on, and the drive is operating normally.	Drive I/O is taking place.	The power is turned off.
2	Drive Service Action Required	Amber	An error has occurred.		Normal status.
3	Drive Service Action Allowed	Blue	The drive CRU can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

Supported Diagnostic Codes on the Seven-Segment Display for the CSM200 Drive Module

The following table provides the diagnostic that can appear on the CSM200 drive module.

Table 16 Supported Diagnostic Codes

Diagnostic Code	Description
– –	The firmware is booting.
.8, 8., or 88	This ESM is being held in reset by another ESM.
AA	ESM A firmware is in the process of booting (the diagnostic indicator is not yet set).
bb	ESM B firmware is in the process of booting (the diagnostic indicator is not yet set).
L0	The controller types are mismatched.
L2	A persistent memory error has occurred.
L3	A persistent hardware error has occurred.
L9	An over-temperature condition has been detected in either the ESM or the power supply.
H0	An ESM Fibre Channel interface failure has occurred.
H1	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 SPF transceiver with a blinking amber LED.
H2	The ESM configuration is invalid or incomplete or is operating in a Degraded state.
H3	The maximum number of ESM reboot attempts has been exceeded.
H4	This ESM cannot communicate with the alternate ESM.
H5	A midplane harness failure has been detected in the drive module.
H6	A catastrophic ESM hardware failure has been detected.
H8	Not applicable to this product.
H9	A non-catastrophic hardware failure has occurred. The ESM is operating in a Degraded state.
J0	The ESM CRU is incompatible with the drive module firmware.
J1	Not applicable to this product.

Diagnostic Code	Description
J2	Not applicable to this product.
J3	Not applicable to this product.
J4	Not applicable to this product.
J5	Not applicable to this product.

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.

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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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