



Changing The World of Storage

Spectra T200, T380, T680, T950, and T-Finity

Drive Installation or Replacement Instructions

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Part Number

91010010 Revision B

Revision History

Revision	Date	Description
A	November 2008	Initial release
B	May 2010	Added the T-Finity library

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Drive Installation or Replacement Instructions

This guide provides instructions for either installing an additional drive or replacing an existing drive in a Spectra T200, T380, T680, T950, or T-Finity library (the library).

Illustrations The replacement drive that you received may not look exactly like the drives shown in this document.

Most of the figures in this guide show the Spectra T380 library. The relative locations of the components and the procedures are the same for the other libraries unless otherwise indicated. The differences are indicated by library type; for example:

- **Spectra T200, T380, or T680**—items indicated with this text refer to any one of these three libraries.
- **Spectra T950 and T-Finity**—items indicated with this text refer to either of these two libraries.

User Interface Updates The BlueScale interface changes as new features are added or other modifications are made between firmware revisions. Therefore, the user interface screens on your library may differ from those shown in this document.

Drive Bay Assemblies Each drive is mounted on a drive sled which is installed in a drive bay assembly (DBA) in the back of the library. If there are no empty drive bays in your library, you must install a new DBA to accommodate additional drives. Backups cannot continue while you install the new DBA and drive(s).

Tape Drive Support This table shows the tape drives supported by the individual libraries.

Library	LTO-1	LTO-2	LTO-3	LTO-4	LTO-5
T200	Y	Y	Y	Y	Y
T380	Y	Y	Y	Y	Y
T680	Y	Y	Y	Y	Y
T950	Y	Y	Y	Y	Y
T-Finity	N	N	N	Y	Y

PREPARE FOR MAINTENANCE

Make sure you fulfill the prerequisites described in this section and familiarize yourself with all the sections in the document before starting.

Continuing or Stopping Backups

Use the following guidelines if you are installing or replacing a drive in a drive bay assembly (DBA) already in the library.

Method	Description
QIP-attach drives (all libraries)	Backups running to all other drives in the library (or partition) can safely continue while you install a new drive or replace an existing one.
Direct-attach SCSI drives (Spectra T200, T380, T680)	If multiple direct-attach SCSI drives are daisy-chained on the same SCSI bus, adding or removing a drive interrupts communications on the bus. Stop backup operations to all of the drives in the daisy chain. Spectra Logic recommends shutting down and powering off the host computer before replacing a drive. Note: Both the T950 and the T-Finity require a QIP for direct-attach drive configurations.
Direct-attach Fibre Channel drives (Spectra T200, T380, T680)	Backups running to other drives in the library (or partition) can safely continue while you install a new drive or replace an existing one, unless the drive you are replacing is the one exporting the library (that is, providing the robotic control path for the partition). If the drive you are replacing provides the control path for the robotics, stop backup operations to the partition. Note: Both the T950 and the T-Finity require a QIP for direct-attach drive configurations.
Note: Selecting a drive to provide the robotic control path is part of configuring a partition. Refer to the individual <i>User Guide</i> for more information.	



Ensuring ESD Protection

The repair environment for the library must be free of conditions that could cause electrostatic discharge (ESD). To protect the library from ESD, follow these procedures:

- Place a static protection mat on the work surface used while removing and installing library components. Use a 1-megaohm resistor to ground the static protection mat.
- Wear a static protection wrist band whenever you handle library components that have been removed from their antistatic bags. Connect this wrist band to the static protection mat or to other suitable ESD grounding.
- Keep all components in antistatic bags when not in use.

Gathering Tools and Supplies

You must have the following to complete this procedure:

Item	Description
Supplies	<ul style="list-style-type: none"> ESD protection equipment
A Replacement Drive from Spectra Logic	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Fibre Channel tape drive example</p>  </div> <div style="text-align: center;"> <p>SCSI tape drive example</p>  </div> </div>

IDENTIFY THE DRIVE LOCATION

Note: If you are installing an additional drive, rather than replacing a drive, skip to [Drive Installation Preparation](#) on page 10.

Your backup software, the library, or both may indicate a drive problem. First, identify the problem drive, then check the Drives screen on the library user interface for the drive identifier, and finally, write down the drive identifier for use in a later section.

Note: If your library has multiple partitions, use your backup software and the Partition Settings screen to identify the malfunctioning drive.

Drives are identified in the library's BlueScale user interface using the format shown in the following sections. You can also access the back of the library and look for the drive sled status light that blinks amber.

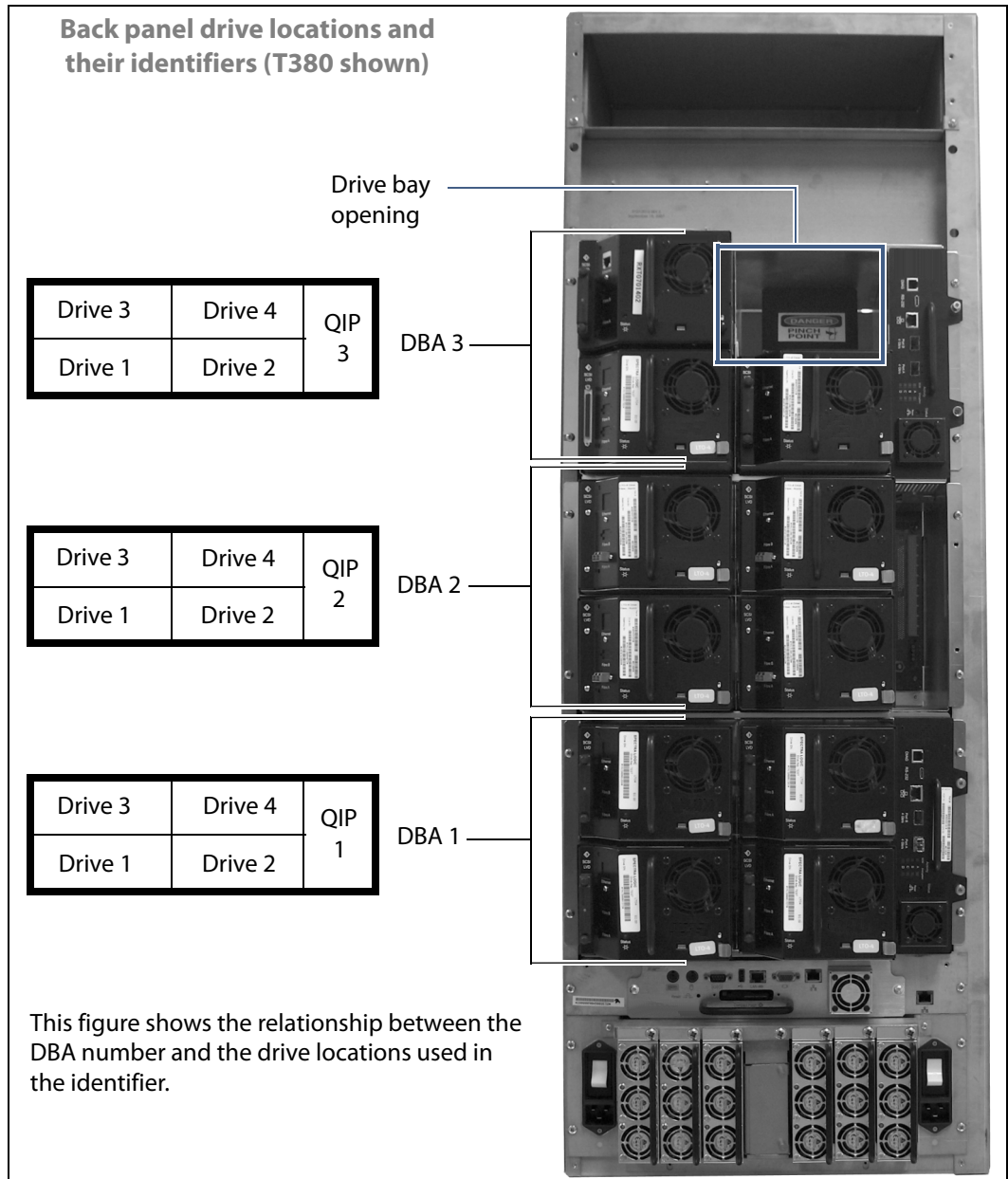


Figure 1 The drive sled (SCSI drive sled shown).

Spectra T200, T380, or T680 Library

The user interface nomenclature uses **DBAx/Y-DRVx**:

- **DBAx** is the number of the drive bay assembly (DBA) containing the drive; a DBA holds up to four drives and one Quad-Interface Processor (QIP).
- **Y** is the drive type (LTO, for example).
- **DRVx** is the number of the drive bay in the DBA, as viewed from the back of the library.



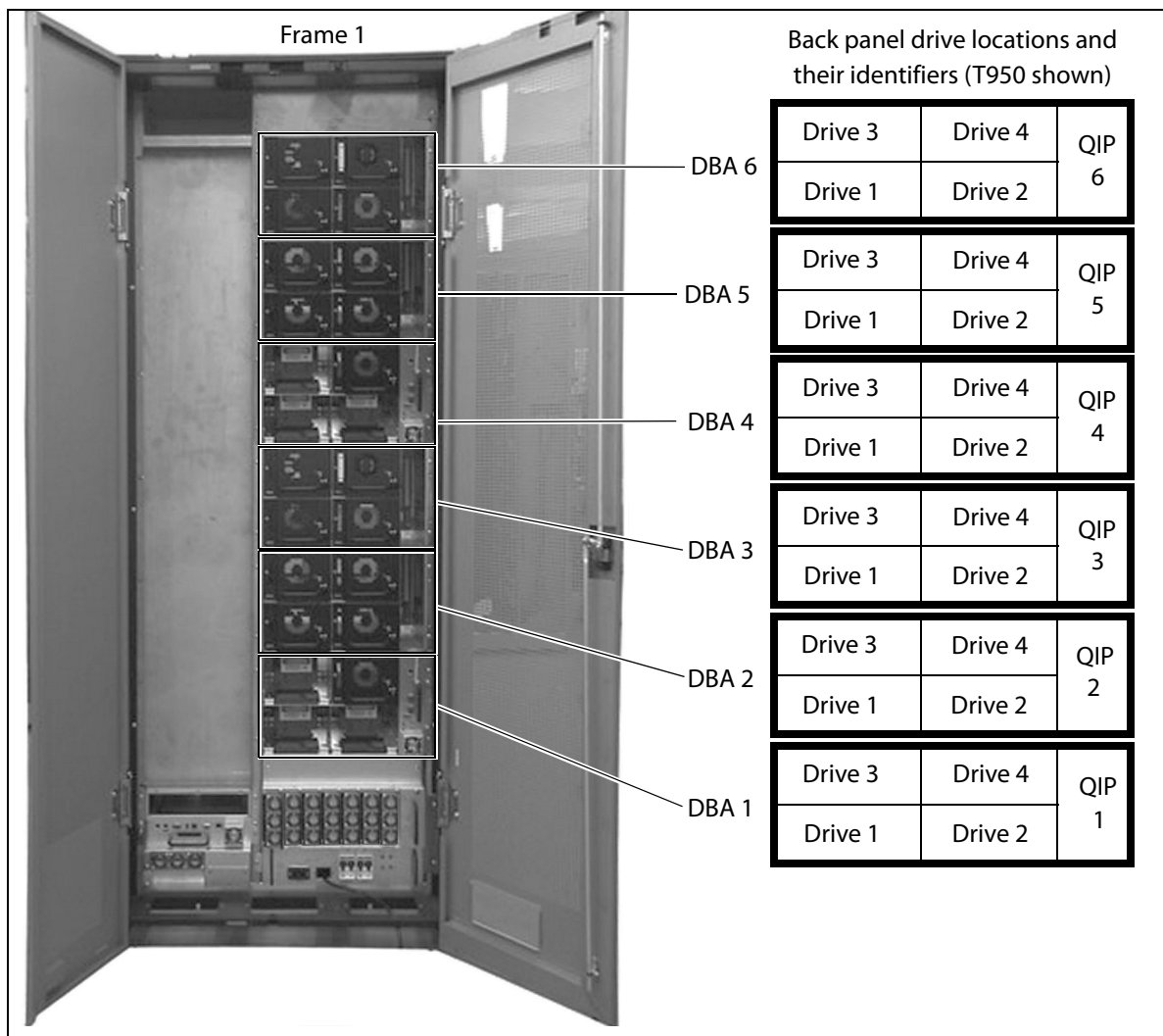
	If this drive ...	Is installed in this drive bay ...	Its identifier is ...
Examples	LTO-n	Drive bay 1 in DBA1	DBA1/LTO-DRV1
	LTO-n	Drive bay 2 in DBA2	DBA2/LTO-DRV2

Spectra T950 or T-Finity Library

The user interface nomenclature uses **FRx/DBAx/Y-DRVx**:

- **FR** is the library frame in which the drive is installed and **x** is the frame number; there can be up to six frames in a cascade.
- **DBA** is the drive bay assembly containing the drive, and **x** is the DBA number; a DBA holds up to four drives and one Quad-Interface Processor (QIP).
- **Y** is the drive type (LTO, for example), and **DRVx** is the number of the drive bay in the DBA.

This figure shows the relationship between the DBA number and the drive locations used in the identifier. The relationship between the DBA number and drive locations is the same for each additional drive frame.



Example If an LTO drive is installed in frame 1, DBA2, drive position 4, its identifier is **FR1/DBA2/LTO-DRV4**.

REPLACE OR INSTALL A DRIVE

This section describes how to replace an existing tape drive or install an additional tape drive, and contains these steps:

- [Preparing the Library](#) (for replacement or installation)
- [Accessing the Drives on page 10](#) (for replacement or installation)
- [Removing the Malfunctioning Drive on page 13](#) (for replacement only)
- [Installing the Drive on page 14](#) (for replacement or installation)



Important

When replacing a drive, the new drive must be the same “type” as the one you replace.

If the drive to be replaced is the only drive in the partition, the existing partition will be deleted.

Preparing the Library

Drive Replacement Preparation

This section describes how to prepare to replace a drive in the library.

Note: If you are installing an additional drive, rather than replacing a drive, skip to [Drive Installation Preparation on page 10](#).

If the malfunctioning drive contains a cartridge, attempt to use the BlueScale user interface to move the cartridge to an empty slot before performing the steps in this section. See the individual *User Guide* for instructions. If you are unable to remove the cartridge, continue with the replacement without removing the cartridge.

After you determine which drive needs replacing, follow these steps to shut down the drive so that you can remove it from the library.

1. If the drive is *attached to a QIP* or if it is a direct-attach Fibre Channel drive, skip to [Step 2](#).

If the drive is a direct-attached SCSI drive, Spectra Logic recommends shutting down and powering off the host computer before replacing the drive.



Caution

Improperly removing a device from a SCSI bus can cause a host computer to crash. If you decide to leave the host running, Spectra Logic is not responsible for any damage to data or equipment.

2. Log into the library with superuser or administrator privileges.

3. Select **Configuration > Drives**. The Drives screen displays.

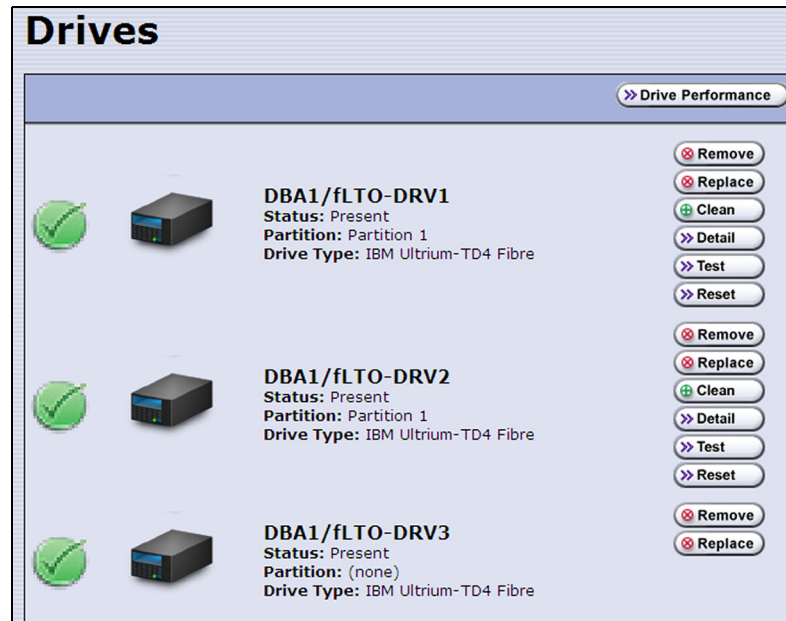


Figure 2 The Drives screen.

Note: The individual drive types are identified by:

- fLTO refers to Fibre Channel.
 - LTO refers to SCSI.
4. Based on the drive identifier you determined in [Identify the Drive Location on page 5](#), select **Replace** for the drive that you want to replace.



Caution

*Do not select **Remove**.* This option permanently removes the drive from the partition. When the replacement drive is installed, it will not be assigned to the partition from which the malfunctioning drive was removed.

If you select **Remove** and the selected drive is the only drive in the partition, the partition will be deleted.

A Feedback Required screen prompts you to confirm that you want to replace the drive.

5. Select **OK**.

Another Feedback Required screen indicates that the requested drive has been successfully shut down.



Important

Do not respond to the prompt in the Feedback Required screen or perform any other operations from the user interface (either locally or remotely) until you complete the replacement procedure. Responding before you replace the drive will power on and configure the drive you just powered down.

Drive Installation Preparation

This section describes how to prepare to add a new drive to the library. If you are replacing a drive, follow the steps in [Drive Replacement Preparation on page 8](#).

1. Log into the library with superuser or administrator privileges.
2. From the toolbar menu, select **Configuration > Drives**. The Drives screen appears.

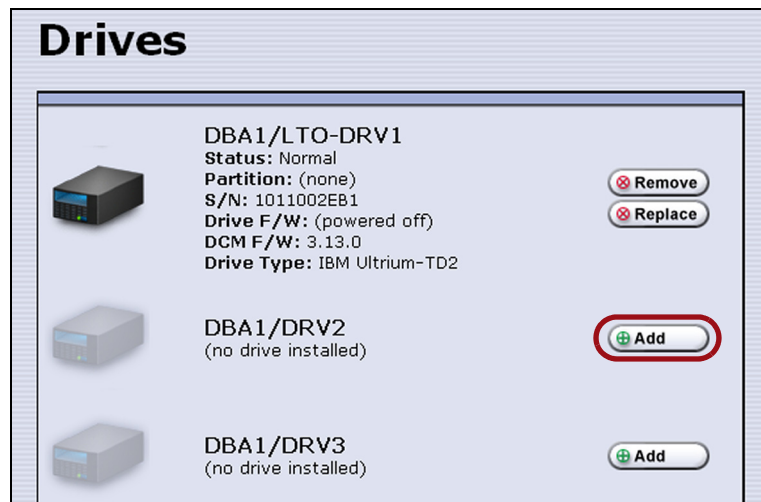


Figure 3 The Drives screen.

3. Select **Add** in the location where you want to add a drive.

A Feedback Required screen prompts you to confirm that you want to add the drive.

4. Select **OK**.

Important

Do not respond to the prompt in the Feedback Required screen or perform any other operations from the user interface (either locally or remotely) until you complete the replacement procedure. Responding before you replace the drive will power on and configure the drive you just powered down.

Accessing the Drives

This section describes how to access the tape drives.

Spectra T200 or T380 Remove the protective cover in order to install or replace drives.

1. From the rear of the library, locate the two knurled screws securing the bottom of the cover to either side of the chassis ([Figure 4](#)).

- Using your fingers or a #2 Phillips screwdriver, loosen the captive screws that secure the bottom of the cover to the chassis.

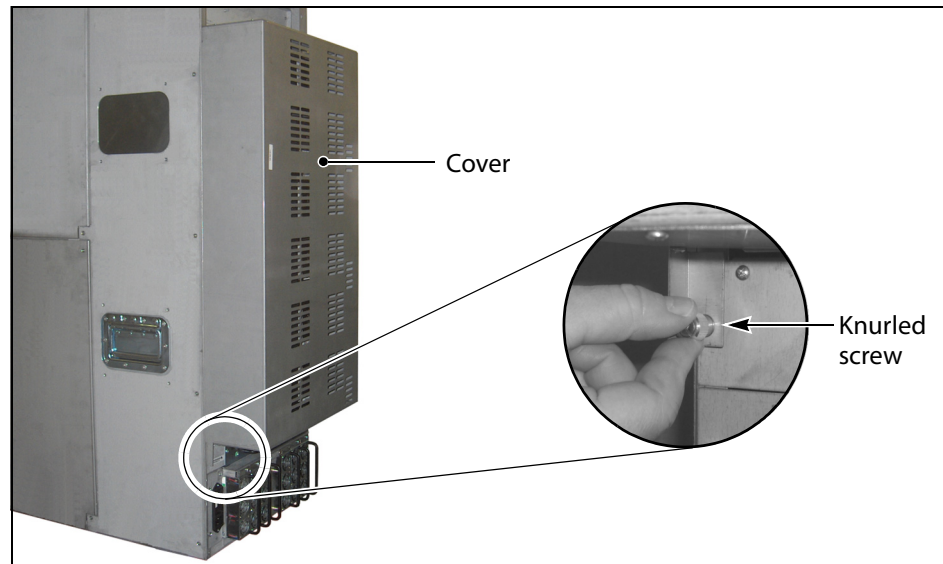


Figure 4 The rear panel cover and screws (T380 shown).

- Lift the cover upward and away from the chassis to disengage the two nuts extending from the back of the cover from the holes on either side of the chassis (see [Figure 5](#)). Set the cover aside.

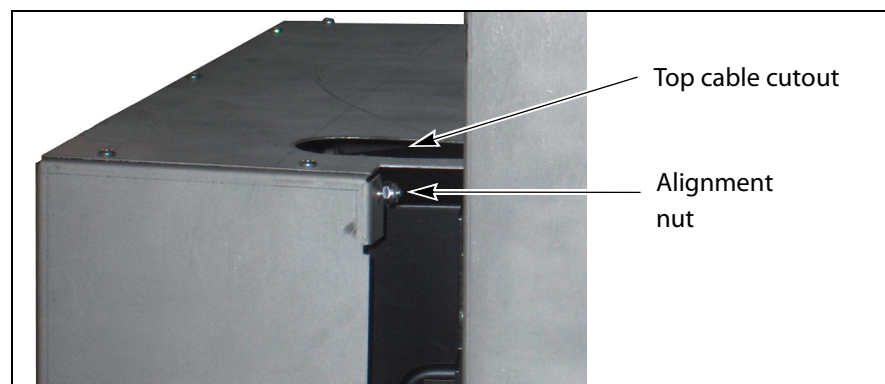


Figure 5 Cover alignment nuts (one on each side).

Spectra T680 The T680 is shipped and installed in a rack. Access the back of the rack and open the door ([Figure 6](#)).

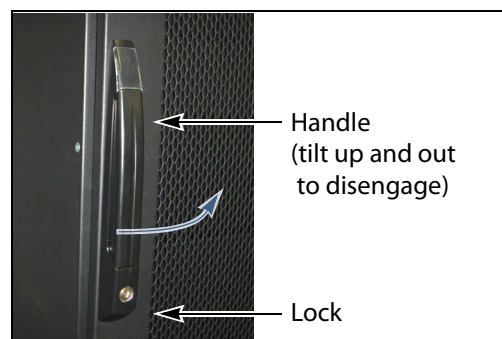


Figure 6 The T680 door handle.

Spectra T950 or T-Finity The drives are shielded by protective doors.

Note: Opening the library's rear doors causes the robotics to slow down. They resume normal speed when the doors are closed again. Operation of the rest of the library is unaffected by the opening and closing of the rear doors.

1. Locate the door lock on the back of the library.
2. Lift the lock and turn it either direction to disengage it and open the library doors.

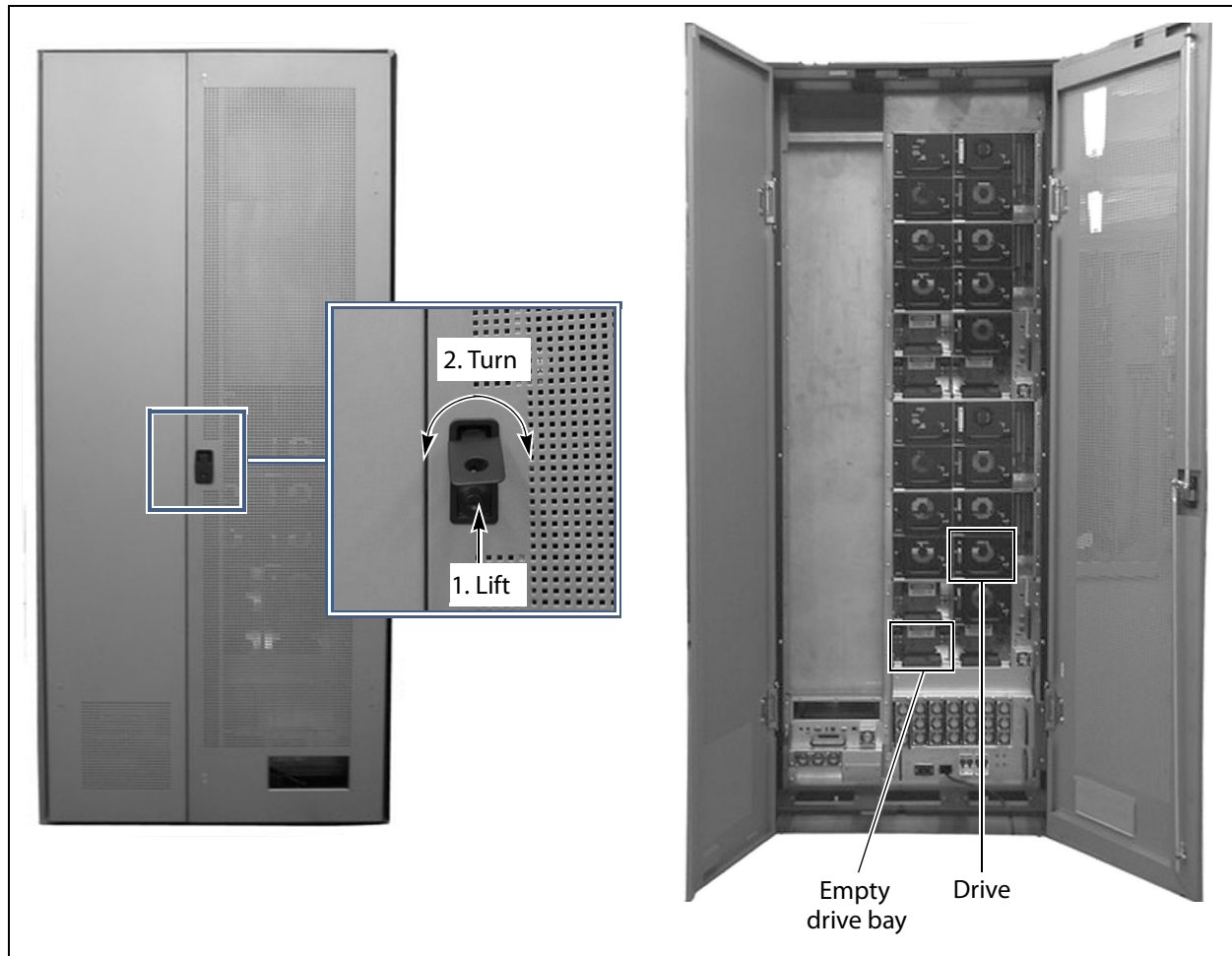


Figure 7 The back of the library (T950 shown).

Removing the Malfunctioning Drive

Locate the drive, as described in [Identify the Drive Location](#) on page 5.

Note: If you are installing an additional tape drive, skip to [Installing the Drive](#) on page 14.

Follow these steps to remove a drive:

1. Ensure that you have prepared the library in [Preparing the Library](#) on page 8.
2. Make sure that the Status LED (see [Figure 1](#) on page 5) is off, indicating that the drive is powered off.
3. If you are replacing a direct-attach drive, carefully disconnect any cables from the drive.

Important

Follow this precaution if your FC tape drive has the connectors on the side, as shown [Figure 8](#).

While sliding a Fibre Channel tape drive located in the left-most location into the library, ensure that you hold the Fibre Channel cable of the adjacent Fibre Channel tape drive out of the way to prevent damaging the cable.

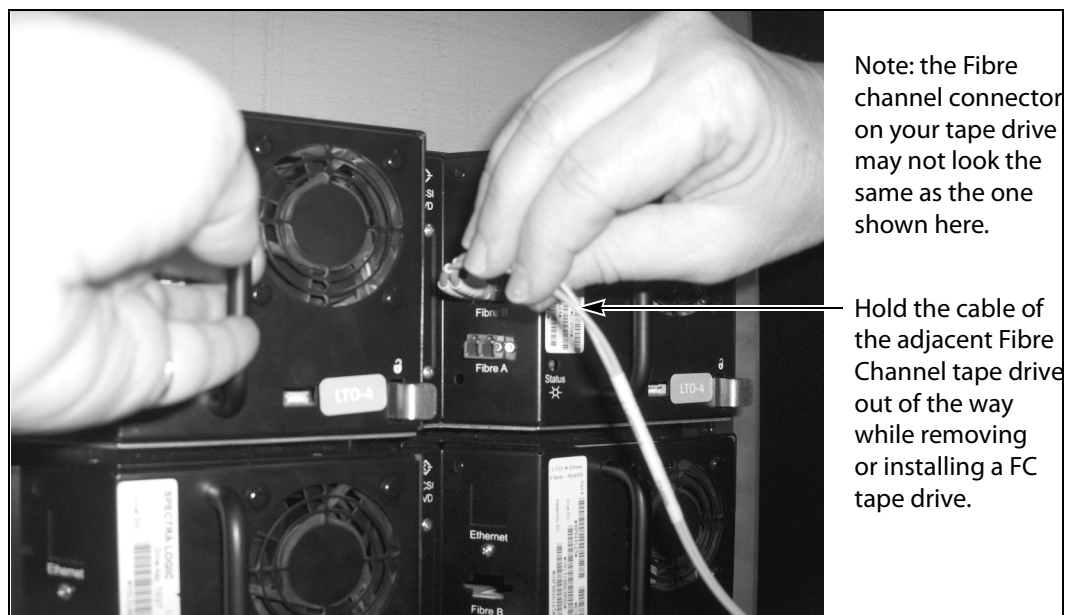


Figure 8 Releasing the drive lock.

- Notes:**
- Label the cables before you disconnect them so you can reconnect them to the same locations on the new drive.
 - Both the T950 and the T-Finity require a QIP for direct-attach drive configurations.
 - Your tape drive may look slightly different than the tape drives shown in this document.

4. Unlock the drive by pushing the drive lock inward.

Note: Depending on the type of drive, the drive lock may look different from the one shown in [Figure 9](#).

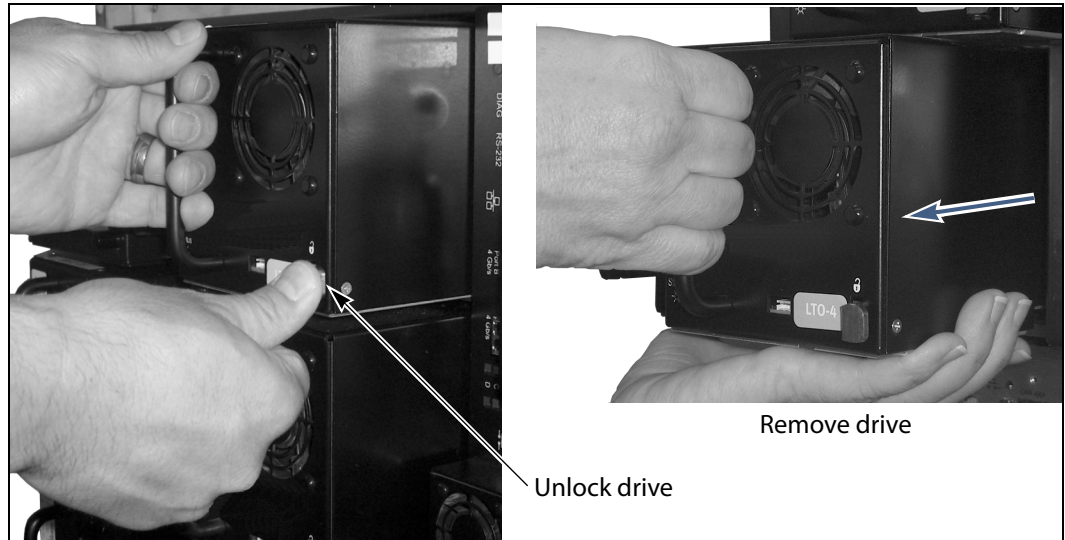


Figure 9 Releasing the drive lock and removing the drive.

5. While supporting the bottom of the drive sled, pull outward on the drive sled handle to remove the drive from the library ([Figure 9](#)).



Caution

- The drive sled weighs approximately 15 lb. (7 kg). Be careful not to drop it.
- When removing the drive, be careful not to damage or dislodge any cables connected to adjacent drives.

6. Set the drive aside for return to Spectra Logic. See [Return the Component](#) on page 22.

Installing the Drive

Follow the steps in this section to install a tape drive in your library.

Note: If you plan to use more than one “generation” of drive in the library (LTO-4 and LTO-5, for example), grouping each generation simplifies the configuration.

1. Refer to [Identify the Drive Location](#) on page 5 to determine where to install each drive.
 - If the library includes QIPs or bus expansion modules—a drive must be installed the same DBA as the QIP or bus expansion module that will connect it to the network (or SCSI bus).
 - If the library uses direct-attach Fibre Channel drives—installing the drives sequentially, beginning with the next available drive bay simplifies the configuration. For example, if drive 1 is in drive bay 1, install drive 2 in drive bay 2, and so forth. The T950 and T-Finity libraries do not allow direct-attach drive configurations.

2. Remove the drive from its protective packaging.

Important

If you are installing a replacement drive, install the new drive in the same location as the old drive.

3. While supporting the bottom of the drive sled, slide the new drive into the empty drive bay (Figure 11). Push the drive in until an audible click indicates that it has locked into place.

Important

Follow this precaution if your FC tape drive has the connectors on the side, as shown Figure 10.

While sliding a Fibre Channel tape drive located in the left-most location into the library, ensure that you hold the Fibre Channel cable of the adjacent Fibre Channel tape drive out of the way to prevent damaging the cable.

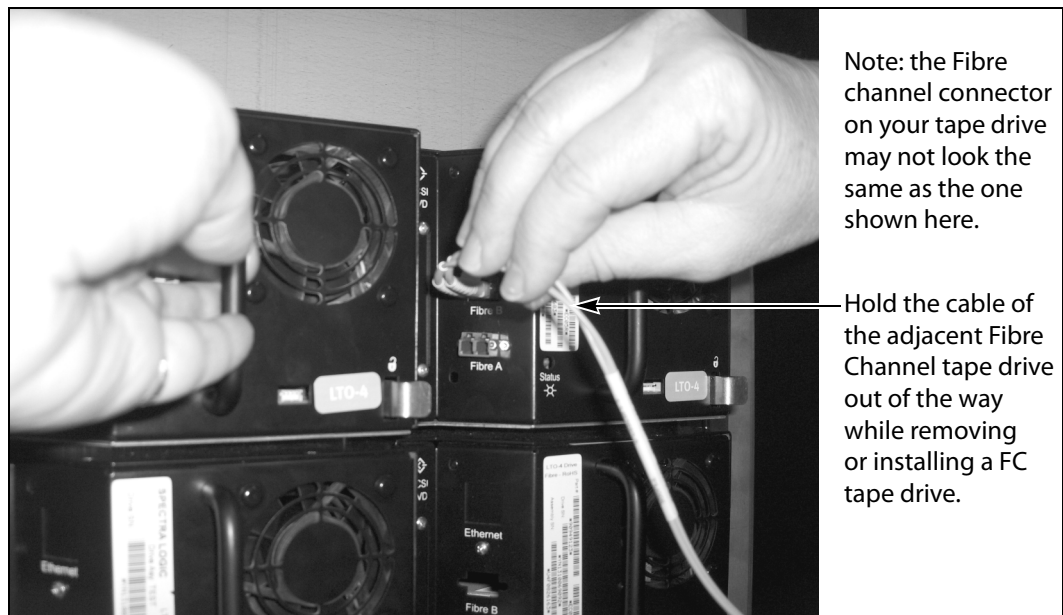


Figure 10 Installing a Fibre Channel drive.

Caution

The drive sled weighs approximately 15 lb. (7 kg). Be careful not to drop it. Be careful not to damage or dislodge any cables connected to adjacent drives.

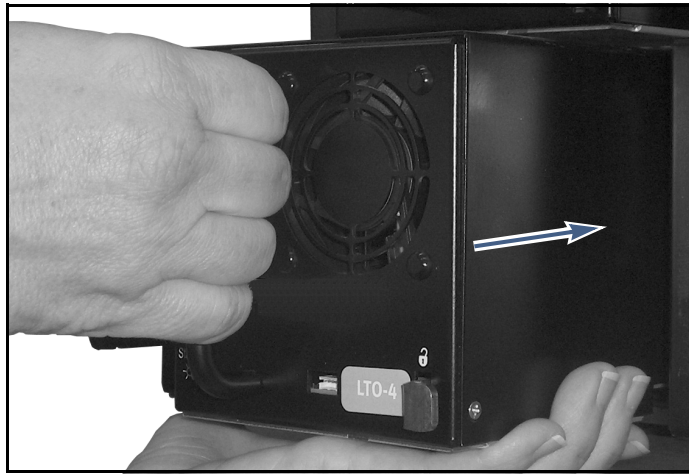


Figure 11 Installing the drive sled into the library.

- Notes:**
- Both the T950 and the T-Finity require a QIP for direct-attach drive configurations.
 - Your tape drive may look slightly different than the tape drives shown in this document.
- 4.** Return to the Feedback Required screen displayed on the user interface (see [Step 4 on page 10](#) for a replacement drive or [Step 5 on page 9](#) for a new drive) and select **OK**.

The process depends on whether you are installing a new drive or replacing a drive.

- **Replacement drive**—The library powers on the new drive and begins the process of configuring it. A window displays showing the progress.
- **New drive**—If you installed a new drive, you need to add the new drive to a partition before it can be used (see [Adding the Drive to a Partition on page 21](#)).

When the configuration is complete, the Drives screen refreshes to show the status of the newly installed drive.

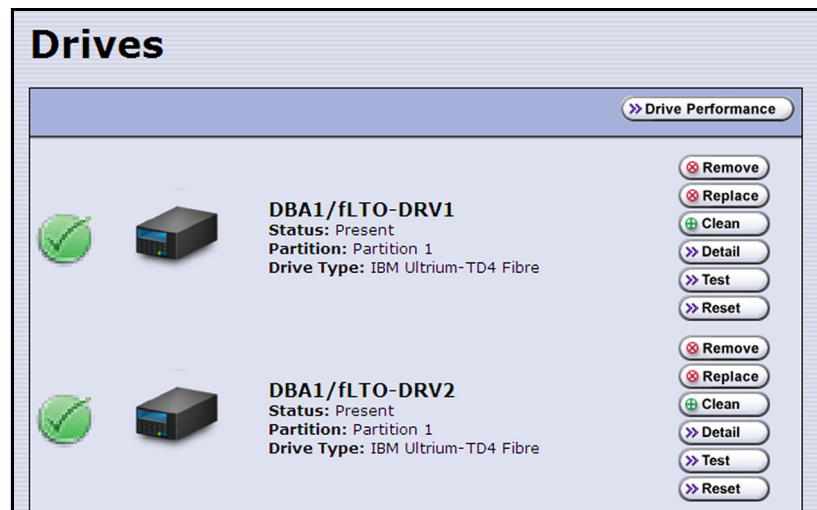


Figure 12 The Drives screen after adding a drive.

- Repeat [Step 2](#) through [Step 4](#) for each additional drive.

COMPLETE THE PROCEDURE

Follow the steps in this section to complete the installation or replacement procedure.

Connecting the Cables

Connect the cables according to the guidelines in this section.

If you...	Connect the cables...
Replaced a drive	to the same positions they were in on the old drive
Installed a new drive	according to your system's requirements

Daisy-Chain Direct-Attach SCSI Drives

This section provides an overview of daisy-chaining direct-attach SCSI drives.

- Notes:**
- If your library configuration does not use direct-attach SCSI drives or if you are not planning to daisy-chain multiple direct-attach SCSI drives on the same SCSI bus, proceed to [Testing the Drive](#) on page 21.
 - Both the T950 and the T-Finity require a QIP for direct-attach drive configurations.

Overview Drives can be daisy-chained together to add multiple drives to a partition. If your library configuration includes direct-attach SCSI drives and you plan to daisy-chain two or more drives in a DBA on a single SCSI bus, you must connect the drives and the bus expansion module before you begin configuring partitions. Read the individual *User Guides* to learn more about the bus expansion module and the role it plays in the library.

Note: Do not connect the bus expansion module to the host until after you finish configuring the partitions.

Single SCSI BUS Configuration Up to four drives in a single DBA can be daisy-chained on a single SCSI bus. Keep in mind that each drive increases the total length of the SCSI bus. Daisy chaining all four drives in a DBA results in an internal bus length of approximately 20 feet (6 meters), which must be subtracted from the maximum allowed length of 39 feet (12 meters) for an LVD SCSI bus.

Note: A maximum of 16 devices, including the four drives in a DBA, can be connected to a single wide LVD SCSI bus. Attaching more than two devices to a single SCSI bus can potentially have a negative impact on the performance of all devices on the bus.

Figure 13 illustrates daisy chaining all four drives in a DBA on a single SCSI bus and connecting them to one host.

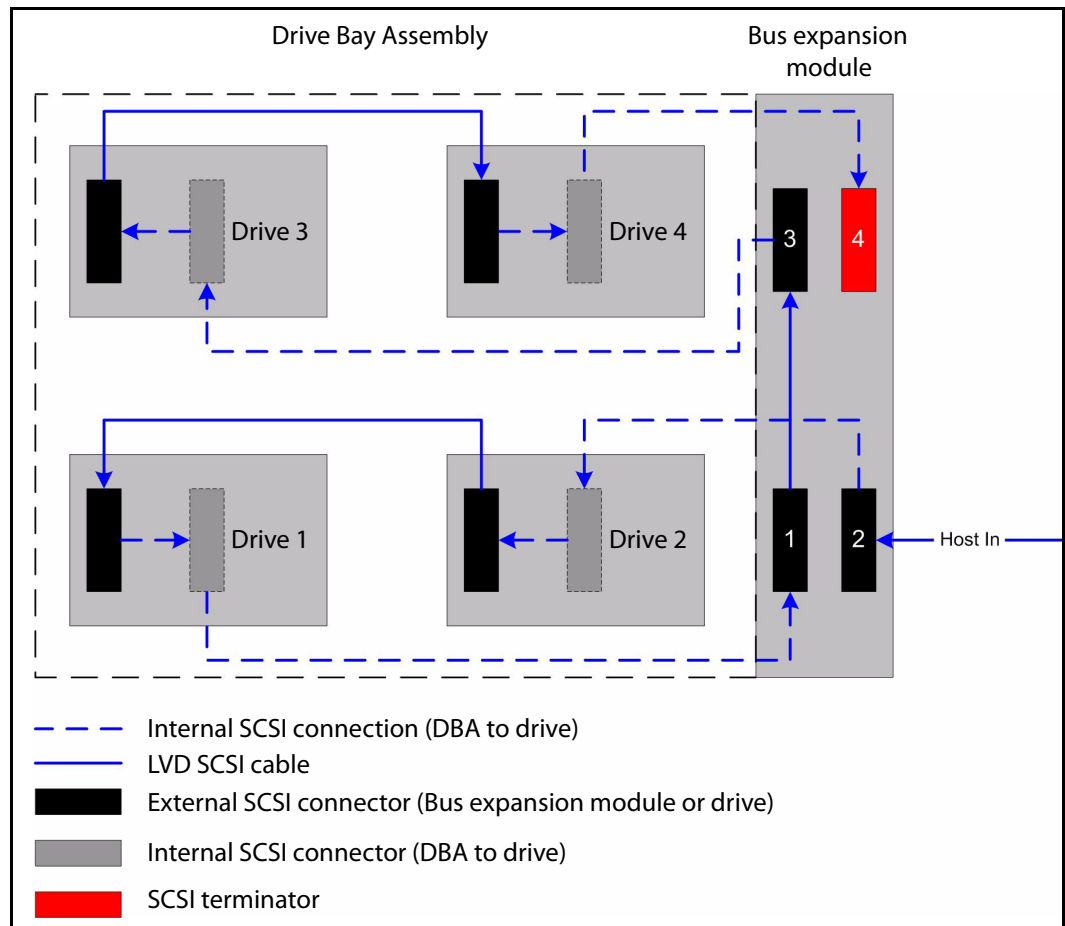


Figure 13 Daisy-chaining direct-attach SCSI drives in a DBA on a single SCSI bus.

Two SCSI Bus Configuration Figure 14 illustrates daisy chaining the four drives in a DBA on two separate SCSI buses and connecting them to two hosts. This type of cabling is used when multiple hosts will be sharing the library resources. The library is typically divided into partitions, as described in the library's User Guide. Each partition is dedicated to a different host.

Note: Always make sure that the SCSI bus is terminated by installing a terminator either on the drive or on the bus expansion module.

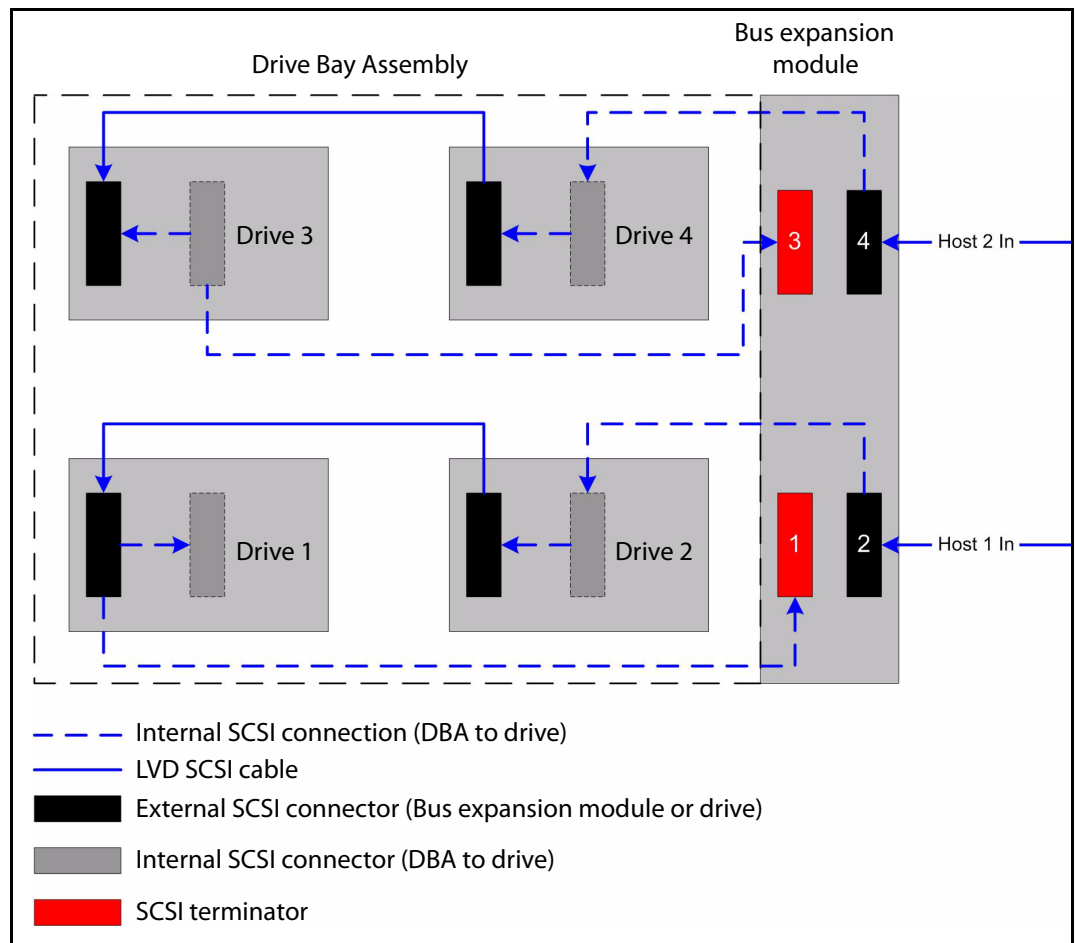


Figure 14 Daisy-chaining direct-attach SCSI drives in a DBA on two SCSI buses.

Connect the SCSI Cables

Determine which drives in the DBA you want to daisy-chain on the same SCSI bus, then follow these steps to connect the drives to each other:

1. Remove the SCSI terminator from each drive (see [Figure 15](#)).

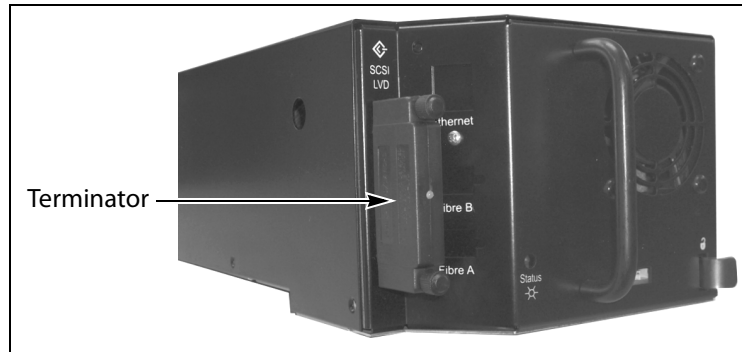


Figure 15 The SCSI terminator on a SCSI drive sled.

2. Refer to the cabling examples on [page 18](#) and [page 19](#), then use SCSI cables to connect the drives together, as appropriate for your desired configuration. Use the shortest possible cable that does not require making tight bends in the cable.
3. Install a SCSI terminator to the appropriate SCSI connector on the bus expansion module (refer to the cabling examples on [page 18](#) and [page 19](#)).

Connect the Fibre Channel Cables

This section only applies to LTO-3 and LTO-4 Fibre Channel drives.

1. Remove the protective plugs from the Fibre Channel port(s) on the drive.



Figure 16 Remove the Fibre Channel protective plugs.

2. Connect a fiber optic cable to Port A on the drive. If your drive has dual Fibre Channel ports, you can connect a second cable to Port B for fail-over. To use the second port for fail-over, refer to the individual *User Guides* for instructions and important information.

Testing the Drive

1. Power on and restart the host computer, if you powered it off.
2. Determine whether your backup software and drive are communicating properly.
 - a. Use the software to write several megabytes of data using the newly installed drive.
 - b. Perform a comparison check on the backup data to confirm that it was written correctly.

Installing the Cover or Securing the Rear Door

Spectra T200 or T380 Replace the protective cover after you complete the installation.

1. Lift the cover and align it so that the two nuts extending from the back of the cover fit into the corresponding holes on either side of the chassis (Figure 5). If the cables to the drives and QIPs installed in the library are routed from the:
 - top of the library, make sure that they fit into the cutout in the top of the cover.
 - bottom of the library, make sure that they fit into the cutout in the bottom of the cover.



Caution

Make sure that cables are not pinched between the cover and the chassis.

2. Using your fingers or a #2 Phillips screwdriver, tighten the two screws to secure the bottom of the cover to the chassis (see Figure 4 on page 11).

Spectra T680 Close and lock the protective door on the back of the library rack (see Figure 6 on page 11).

Spectra T950 or T-Finity Close and lock the protective doors on the back of the library (see Figure 7 on page 12).

Adding the Drive to a Partition

- **Replacement drive**—If you replaced a drive, the new drive is automatically added to the partition of the old drive.
- **New drive**—If you installed an additional (new) drive, you need to add it to a partition before you can begin using it for backup operations. Refer to the individual *User Guide* for instructions.

Restarting Backups

Use your backup software to restart any backup processes that had been running to the replaced drive. This restart ensures that the software recognizes the drive as working and available.

RETURN THE COMPONENT

Return Guidelines

Unless Spectra Logic Technical Support informs you otherwise, return the defective component to Spectra Logic following the guidelines in the next section. If Spectra Logic Technical Support informs you that the component does not need to be returned, dispose of it in a manner appropriate for your company guidelines.

Return Procedures

After you complete the replacement procedure, return the defective component using ALL the packaging that the replacement component arrived in (including any anti-static bags or foam inserts).



Caution

Severe damage can occur if the component is not packaged correctly, and you may be invoiced if it is received with damage due to improper or insufficient packaging.

Use the return label and instructions that were included with the replacement component when preparing to ship the replacement part. If you cannot locate these, contact Spectra Logic for another copy (see [Contacting Spectra Logic on page 2](#)). The return label and RMA printed on it are used to associate the returned part with your account. To avoid being invoiced for failure to return the part, do not ship the part back without the RMA return label.