9840 Tape Drive

Product Manual

STORAGETEK

9840 Tape Drive

Product Manual

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Summary of Changes

The following is a history and summary of changes for this publication:

EC	Date	Edition	Description
112225	04/99	First	Initial Release
53911	08/99	Second	See this edition for a description of changes.
111382	02/00	Third	See this edition for a description of changes.
111462	04/00	Fourth	See this edition for a description of changes.
111521	10/00	Fifth	See this edition for a description of changes.
111701	03/02	Sixth	Updated entire manual to reflect current 9840 EC levels. Reorganized Chapter 6, Menu System with updated menu trees and tables.

Contents

Figures

Tables

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Preface

This manual contains information about the 9840 Tape Drive operating with Fibre Channel or Small Computer System Interface (SCSI) interfaces. The installation chapter has instructions for the different 9840 client-server configurations.

This manual includes operation, installation, maintenance, and reference information.

■ Organization

The sections of this book contain the following information:

Chapter 1   "Introduction" provides a general description of the 9840 Tape Drive, its operating panel, and the host environments in which it operates. Use this chapter to become familiar with the product.

Chapter 2   "Safety and Handling" provides safety and handling information that you must be familiar with before attempting an installation or repair of the subsystem. Read this chapter before installing all or part of a 9840 Tape Drive.

Chapter 3   "Installation" gives detailed information on how to install the 9840 Tape Drive in several types of environments including libraries, Stand Alone Rack (SAR) installations, and desktop installations.

Chapter 4   "Getting Started" provides detailed instructions for the most common drive operations that you will perform.

Chapter 5   "Cartridge Scratch Loader" provides CSL maintenance procedures.

Chapter 6   "Menu System" gives detailed instructions for all operations that can be performed on the drive from the operator panel.

Chapter 7   "Error and Recovery" explains what action to take when there is a known error condition. Error conditions are usually indicated by the operator panel indicators and display.

Chapter 8   "Servicing the Drive" provides procedures to remove a jammed cartridge, clean the tape path, clean Fibre Channel components, and loop test the Fibre Channel ports.

Appendix A "Specifications" provides specifications on the tape drive and cartridge.

Glossary The Glossary defines new or special terms and abbreviations used in this publication.

Index The Index assists in locating information in this publication.

■ Comments and Suggestions

A Reader's Comment Form at the back of this publication lets you communicate suggestions or requests for change. StorageTek encourages and appreciates reader feedback.

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Alert messages call the reader's attention to information that is especially important or that has a unique relationship to the main text or graphic.

Note: A note provides additional information that is of special interest. A note might point out exceptions to rules or procedures. A note usually, but not always, follows the information to which it pertains.

CAUTION:
A caution informs the reader of conditions that might result in damage to hardware, corruption of data, corruption of application software, or long-term health problems in people. A caution always precedes the information to which it pertains.

WARNING:
A warning alerts the reader to conditions that might result in injury or death. A warning always precedes the information to which it pertains.

■ Related Publications

The following publications contain additional information on the 9840 Tape Drive or its configurations.

Publication	Part Number
9840 Tape Drive General Information Manual (GIM)	MT 4004
TimberWolf 9738 Library Product Manual	95836

■ Conventions

Typographical conventions highlight special words, phrases, and actions used in this publication.

Item	Example	Description
Button	Menu	**Helvetica** font, and capitalization follows product label.
Emphasized text	*not* or *must*	Important or emphasized words and phrases appear in italics.
Filenames	`dictionary.txt`	`Courier` font.
Hypertext links	Figure 2-1	Appear in blue text.
Indicators/ LEDs	*power*	Italic, **Helvetica** font, and capitalization follows product label.
Keyboard keys	[Y], [Enter] or [Ctrl+Alt+Delete]	Appear within brackets, in **Helvetica** font, with initial capital letters or as the key appears on the keyboard.
Screen captures or messages	`downloading`	`Courier` font.
Parameters or input	Device = *xx*	Variables that require values assigned appear in italics.
Pathnames	`P:\Printshp\Pubs` or `home/gandalf/litdist`	`Courier` font.
Positions for switches, jumpers, and circuit breakers	ON	Appear in default font and all capital letters.
URLs	www.stortek.com	Universal Resource Locator (URL) links appear in blue text.

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この装置は、クラスＡ情報技術装置です。この装置を
家庭環境で使用すると電波妨害を引き起こすことがあり
ます。この場合には使用者が適切な対策を講ずるよう要
求されることがあります。　　　　　　　　VCCI-A

English translation: This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may occur, in which case, the user may be required to take corrective actions.

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情況下，使用者會被要求採取某些適當的對策

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Introduction

This chapter provides an overview of the 9840 Tape Drive. It contains:

■ Overview

The 9840 Tape Drive is a small, modular, high performance tape drive. It is 82.6 mm (3.25 in.) high, 146 mm (5.75 in.) wide, and 381 mm (15 in.) deep. Actual installed configuration requires additional space.

Figure 1-1. 9840 Tape Drive

C53970
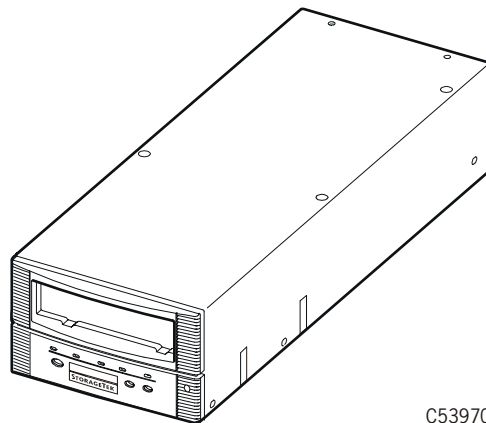
In the client-server environment, it is available in the following configurations:

- Desktop (manual load)
- Rack-mountable (single or dual manual load)
- Desktop Cartridge Scratch Loader (CSL)
- Rack-mountable CSL
- Automated library configuration

Host Interfaces

The 9840 Tape Drive interfaces with Fibre Channel and SCSI hosts. The drive ships with a factory installed interface card that is *not* to be changed in the field or at customer sites.

- The Fibre-Channel (FC) configuration of the 9840 Tape Drive has dual fiber-optic ports to allow for point-to-point, arbitrated-loop (including redundant-loop), and fabric topology. The FC interface for the 9840 Tape Drive uses Fibre Channel protocol for SCSI (FCP-2).

- The SCSI interface card (ASIA—Application Specific Interface Adapter) has only one port. The card can be programmed to different interface specifications in the field from the drive operator panel.

Configurations

The drive is usually a component in a subsystem assembly that consists of the drive, a power supply, and enclosures or trays, depending on the installation environment. Refer to Table 1-1 for specific 9840 Tape Drive configurations and interfaces.

Table 1-1. Configurations and Interfaces

Configuration	Example	Fibre Channel	SCSI
9840 Tape Drive Desktop	Figure 1-2 on page 1-3	✓	✓
9840 Tape Drive Rack-mountable Tray*	Figure 1-3 on page 1-3	✓	✓
9840 Tape Drive Desktop CSL	Figure 1-5 on page 1-4	✓	✓
9840 Tape Drive Rack-mountable CSLs*	Figure 1-6 on page 1-5	✓	✓
9738 Library	Figure 1-8 on page 1-6	✓	✓

*Rack-mountable Drive and CSL trays may be intermixed within a single rack cabinet.

Depending on the installation, the drive and power supply may be separated or combined in an assembly. The FRUs (drive and power supply) may be attached to a tray or installed within an enclosure.

■ Desktop Unit

The 9840 Tape Drive desktop unit (Figure 1-2) is a manual-load single drive, with power supply, housed in a desktop cabinet.

Figure 1-2. 9840 Tape Drive Desktop Unit

C53303
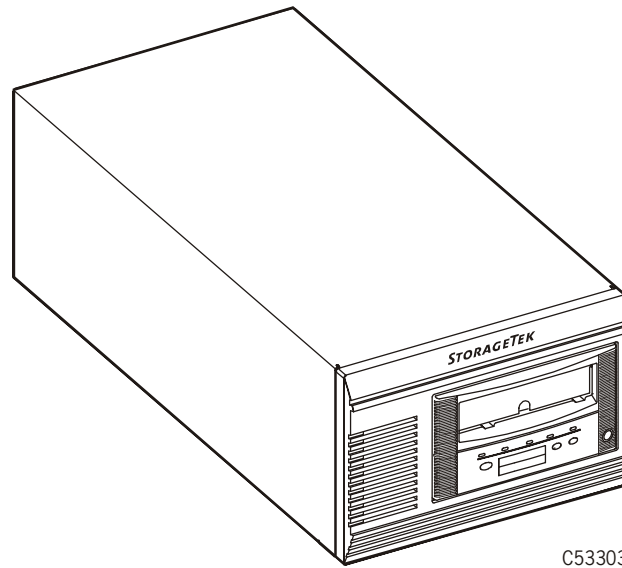
■ Rack-mountable Drive Tray

The 9840 Tape Drive is also available in rack-mountable trays. Each tray (Figure 1-3) can house a single manual-load drive or two manual-load drives, plus a power supply for each drive. Any combination of trays can be used to fill the rack cabinet slots. A different interface could be used for each tray.

Figure 1-3. 9840 Tape Drive Rack-mountable Tray

C53969
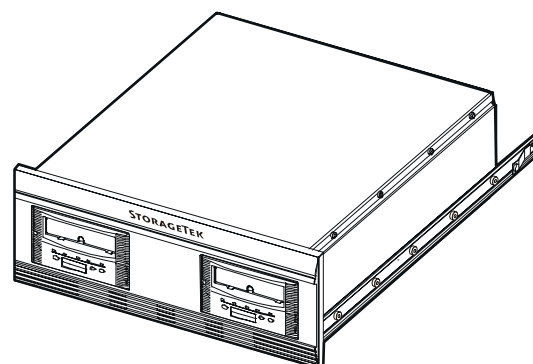
The StorageTek RACK001 cabinet (Figure 1-4) holds up to six trays. Any combination of trays can be used to fill the rack cabinet slots.

Figure 1-4. StorageTek RACK001 Cabinet with Drive Trays
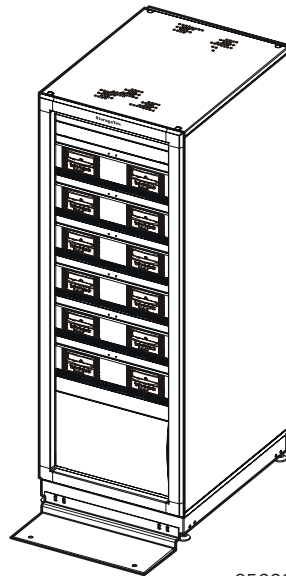
C53305

■ CSL Desktop Unit

The CSL desktop unit (Figure 1-5) consists of a 9840 Tape Drive, a power supply, and a scratch loader mechanism. The CSL mechanism is an electromechanical device that can load and unload up to seven cartridge tapes. It also has a feed channel to mount a priority cartridge into the tape drive.

The desktop CSL is stackable up to a height of two units. Protective feet are installed on the bottom of the unit to allow for stability.

Figure 1-5. Desktop CSL Unit
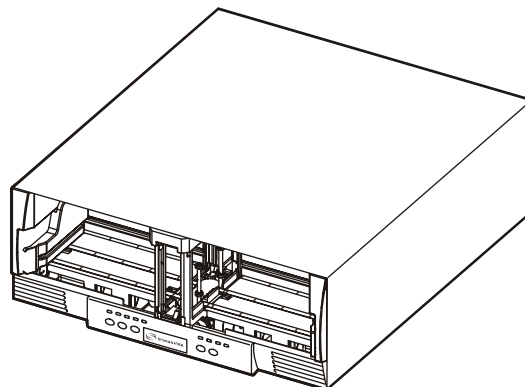
C53971

■ Rack-mountable CSL

The CSL is also available in a 19 inch tray (Figure 1-6) that can be mounted into a rack cabinet.

Figure 1-6. CSL Rack-mountable Tray
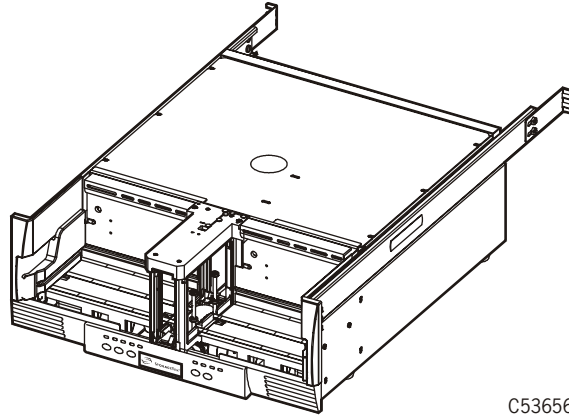
C53656

Up to six CSL trays may be installed within the StorageTek RACK001 (Figure 1-7), or intermixed with drive trays.

Figure 1-7. StorageTek RACK001 with CSL Trays
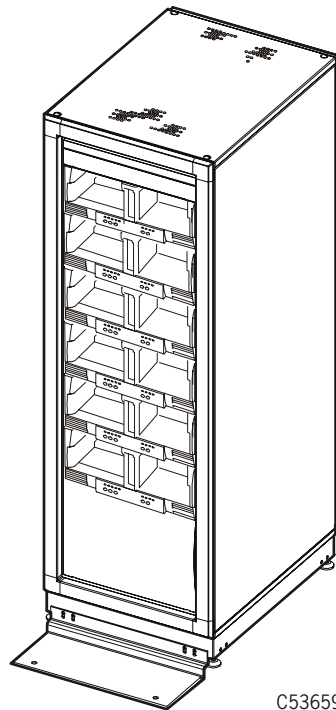
C53659

■ 9840 Tape Drive in 9738 Library

Figure 1-8 shows the 9840 Tape Drive used in a 9738 Library. It is mounted to a tray for easy installation into the library. The 9840 Tape Drive when installed in the 9738 Library uses a Fibre Channel or SCSI interface.

Figure 1-8. 9840 Tape Drive Assembly for the 9738 Library
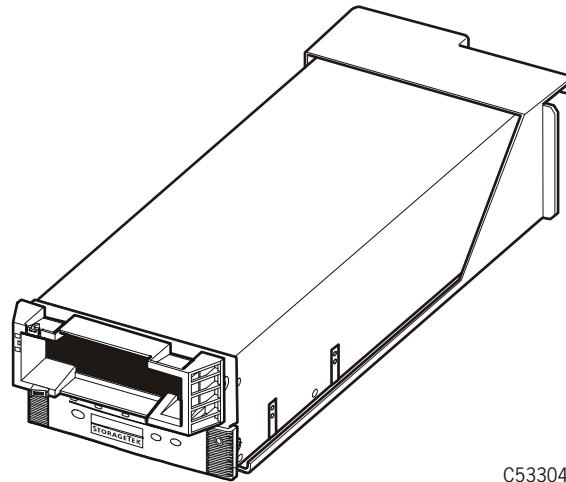
C53304

Figure 1-9 shows the front of the 9738 Library and its features.

Figure 1-9. 9738 Library
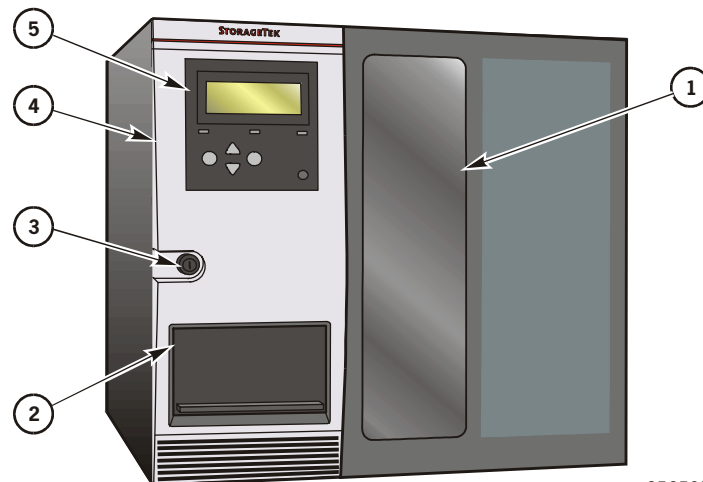
C53505

1. Viewing Window
2. Cartridge Access Port (CAP)
3. Key Lock
4. Front Door
5. Operator Panel

■ Operator Panels

This section describes the operator panel switches, indicators, and the operator panel display for the 9840 Tape Drive. There are two operator panels (Figure 1-10) for the 9840 Tape Drive. They are:

Either operator panel enables you to view the configuration of the 9840 Tape Drive, and notifies you when further support is required.

Note: The 9840 Tape Drive and use small push-button switches. The term switch or switches is used to identify them throughout this manual.

Figure 1-10. 9840 Tape Drive Operator Panels
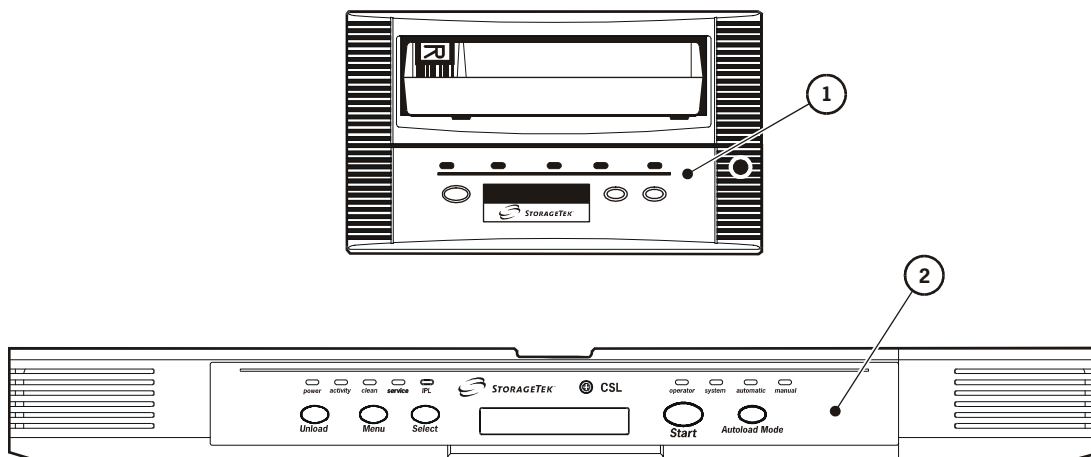
C53673

1. Standard Operator Panel
2. CSL Operator Panel

Standard Operator Panel

The standard operator panel (Figure 1-11) has a 10-digit display, four pushbutton switches (switches), and four indicators.

Refer to Table 1-2 on page 1-9 for explanation of the standard operator panel switches and Table 1-3 on page 1-11 for the use of the indicators.

Figure 1-11. Standard Operator Panel Switches
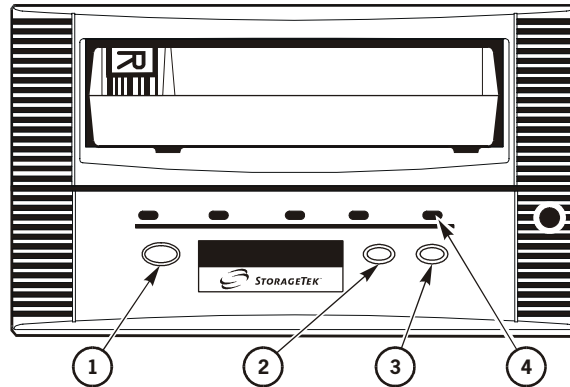
C53675

1. Unload
2. Menu
3. Select
4. IPL

Standard Operator Panel Switches

Table 1-2 provides control descriptions of the 9840 Tape Drive operator panel switches.

Table 1-2. Operator Panel Switches

Control Name	Control Description
Unload	This switch is used to rewind and unload the tape cartridge, ending with the tape cartridge ejected and retrievable.
	If **Unload** is pressed *during* a write operation, the drive attempts to write the remaining data before it unloads. A display of `UnWr xxxx` (meaning Unwritten Data, where *xxxx* is a fault symptom code) means that the attempt failed and some data remains unwritten to tape.
	Pressing **Unload** switch again will cause loss of this data. For the host to save the unwritten data, the operator must issue the following command sequence before pressing **Unload** again:
	• In the SCSI environment: `Recover Buffer Data` • In the Fibre Channel environment: `Recover Buffer Data`
Menu	This switch is used to enter and exit the menu system and during navigation of submenus. The menu system allows you to reconfigure the drive or do special operations.
	When in normal operation mode, pressing this switch will take you to the Online/Offline top menu. To make changes in drive configurations or do special operations, the drive must be offline, but if you only want to view drive configurations, it may remain online. Use the **Select** switch to change modes.
	When in a main menu, with the drive offline, pressing **Menu** will step you through the other main menus, bypassing the submenus (to enter submenus, see **Select** Switch).
	When in a submenu, pressing **Menu** will step you through the other submenus or through different sections in a submenu.
	The most important main menu selections are: • Offline/online state • Drive configuration choices • Special drive operations • Main exit
	Detailed instructions are included in this manual where needed.

Table 1-2. Operator Panel Switches (Continued)

Control Name	Control Description
Select	When in a main configuration menu, pressing this switch will select one of the direct configuration/action choices in the main menu itself, or select the underlying submenus, depending on the structure of the main menu.
	When in a Offline configuration submenu, pressing this switch will select one of the direct configuration/action choices in the submenu.
	When in Online, view only, configuration submenus, pressing **Select** is same as pressing **Menu**.
	Detailed instructions are included in this manual where needed.
IPL	Pressing this indented switch causes the Initial Program Load (IPL) to execute. This is identical to the IPL that takes place automatically after power on sequencing is complete. Press **IPL** when necessary to reset the drive. `IPL Pend` (IPL Pending) is displayed for one second when this switch is pressed.
	During IPL, the following are normally displayed in sequence:
	• `LOAD XXXX` (*XXXX* = SCSI or FBCN) • `LOAD CC` (load common controller code) • `LOAD SERVO` (load servo code) • `Start Init` (start initialization) • (A corporate ID, indicating drive IPLed and is operational)
	During IPL, the following errors can be displayed:
	• `Memory Err` • `Boot Fail`
	Note: See Table 7-2 on page 7-3 for instructions on how to handle error conditions or for an explanation of any additional display.
	Following a successful IPL, display may alternate between an asterisk (*) and *xxxx*`:Dmp`*yy* where: *xxxx* = fault symptom code (FSC), and *yy* = number of uncollected dumps in the EEPROM.
	Flashing stops and messages are removed when any tape is inserted or any control is pressed.
	Optionally, insert dump-formatted tape to collect dump data to tape.

Standard Operator Panel Indicators

The operator panel indicators (Figure 1-12) can convey more information than described below. For additional information, see Chapter 7, "Error and Recovery."

Figure 1-12. Standard Operator Panel Indicators

C53674
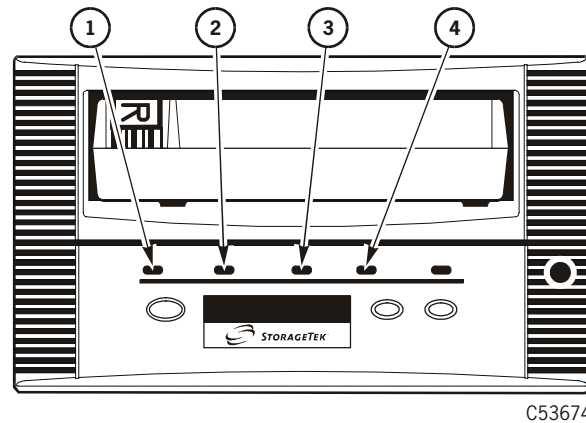
1. *power*
2. *activity*
3. *clean*
4. *service*

Table 1-3 provides a detailed explanation of the 9840 Tape Drive operator panel indicators.

Table 1-3. Operator Panel Indicators

Indicator Name	Indication	Explanation
power (green)	Off:	Power is off.
	Flashing:	Unit is powering up, performing IPL, or collecting dump.
	Flashing doesn't stop:	IPL failed.
	On (steady):	Power applied and IPL complete.
activity (green)	Off:	Tape cartridge not loaded.
	Flashing:	Tape cartridge loaded and tape is moving.
	On (steady):	Tape cartridge loaded and tape is stopped.

Table 1-3. Operator Panel Indicators (Continued)

Indicator Name	Indication	Explanation
clean (amber)	On (steady):	Drive requires cleaning because of:
		1. Distance, when a firmware defined length of tape has passed over the R/W heads.
		2. Error, after a read/write perm and at least half the firmware defined length of tape has passed over the R/W heads.
service (red)	Off:	No error was detected.
	Flashing:	An error/s detected and dump data is being collected to the EEPROM.
		If within one minute the drive detects the same FSC, the message DumpAgain? is displayed: see "DumpAgain? Indication" on page 7-12 for instructions.
	On (steady):	A hardware error was detected and drive is not functional. A constant indicator cannot be ignored by the operator. If a manually initiated IPL doesn't eliminate problem, the drive should be replaced.

CSL Operator Panel

The CSL operator panel (Figure 1-13) allows a human interface to the subsystem. When the 9840 Tape Drive is installed in a CSL, the 9840 Tape Drive front operator panel switches and indicators are replicated on the left side of the CSL front panel.

Note: See "Standard Operator Panel" on page 1-8 for tape drive specific switch usage and indicator information.

The right side of the CSL front panel contains the switches and indicators specifically for the CSL operation.

Note: See Chapter 5, "Cartridge Scratch Loader," for CSL specific switch usage and indicator information.

Figure 1-13. CSL Operator Panel
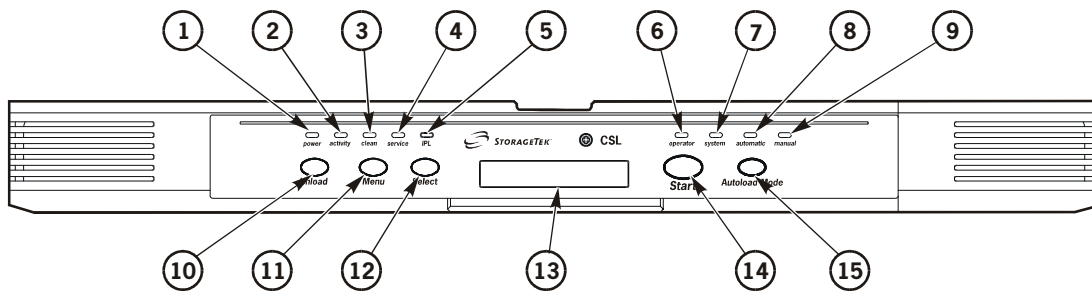
C53660

1. *power* indicator
2. *activity* indicator
3. *clean* indicator
4. *service* indicator
5. IPL switch
6. *operator* indicator
7. *system* indicator
8. *automatic* indicator

9. *manual* indicator
10. Unload switch
11. Menu switch
12. Select switch
13. Operator display
14. Start switch
15. Autoload Mode switch

Note: The IPL switch (5) initiates IPL for the drive only. The Power switch on the back of the CSL initiates IPL for the CSL and the drive.

Display

The operator panel has an alphanumeric display that indicates:

- Drive status
- Menu selections and configuration choices
- Error messages and fault symptom codes
- Host-generated messages
- Tape bar, if activated

The display is formed by a horizontal array of 10 segments. Each segment is formed by an array of 35 dots—five wide and seven high. When the tape bar is not activated, the lighted segments and dots form text messages. The text messages may display steadily, flashing, or alternating with other messages.

Tape Bar

The tape bar uses the operator panel display to show the amount of tape that has been written and read (). The tape bar is a configuration option that must be activated by authorized service personnel. Once activated, it appears on the operator panel display when the drive is reading or writing.

When the tape bar is activated, the segments and dots simultaneously show the percentage of the total tape length that has been written and read. Each dot represents 2% of the tape length; each segment represents 10%.

Note: The tape bar gets its information from the media information region (MIR) on the tape. The MIR is written to the tape when the tape is unloaded. If the MIR is bad, the tape bar does not display. To rewrite the MIR, see (TBD).

Write Bar

As data is written to tape, the lighted dots forming the write bar appear at the left side of the display and advance to the right. The write bar uses the full height of the display. As the dots fill the display, note that only every other dot is lighted. The point where the write bar ends is the percentage of tape written.

Read Bar

As data is read from the tape, the read bar appears in the center of the write bar as a single row of unlighted dots. This row is bordered above and below by single rows of lighted dots. The read bar also begins at the left side of the display and advances to the right. The point where the read bar ends is the percentage of tape that has been read.

Figure 1-14. Tape Write/Read Bar Chart
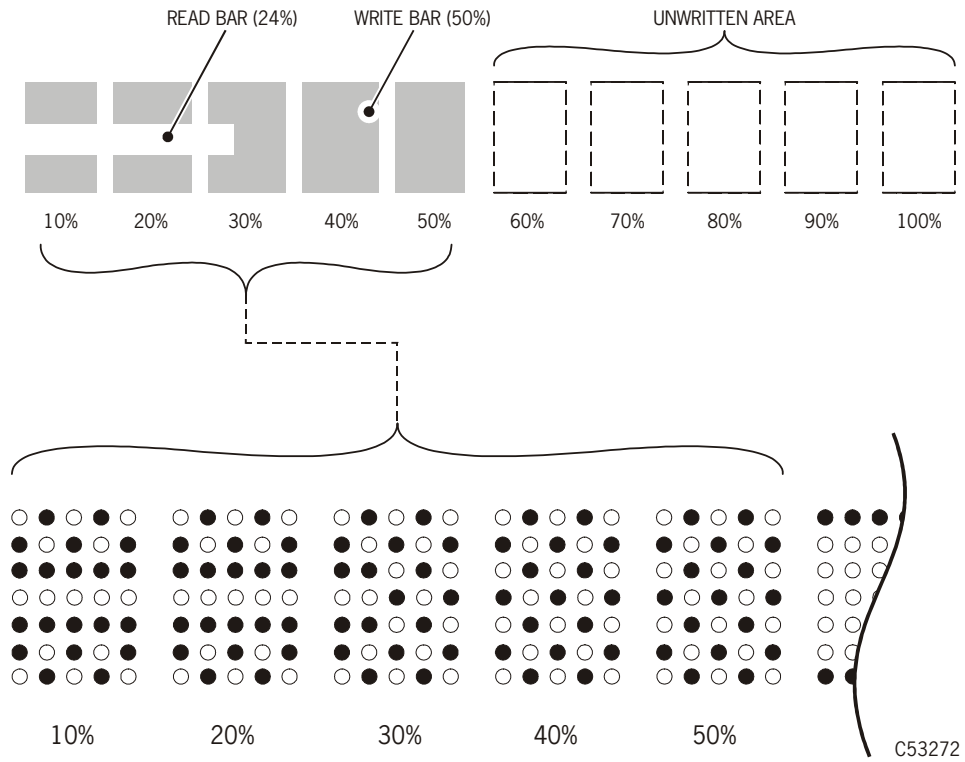
■ Cartridges

Currently, there are two types of 9840 tape cartridges (Figure 1-15 on page 1-17). Customers may purchase the standard and the VolSafe cartridge.

- The standard cartridge uses *white* labels and can be write protected. If not write protected, data can be written over. Refer to Table 1-4.

- The VolSafe cartridge uses *yellow* labels and *cannot* be written over. Data can *only* be appended to the information on the cartridge. Refer to Table 1-4.

The cartridges have one supply and one take-up reel. The design allows for mid-point loading and provides an average access-to-data time of 11 seconds. The dual-hub architecture yields a load/initialize time of 4 seconds.

The 9840 Tape Drive cartridges have the same dimensions as the 18- and 36-track tape drive cartridges. This allows mixing of cartridges within existing libraries.

Note: See Cartridge Specifications in Appendix A, "Specifications," for more specific information.

Do not use a VolSafe tape to make a dump, code, data tape, or to build an MIR. A "Write Prot" message displays if a VolSafe tape is used.

Table 1-4 shows the similarities of the standard and VolSafe cartridges.

Table 1-4. Standard and VolSafe Cartridges

Feature	Standard	VolSafe
1. Manufacturer Label Area	White	Yellow
2. Customer Label Area	White	White
3. Access Door	Same	Same
4. Write Protect Switch	White	Yellow
5. Finger Grips	Same	Same
6. Volser Label Area	Same	Same
7. Media ID (human or barcode identifiable)	White	Yellow
8. Media ID (machine identifiable)	Flush dimples (all four)	First dimple recessed
9. Manufacturer Part ID	White	White

9840 Tape Cartridge

Figure 1-15 provides specific features of the 9840 tape cartridge.

Figure 1-15. 9840 Tape Cartridge
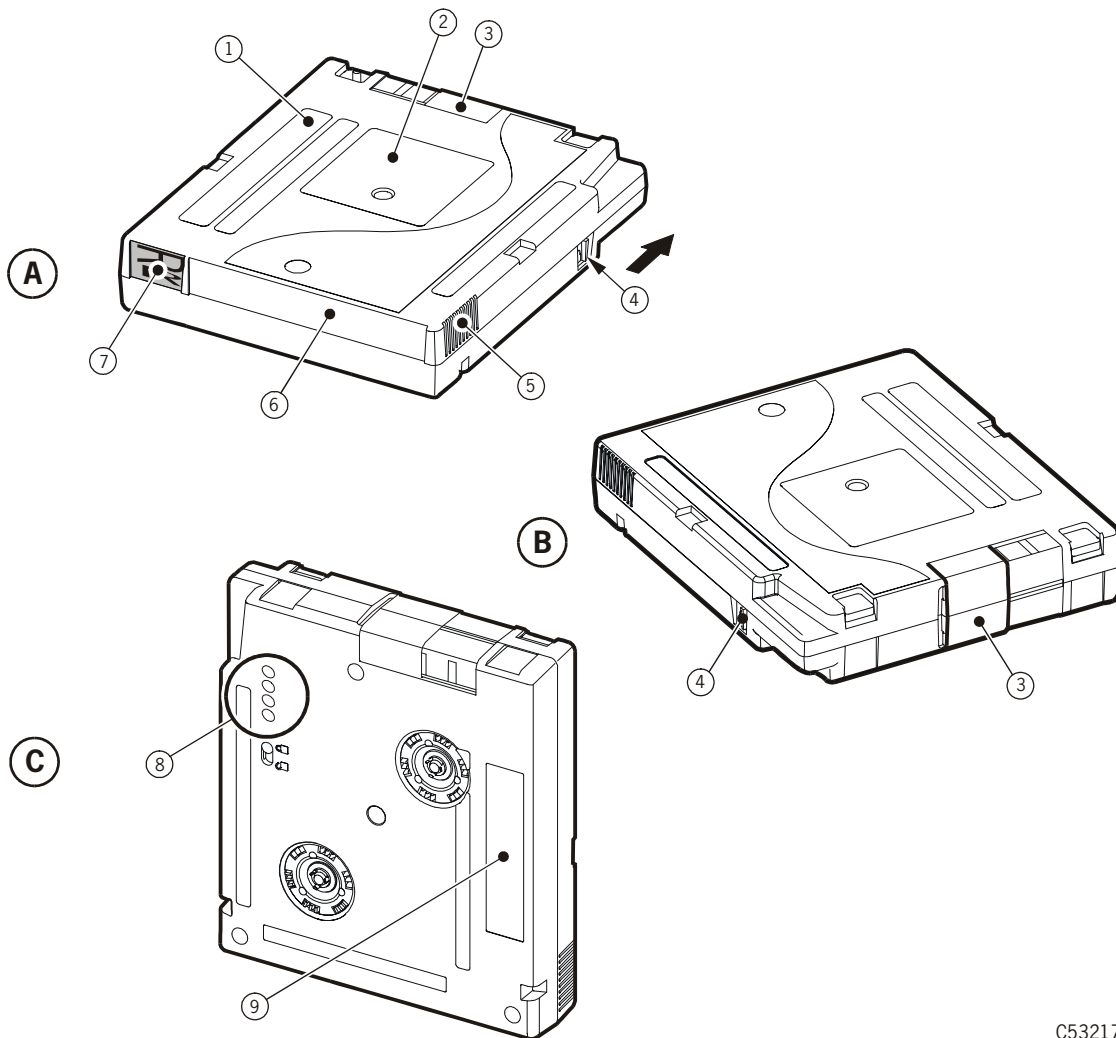
C53217

Components of the 9840 Tape Cartridge

A. Rear view
B. Front view
C. Bottom view

1. Manufacturer label (Std - White, VolSafe - Yellow)
2. Customer label
3. Access door
4. Write-protect switch (Std - White, VolSafe - Yellow)
5. Finger grips
6. VOLSER label
7. Media ID (Std - White, VolSafe - Yellow)
    (human or barcode readable)
8. Media ID (machine readable)
    (First dimple recessed on VolSafe)
9. Manufacturer Part ID

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Sixth Edition

Safety and Handling

<div style="float:right">2</div>

This chapter covers topics that are *essential to all installation and service activity*:

- "Safety Precautions"
- "Electrostatic Discharge (ESD) Damage Prevention" on page 2-3
- "Fiber Optic Safety" on page 2-5

Read the following pages and become familiar with these guidelines *before beginning any service activity.*

■ Safety Precautions

CAUTION:
***Potential injury:* On-the-job safety is very important; therefore, observe the following safety precautions while you are engaging in any maintenance activity. Failing to follow these precautions could result in serious injury.**

Remove all conductive jewelry, such as watches and rings, before you service powered-on equipment.

- Avoid electrical shock. Be careful when you work near power connectors and supplies.

- Power off the equipment that is being serviced before you remove a field replaceable unit (FRU) or other component. Remember that dangerous voltages could still be present in some areas even though power is off.

- Ground all test equipment and power tools.

- Lift objects properly; read the information in "Lifting Techniques" (see below).

- Do not remove, cut, or relocate any floor tiles indiscriminately. Before you manipulate floor tiles, be sure that you understand the customer's environment and receive the customer's approval. Remember, each situation is different.

- Enforce good housekeeping practices in the equipment area to help prevent accidents or fire.

Note: Important things to investigate and to be aware of include the use of Halon® gas, under-the-floor smoke detectors, and cables to other equipment nearby.

Lifting Techniques

Lifting, regardless of how much or how little, can create serious back stress. If you follow these guidelines, you can reduce the risk of back injury:

- Do not twist your body to pick something up or put it down. Twisting puts extreme pressure on your back, especially when you lift or carry objects. Instead of twisting, make the task two separate moves; first, lift, and then use your feet to turn your body.

- Plan the lift: first examine the object and then determine how it will be lifted and where it will be placed.

- Choose the appropriate lifting technique. Examine the weight, size, location, frequency, and direction of the lift. Plan to avoid awkward postures, and determine if material-handling aids are needed.

- Place your feet shoulder-width apart, and place one foot a little behind the other. Keep your back straight because even light loads can significantly increase pressure on the spine when you lean forward.

- Whenever you can, grip the load with your whole hand, and use two hands.

- Carry objects at elbow height and close to your body. The farther away you hold an object, the more force it puts on your lower back.

- Lift with your legs instead of your back. Leg muscles are some of the strongest in your body. When you squat and lift with your legs, you can lift more weight safely.

- Alternate lifting tasks with tasks that are less stressful to the same muscles. This technique ensures that your muscles have some recovery time.

Shoulder, Elbow, Wrist, and Hand Safety

Follow these guidelines to minimize the possibility of injury to your shoulders, elbows, wrists, and hands.

- Work within your safety zone–the area between shoulder level and knuckle level of your lowered hands. You face less chance of injury when you work or lift in this area.

- Keep your elbows bent to keep loads close to your body and to decrease the amount of force necessary to do the job. If you use this posture, you will put less weight and pressure on your shoulder.

- Be sure to keep your wrists straight. Avoid bending, extending, or twisting your wrists for long periods of time.

- Do not use a pinch grip to lift large or heavy loads because the way you lift also can affect the tendons in your hand. When you grasp an object between your thumb and fingers, you put a lot of tension on hand and wrist tendons. Use both hands–use one for a while, and then use the other–to give them rest.

■ Electrostatic Discharge (ESD) Damage Prevention

Anyone who handles ESD-sensitive components must be aware of the damage that ESD can cause to electronic components and must take the proper precautions to prevent it. Also, anyone who performs maintenance on StorageTek equipment must complete an ESD-basics course.

CAUTION:
***Potential damage to equipment:* Handle ESD-sensitive components *only* under ESD-protected conditions. To meet this requirement, always use a grounding kit and always follow these ESD precautions and procedures when you are servicing equipment or handling ESD-sensitive components.**

ESD Precautions

Always take the following general precautions when you work with ESD-sensitive components:

- Wear ESD protection whenever you install, remove, maintain, or repair equipment.

- Keep ESD-sensitive printed-circuit components in their ESD-protective packages until you have taken all ESD-preventive steps and you are ready to install the component.

- Do not allow anyone to touch or handle an unprotected ESD-sensitive component unless that person has taken all ESD precautions.

- Reinstall all equipment covers and close all equipment doors after you have completed the work.

- If the grounding-kit work surface has been exposed to temperatures above 66ºC (150ºF) or below 4.5ºC (40ºF), acclimate the work surface to room temperature before you unroll it.

- Immediately place any component that you have removed into an ESD-protective package.

- Keep the grounding-kit work surface clean.

- To clean the work surface, use a mild detergent and water, and make sure that the surface is completely dry before you use it.

- Periodically check the electrical resistance of the ground cord and the wrist-strap coil cord.

  Note: The ground cord should measure less than 1.2 MΩ, and the coil cord should measure between 0.8 and 1.2 MΩ. Repair or replace the cords if they no longer meet these requirements.

ESD-Protection Procedure

Remember that each customer environment is different. Address all the customer's concerns before you work on any equipment.

Prepare the Work Area

1. Before you service the equipment, unfold the grounding-kit work surface completely and place it on a convenient surface.

2. Attach one end of the ground cord to the work surface; secure the snap fastener.

   Note: You will attach the free end in a later step.

3. Slip on an ESD wrist strap. Make sure that the strap is comfortable and makes contact with the entire circumference of your wrist.

4. Snap one end of the coil cord to the wrist band.

Access the Equipment

5. Carefully open the doors to the equipment or remove the covers from the equipment. Do not touch any internal components.

   CAUTION:
   Be sure that you are properly grounded before you touch any internal components.

6. Attach the free end of the coil cord to the most appropriate place:

   a. If you are working on components from a small piece of equipment, attach the free end of the coil cord to the grounding-kit work surface. In addition, be sure that you touch an unpainted metal surface on the equipment before you touch an internal component.

   b. If you are working on components from a large piece of equipment, attach the free end of the coil cord to a grounding jack or to an unpainted metal surface inside the equipment.

Replace Components

7. Remove the defective component and place it on the work surface.

8. Remove the replacement component from its ESD-protective package, and install the component in the equipment.

9. Place the defective component in the ESD-protective package.

Clean Up

10. Disconnect the ground cords from the equipment.

11. Reinstall all equipment covers and close all equipment doors.

12. Disconnect the coil cord from your wrist, and, if necessary, disconnect the ground cord from the work surface.

13. Properly store the work surface and the other Field Service Grounding Kit items.

■ Fiber Optic Safety

StorageTek products use both light emitting diodes (LEDs) and laser multi-mode transmitter-receiver (transceiver) modules. LED transceivers use low power and are not as dangerous as laser transceivers.

WARNING:
***Eye hazard*. Never look directly into a fiber-optic cable, a fiber-optic connector, or a laser transmitter-receiver module. Hazardous conditions might exist from laser power levels that are capable of causing injury to the eye.**

Be especially careful when using optical instruments with this equipment. Such instruments might increase the likelihood of eye injury.

The laser transceivers in fiber-optic equipment can pose dangers to personal safety. Ensure that anyone who works with this StorageTek equipment understands these dangers and follows safety procedures. Ensure that the optical ports of every laser transceiver module are terminated with an optical connector, a dust plug, or a cover.

Each fiber-optic interface in this StorageTek Fibre Channel equipment contains a laser transceiver that is a Class 1 Laser Product. Each laser transceiver has an output of less than 70 μW and a wavelength of 850 nm. StorageTek's Class 1 Laser Products comply with EN60825-1(+A-11) and with sections 21 CFR 1040.10 and 1040.11 of the Food and Drug Administration (FDA) regulations.

The following translations are provided for Finland and Sweden who wish to identify laser safety and classification:

CLASS 1 LASER
LUOKAN 1 LASERLAITE
KLASSE 1 LASER APPARAT

■ Laser Product Label

In accordance with safety regulations, a label on each StorageTek Fibre Channel product identifies the laser class of the product and the place and date of the manufacturer. The label appears on top of a Fibre Channel tape drive and near the Fibre Channel connectors on a Fibre Channel tape library. A copy of the label is shown here:

CLASS 1 LASER PRODUCT
LASER KLASSE 1
APPAREIL A LASER DE CLASSE 1
COMPLIES WITH 21 CFR 1040.10 AND 1040.11

■ Fiber-Optic Cable Handling

Observe these precautions when you handle fiber-optic cables:

- Do not coil the cable to less than 96 mm (3.75 in.) in diameter.

- Do not bend the cable to less than 12 mm (0.5 in.) in radius. StorageTek recommends that a cable's bend radius be no less than 20 times the diameter of the cable.

- Do not pull on the cables; carefully place them into position.

- Do not grasp the cables with pliers, grippers, or side cutters; do not attach pulling devices to the cables or connectors.

- Keep cables away from sharp edges or sharp protrusions that could cut or wear through the cable; make sure that cutouts in the equipment have protective edging.

- Protect the cable from extreme temperature conditions.

WARNING:
Eye hazard. **Never look directly into a fiber-optic cable, a fiber-optic connector, or a laser transceiver module. Hazardous conditions might exist from laser power levels that are capable of causing injury to the eye.**

Be especially careful when using optical instruments with this equipment. Such instruments might increase the likelihood of eye injury.

- Install the connector's protective cover whenever the connector is not connected.

■ Fiber-Optic Cable Installation

Follow these guidelines when you install fiber-optic cables:

1. **Cable routing:**

   - **Raised floor:** You may install fiber-optic cables under a raised floor. Route them away from any obstruction, such as existing cables or other equipment.

   - **Cable tray or raceway:** Place the cables in position; do not pull them through the cable tray. Route the cables away from sharp corners, ceiling hangers, pipes, and construction activity.

   - **Vertical rise length:** Leave the cables on the shipping spool, and lower them from above; do not pull the cables up from below. Use proper cable ties to secure the cable.

   - **General:** Do not install fiber-optic cables on top of smoke detectors.

2. **Cable management:**

   - Leave at least 4.6 m (15 ft) of cable at each end for future growth.

   - Use strain reliefs to prevent the weight of the cable from damaging the connector.

   - Review all information in this manual and in any related manuals about safely handling fiber-optic cables.

WARNING:
Eye hazard. **Never look directly into a fiber-optic cable, a fiber-optic connector, or a laser transceiver module. Hazardous conditions might exist from laser power levels that are capable of causing injury to the eye.**

Be especially careful when using optical instruments with this equipment. Such instruments might increase the likelihood of eye injury.

3. **Connector protection:**

   - Insert connectors carefully to prevent damage to the connector or fiber.

   - Leave the connector's protective cover in place until you are ready to make connections.

   - Replace the connector's protective cover when the connector is disconnected.

   - Clean the connector before making a connection. Make sure that there are no obstructions and that keyways are aligned.

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Installation

<div style="text-align: right">

3

</div>

The 9840 Tape Drive can be installed as a desktop, rack-mountable drive, desktop Cartridge Scratch Loader (CSL), rack-mountable CSL, or within a 9738 library.

A desktop unit or desktop CSL contains a drive with either a Fibre Channel (FC) or Small Computer System Interface (SCSI) interface.

The StorageTek RACK001 can hold up to six CSL trays, drive trays, or any combination.

- The rack-mountable drive tray is available with FC or SCSI interface connections. A single tray contains one or two drives (both drives must have the same type of interface).

- The CSL tray is available with a FC or SCSI interface.

The 9738 Library may contain up to three drives with a FC or SCSI interface.

This chapter contains installation instructions for each configuration. It also provides cabling instructions to the host system(s).

Note: When installing the 9840 Tape Drive in a 9738 library, always use this chapter together with the 9738 Library Product Manual.

■ Verify all Equipment has Arrived

Check the equipment against the shipping invoice to make sure that all the ordered equipment has arrived. You can only check some items, such as cables, after the equipment is unpacked.

■ Unpacking the Shipment

Follow these steps to unload the equipment (drives, CSL or drive trays, or a rack):

WARNING:
***Personal injury or equipment damage.* Be aware of floor openings, cables, and other obstructions that might injure you or damage the equipment while you are moving and positioning the equipment.**

1. Move the equipment as close as possible to the installation area. The rack has casters and can be rolled into the final position.

2. Open the shipping carton and remove the contents.

    Note: Make arrangements with the customer to dispose of the shipping cartons and packaging material.

3. Position the unpacked equipment near the final location according to the customer's floor plan, but leave enough space to enable you to connect and route the cables.

    Note: Service clearances for the rack configuration are shown in Figure 3-1 on page 3-3.

■ Inspecting the Equipment

1. Remove all accompanying documentation (such as the *9840 Tape Drive Product Manual*) and component packages, then place them aside.

2. Make sure the serial numbers correspond with the shipping invoice.

3. Make sure the required cables are available:

    *   Table 3-1 on page 3-4 lists the FC cables that connect the 9840 Tape Drive to Fibre Channel hubs or host bus adapters (HBAs). Figure 3-2 on page 3-4 shows the connector.

    *   Table 3-2 on page 3-5 lists the SCSI cables that connect the 9840 Tape Drive to HBAs. Figure 3-3 on page 3-5 shows the cable connectors.

4. Report any missing or incorrect contents to the Louisville plant.

Figure 3-1. RACK001 Floorspace (Top View)

606
(23.9)

153
(6.02)

300
(11.8)

60.5
(2.38)

100
(3.94)

798
(31.4)

1.025 m
(40.4)

762
(30)

C53684
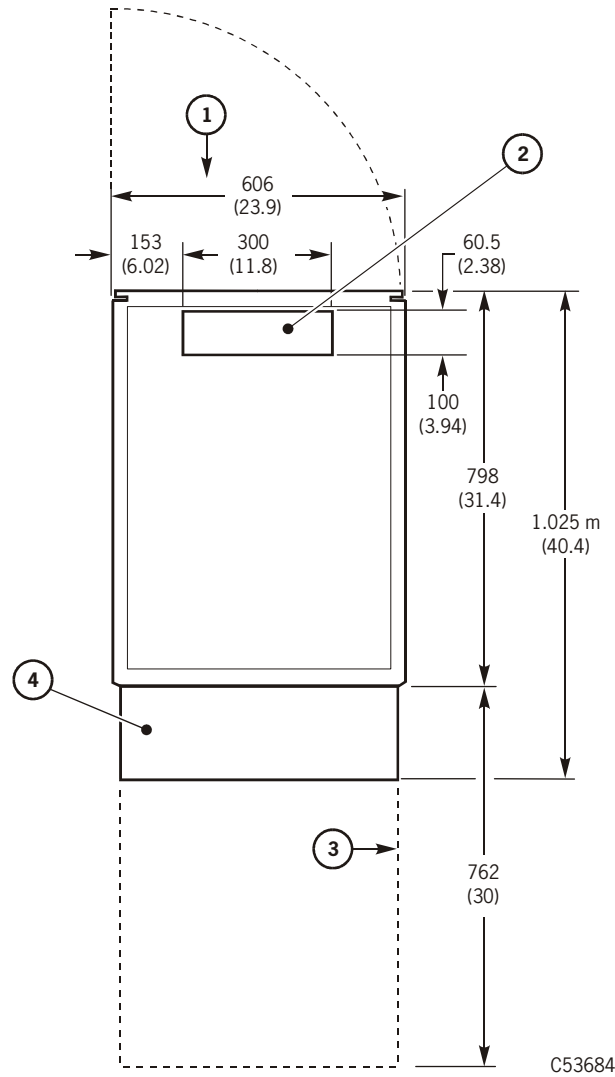
1. Rear door clearance
2. Cable cutout in floor of rack
3. Service clearance
4. Stabilizer

Table 3-1. Fibre Channel Cable (SC to SC Connectors) Part Numbers

Length		Part Number	
Meters	**Feet**	**Plenum[1]**	**Riser[2]**
2	6.6	10800122	10800132
5	16.4	10800123	10800133
10	32.8	10800124	10800134
20	65.6	10800125	10800135
30	98.4	10800126	10800136
50	164	10800127	10800137
100	328.1	10800128	10800138
250	820.2	10800129	10800139
500	1640.4	10800130	10800140

Notes:

1. Plenum cables are designed for installation in air ducts. Plenum materials are manufactured to meet UL standards for flammability (produce little smoke).

2. Riser cables can be used in computer rooms. Riser cable materials are not classified according to flammability or toxic gas emissions.

Figure 3-2. Fibre Channel Cable Connector

C53685
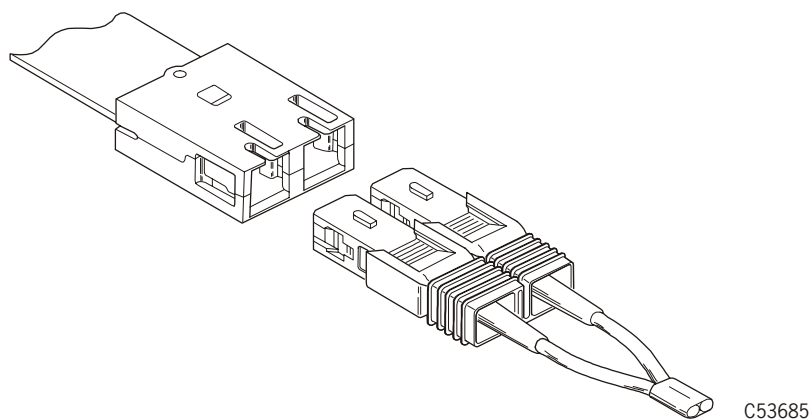
Note: The cable connector is keyed so the cable can only be inserted one way.

The cable acts somewhat like a null modem cable in that the transmit from one end of the cable connects to the receive at the other end of the cable. The cable connectors are typically labeled A and B. In addition, one strand of the cable is labeled (with the vendor name and other information) while the other strand is unlabeled.

Table 3-2. SCSI Cable Part Numbers

Standard Rated Cable (CL2)	Plenum Rated Cable (CL2P)	Length (meters)	Length (feet)
10083309	1008313	3	10
10083310	1008314	4	20
10083311	1008315	15	49
10083312	1008316	20	65

A 9840 Tape Drive can be connected to an AS/400 through a 6501, 6534, or 2729 IOP using a 68-pin SCSI cable (listed in the preceding table).

Note: The 6501 IOP also requires an interposer (order from IBM P/N 05H3834).

Figure 3-3. SCSI Cable Connectors
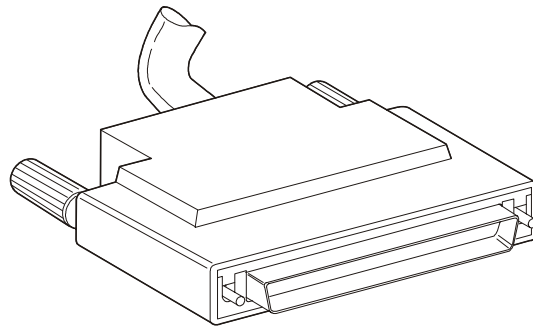
C53686

■ Hubs

Because of the fast growth and the increased demand for FC attachments, hubs can provide cascading (multiple) loops within a FC network. StorageTek tape drives are designed to use hubs to provide for an arbitrated loop which provides the following capabilities:

- Centralizes the attachment of the tape drives within the arbitrated loop

- Establishes connections with fiber-optic cables

- Provides translation of physical media (such as copper to optical fiber)

- Provides an external power supply for the port bypass

- Provides port bypass functionality for port failures

- Allows cascading to increase tape drive and initiator attachment

- Supports the ability to power-on and -off, install, or deinstall tape drives

- Provides a central point of port management and monitoring of the tape drives

- Extends the distances between tape drives and initiators

Considerations

Jitter is a consideration when selecting, installing, and configuring hubs within a Fibre Channel network. Jitter is the deviation of timing of an exchange.

The accumulation of jitter occurs and continues to grow within a chain of repeaters. As a signal is input to a repeater, jitter is not removed from the clock and is transferred to the data at the output. At some level within the network, jitter could exceed the allowable limit causing excessive errors. Assuring that there are NL_Ports within the loop to reclock the signal, jitter will be minimized.

Loop Port State Machines (LPSM) are required to control the operation of the loop and ensure Loop Initialization Protocol (LIP) is executed whenever a reset or power-on occurs.

Cascading Fibre Channel Hubs

Cascading of hubs allows an increase of tape drive and initiator attachments within the arbitrated loop. There is no limit to the number of cascading hubs within a network as long as basic guidelines are followed (refer to the hub manufacturer's requirements).

Figure 3-4 on page 3-7 shows a network incorporating cascading hubs. Notice that port 1 and port 4 are used for connecting hubs together.

■ Begin the Hardware Installation Process

Use the list below to determine where to begin:

- "9738 Library Attachment" on page 3-8
- "Desktop Units" on page 3-19
- "Rack" on page 3-26

Figure 3-4. Cascading Hubs
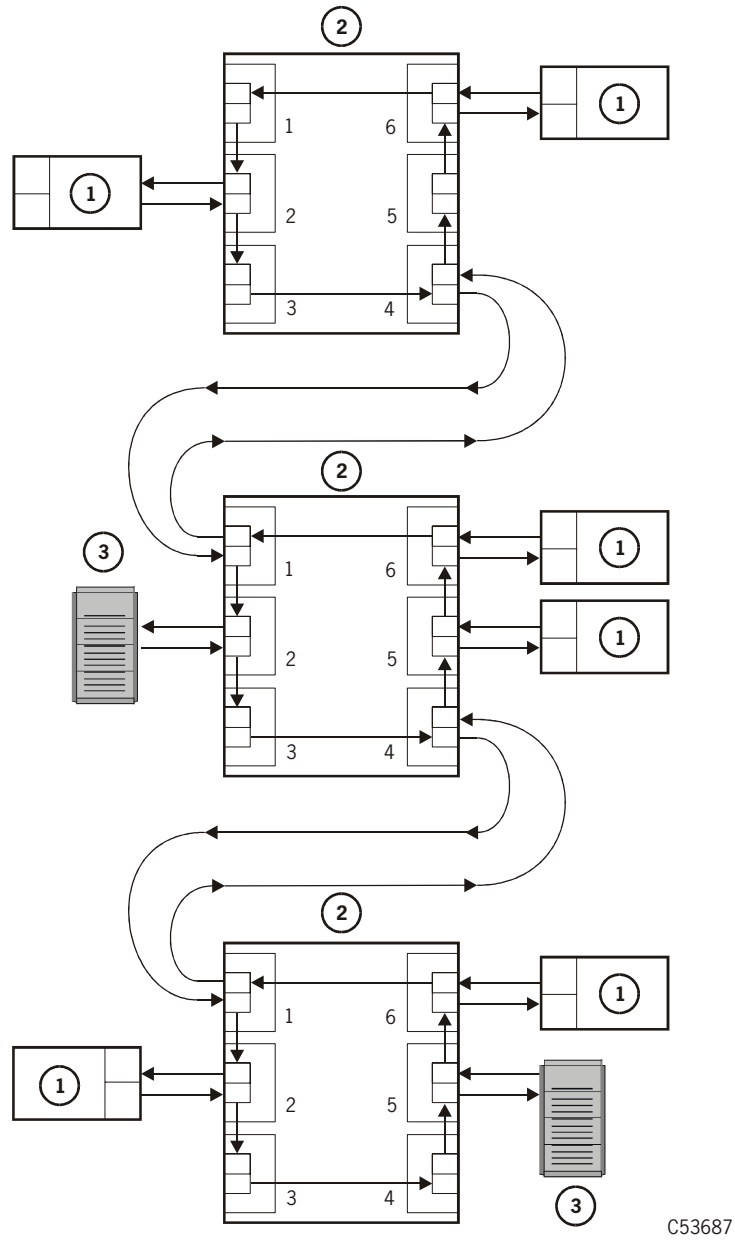
1. 9840 Tape Drive
2. Hub
3. Server

■ 9738 Library Attachment

Figure 3-5 shows the rear of the 9738 Library (some sheet metal has been removed for clarity). Follow the procedures in this section to:

- Insert the 9840 Tape Drive/tray assembly and power supply into the 9738 library

- Cable the drive to the library and the host system

Figure 3-5. 9738 Library Attachment

C53983
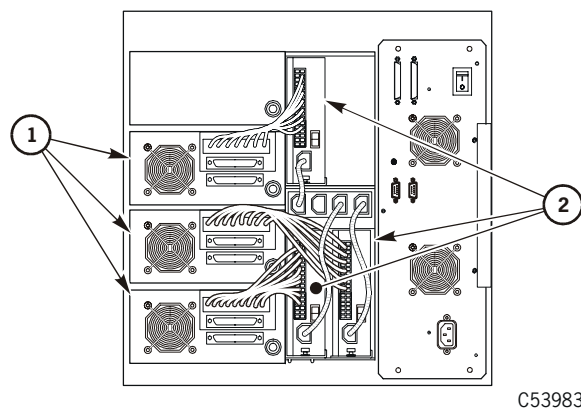
1. Drives
2. Power Supplies

This section contains the following 9738 Library and 9840 Tape Drive procedures:

- "Prepare and Install the Drive" on page 3-9
- "Install Power Supplies" on page 3-11
- "Connect Drive and Library Cables" on page 3-12
- "Install Host Interface Cables" on page 3-13
- "Apply Power to Library Drive" on page 3-18
- "Install a Cleaning Cartridge" on page 3-18

Prepare and Install the Drive

Use the instructions below to install the drive:

Note: It is assumed that the drive has been unpackaged per the instructions in .

---

1. Inspect the target for damage (such as white scratched off the target).

   a. If the target is damaged, obtain a replacement target (PN 300048901).

   b. Remove the damaged target and snap the new one into the opening shown in the figure below.

   Note: The drive ships with the target installed in the bezel.

   1. Library horizontal target

C53347

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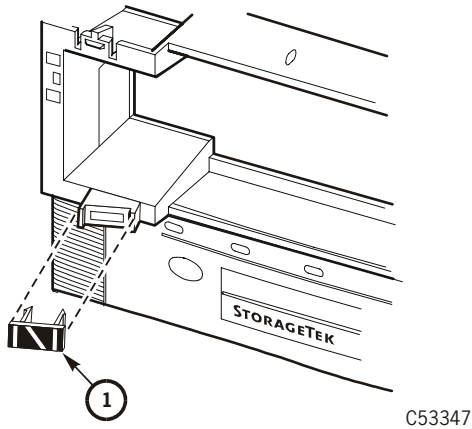
2. Remove the shipping insert from the drive bezel by squeezing both sides of the handle together and pulling it out from the drive (see figure).

   1. Shipping insert

C53218

---
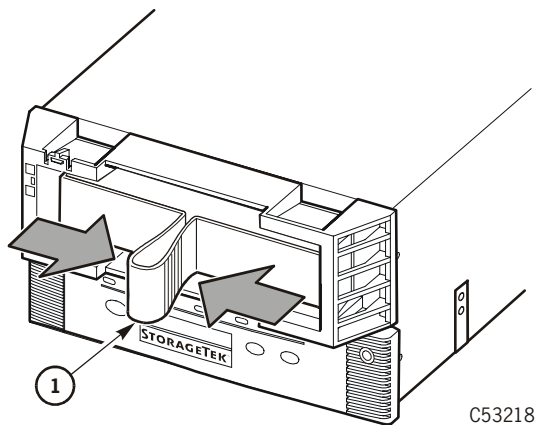
3. Set the drive tray onto the bottom edge of the drive slot.

   Note: The first drive is placed in the bottom slot position. See figure.

4. Push the tray fully into the drive slot.
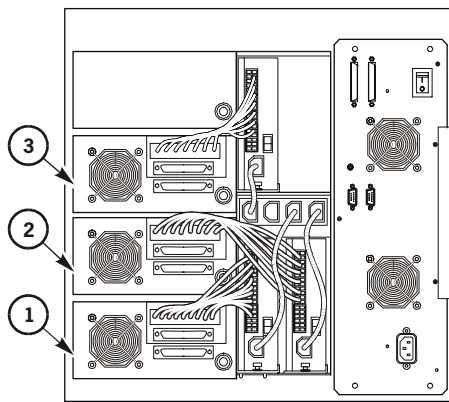
1. Drive 0
2. Drive 1
3. Drive 2

C53248

CAUTION:
If the tray is not fully tightened, the library may not be able to calibrate the drive(s).

5. Turn the tray latch to the right (clockwise) until tight (see figure).

   Note: You should test the drive tray for play by grasping it and pulling back. If you feel any looseness, retighten the tray latch.

6. Repeat Steps 1 through 5 for all remaining drives.
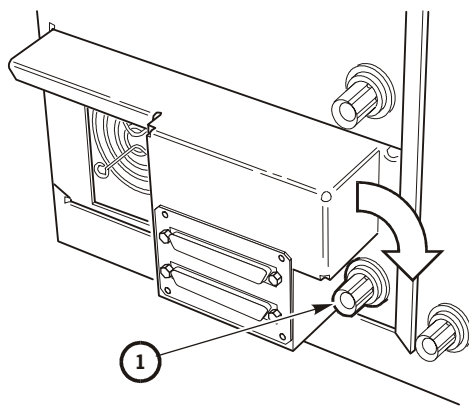
1. Tray latch

E53369

Install Power Supplies

Install power supplies in the 9738 between the drive slots and the electronics module. Use the instructions below to attach a power supply to the 9738:

Note: Ensure the power supply switch is off.

---

1. Open the rear cover of the library.

2. Slide the power supply into the library.

    a. Make sure to seat the metal tab into the slot at the rear of the chamber (see figure).

    b. Place the power supply for Drive 0 in the lower left (see figure).

1. Metal tab
2. Mounting screw

E53249
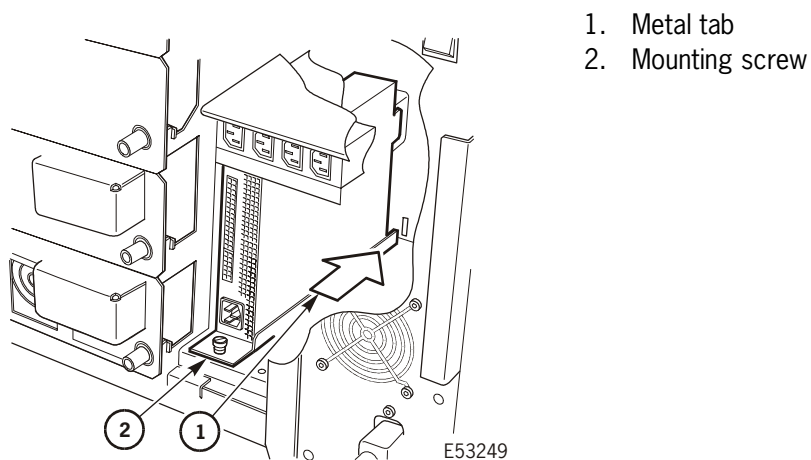
3. Tighten the mounting screw.

4. Repeat Steps 2 and 3 for all remaining drive power supplies.

    Note: Place the power supply for Drive 1 in the lower right, and the power supply for Drive 2 in the upper left.

Connect Drive and Library Cables

Follow these instructions to connect the drive to the power supply and library:

1. Locate the plastic bag containing the power cord.

2. Make sure the power switch on the power supply is in the OFF position.

3. Connect P2 of the drive power cable to the top jack (J2) on the power supply (see figure), and the P53 connector to the top jack on the drive.

4. Connect the female end of the power cord to the power supply receptacle (J1), and the male end of the cord to a power outlet in the library (see figure).
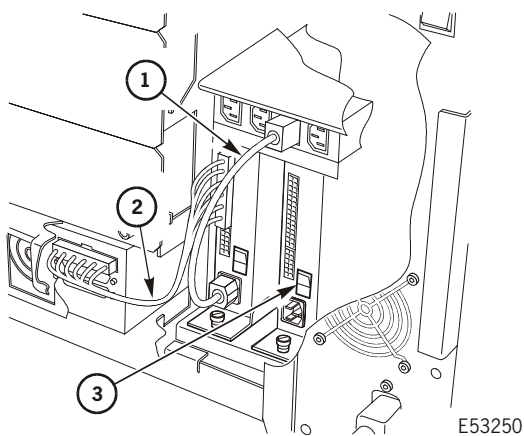
1. Power cord
2. Power supply cable
3. Power switch

E53250

5. Repeat Steps 1 through 4 for remaining drive positions.

Note: Use the figure below as a guide for routing the drive power cable from a power supply to the proper drive.

- The lower-left power supply connects to Drive 0.
- The lower-right power supply connects to Drive 1.
- The upper-left power supply connects to Drive 2.

1. Drive 0
2. Drive 1
3. Drive 2

C53248
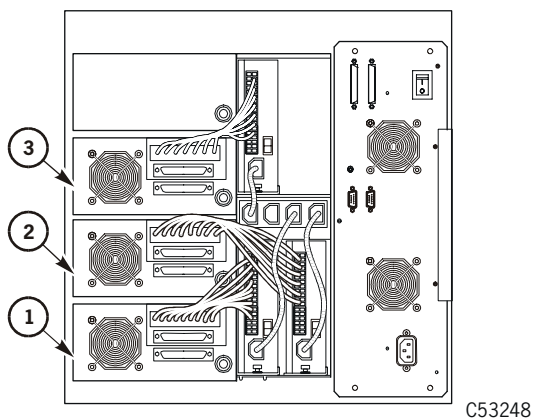
6. Connect the plug of the TTI cable to the drive (see figure).

    a. P983 goes to drive 0.

    b. P982 goes to Drive 1.

    c. P981 goes to Drive 2.

7. Repeat Step 6 for remaining drives.
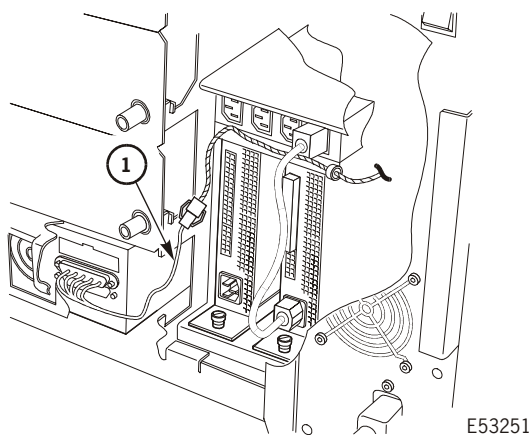
    1. TTI cable

E53251

Install Host Interface Cables

The 9840 supports FC and SCSI interfaces. Refer to:

- "9738 Fibre Channel Cable(s)"
- "9738 Library SCSI Cable(s)" on page 3-16

9738 Fibre Channel Cable(s)

Use the instructions below to attach Fibre Channel drives to the 9738 Library:

CAUTION:
Cable damage. **Fiber-optic cables are easily damaged. Follow the guidelines in "Fiber Optic Safety" on page 2-5 to prevent damage to the cables.**

1. Mark each FC cable with the drive position number, device address, and port.

2. Route the cable(s) from the host, hub or switch to the 9738 library.

    Note: Do not connect either end of the cables at this time.

3. Remove the rubber port plug from the selected drive port.

4. Remove the cable connector covers and clean the cable ends with wipes.

CAUTION:
Equipment damage. **Do not force the fiber-optic plug into the connector.**

5. Connect the FC cable to the desired port on the rear of the tape drive (see the figure below).

    a. Port A is on the left side.

    b. The connector is keyed so the cable can only be inserted one way.

6. Repeat Steps 3 through 5 if you will be using both ports of the drive.
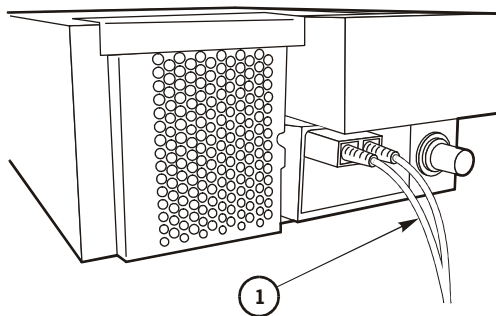
1. Fibre Channel Cable

C53815

7. Locate the metal port enclosure.

8. Route the FC cable(s) through the appropriate hole of the enclosure.

9. Fasten the metal enclosure to the drive with two screws.

    Note: To maintain the agency verification status of the product, you must attach the FC port enclosure when using FC drives.
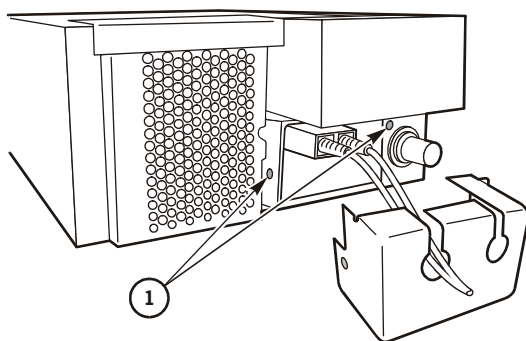
1. Mounting screw location (2X)

C53816

10. Locate the grommets.

11. Slip a grommet over each installed FC cable.

12. Seat the grommet into the hole of the metal enclosure.

1. Grommets (2X)
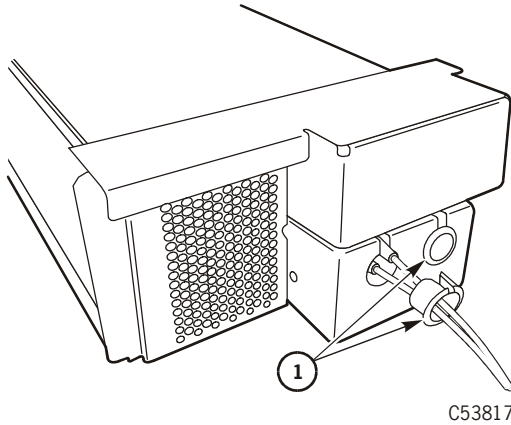
C53817

13. Route the cable(s) to the hub or switch.

14. Remove the cable connector covers and clean the cable ends with wipes.

15. Connect the cable to an open port on the switch or hub.

16. Repeat Step 3 through Step 15, as applicable, for all other drives in the 9738 library.

17. Proceed to "Apply Power to Library Drive" on page 3-18 if you are only installing FC drives.

1. Fibre Channel cable
2. Fibre Channel GBIC
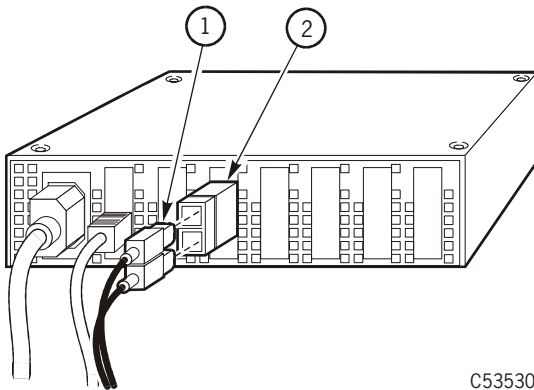
C53530

9738 Library SCSI Cable(s)

The 9840 Tape Drive connects to a SCSI bus and supports *only* the differential alternative.

Note: Term power is not supplied by the 9840 Tape Drive, it must be supplied by the host bus adapter card.

All host systems should have either the SCSI ports labeled or the international symbols displayed (Figure 3-6 on page 3-16) to indicate the electrical configuration for that port.

Figure 3-6. SCSI International Symbols
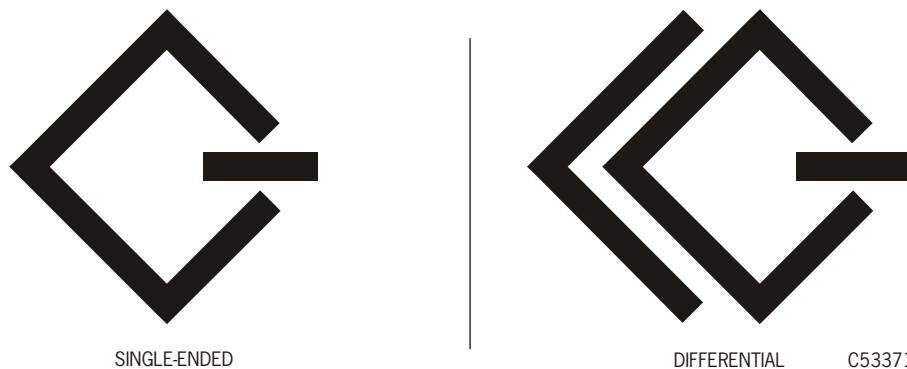
SINGLE-ENDED   DIFFERENTIAL   C53371

CAUTION:
Maximum cable length. **The maximum cable length for the differential alternative is 25 m (82 ft). Make sure that the total cable length (including all daisy-chain cables) from the host to the last device does not exceed the maximum length.**

Use the following instructions to attach the SCSI drives to the 9738 Library:

1. Mark each SCSI cable with drive position number and the device address (SCSI ID), information is used in Chapter 6, "Menu System."

CAUTION:
Connector damage. **Be careful not to bend or damage the pins or connectors when connecting the cable to the drive.**

2. Connect the host SCSI cable to the lower 68-pin jack on the drive (see figure).

    Note: You might want to connect the host SCSI cable to the 9738 library and daisy-chain from the library to the 9840. If this describes your configuration, refer to the *9738 Product Manual* for cabling instructions.
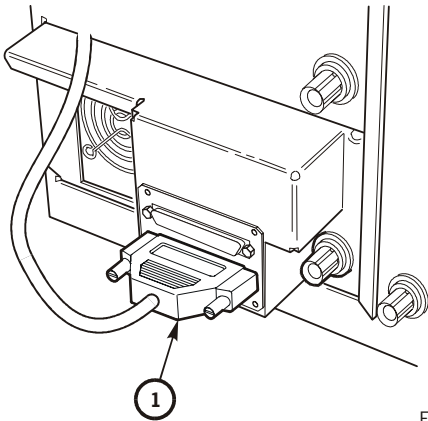
1. SCSI interface cable

E53252

3. If you are not going to daisy-chain drives, skip to Step 5.

    Note: If you are daisy-chaining drives, locate a daisy-chain cable (PN 10083599) in the hardware kit.

4. Connect one end of the cable to the top 68-pin jack on the drive tray, and connect the other end of the cable to the bottom jack of the higher drive tray (see figure).

    Note: If you are daisy chaining all three drives within the library, use another daisy-chain cable and connect the upper 68-pin jack on the middle drive to the lower 68-pin jack on the upper drive.
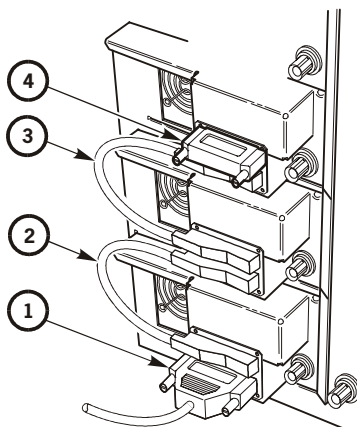
1. Host interface connection
2. SCSI daisy-chain cable (Drive 0 to 1)
3. SCSI daisy-chain cable (Drive 1to 2)
4. SCSI terminator

C53370

5. Install the terminator (part number 10148003) either at the top jack at the rear of the drive tray or to the device at the end of the SCSI bus.

6. Repeat steps 2 through 5, as they apply to the bus configuration, for any other drive.

7. Proceed to "Apply Power to Library Drive" on page 3-18.

Apply Power to Library Drive

1. Turn on the power switch of each 9840 Tape Drive power supply.

2. Connect the library power cord to a power source and enable the power switch.

3. Verify that the drives power on.

Install a Cleaning Cartridge

Use the instructions below to apply the label to a cleaning cartridge:

1. Obtain the cleaning cartridge label.

2. Label a cleaning cartridge (identified by a "U" in the media ID area) by attaching a DG CLN label to the VOLSER label area (see figure).
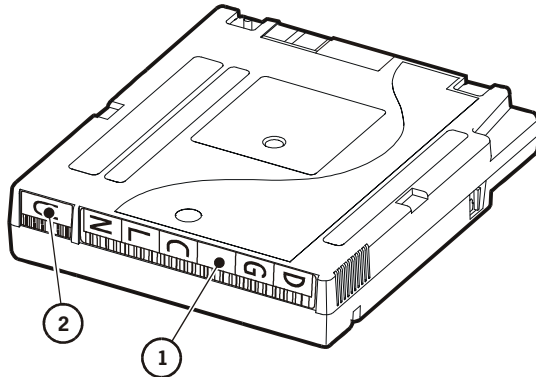
1. VOLSER label area
2. Media ID area

C53373

3. The cleaning cartridge will be installed in Column 0 Row 7. Refer to the 9738 documentation to enable auto cleaning.

4. Proceed to "Configure the Drive" on page 3-53.

■ Desktop Units

This section provides the installation procedure for the 9840 Tape Drive desktop configuration. A desktop configuration contains either a manual mount drive or a CSL. Fibre Channel or SCSI interfaces are available.

This section contains the following desktop procedures:

- "Desktop Drive Shipping Insert"

- "CSL Shipping Insert" on page 3-20

- "Install Host Interface Cables" on page 3-21

- "Power-On Desktop/CSL" on page 3-25

Desktop Drive Shipping Insert

Use the instructions below to remove the shipping insert from the drive:

Note: See "CSL Shipping Insert" on page 3-20 to remove the CSL shipping insert.

---

1. Remove the shipping insert from the drive.

   a. Squeeze both sides of the handle together.

   b. Pull the shipping insert out from the drive.
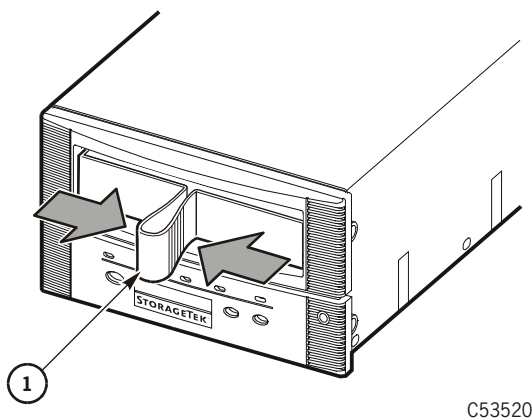
1. Shipping insert

C53520

2. Store the shipping insert.

Note: The shipping insert should be installed in the drive whenever the Desktop Unit is returned to StorageTek for any reason.

CSL Shipping Insert

Use the instructions below to remove the shipping insert from the CSL:

Note: See "Desktop Drive Shipping Insert" on page 3-19 to remove the desktop drive shipping insert.

1. Locate the shipping insert within the feed channel.

2. Push the input bin bookend to right of the input bin and hold it in place.

3. Reach through the input bin and squeeze the shipping insert handle together.

Note: Squeezing the handle unlocks the shipping insert from the drive.

4. Slide the shipping insert out through the feed channel to the cartridge stop mechanism.

5. Push down on the cartridge stop mechanism and remove the shipping insert.
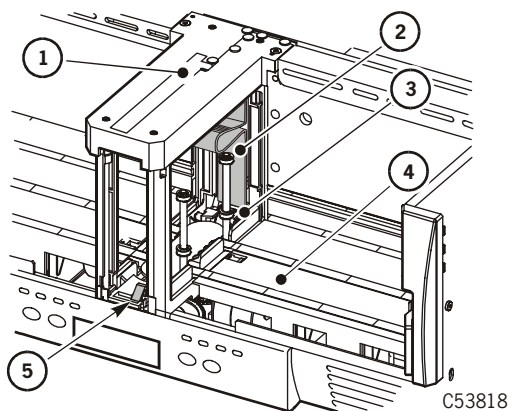
1. Feed channel
2. Shipping insert
3. Feed roller
4. Input bin
5. Cartridge stop mechanism

C53818

6. Store the shipping insert.

Note: The shipping insert should be installed in the drive whenever the CSL is returned to StorageTek for any reason.

Install Host Interface Cables

The 9840 Tape Drive supports Fibre Channel and SCSI interfaces. This section contains:

- "Fibre Channel Cables (Desktop/CSL)"
- "SCSI Cables (Desktop/CSL)" on page 3-23

Fibre Channel Cables (Desktop/CSL)

Use the instructions below to install the Fibre Channel cables:

CAUTION:
***Cable damage.* Fiber optic cables are easily damaged. Follow the guidelines in Chapter 2, "Safety and Handling" to prevent damage to the cables.**

1. Mark each Fibre Channel cable with the device address and port.

2. Route the interface cable(s) from near the host, hub, or switch to the drive/CSL.

   Note: Do not attach either end of the cable(s) at this time.

3. Remove the rubber port plug from the selected drive/CSL port and clean the port.

   Note: If you are unfamiliar with the cleaning procedure, see "Clean Fibre Channel Components" on page 8-4.

4. Remove the interface cable connector covers and clean the cable ends with wipes.

   Note: If you are unfamiliar with the cleaning procedure, see "Clean Fibre Channel Components" on page 8-4.

CAUTION:
Equipment damage. **Do not force the fibre optic plug into the port connector.**

5. Connect the Fibre Channel cable to the desired port on the rear of the tape drive/CSL.

Note: Port A is on the left side and Port B is on the right side of the drive/CSL. The connector is keyed so the cable can only be inserted one way.

6. Repeat Steps 3 through 5 if you will be using both ports of the drive.

1. CSL
2. Desktop drive
3. Port A (Fibre Channel cable)
4. Port B (Fibre Channel cable)
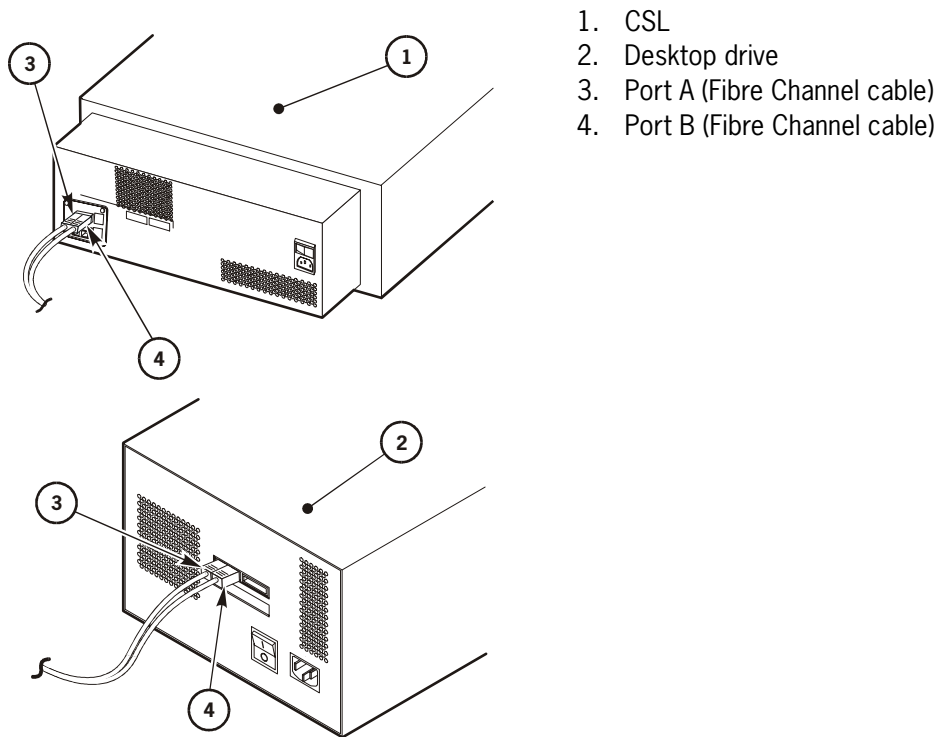
C53819

7. Route the interface cable(s) to the hub or switch and connect to an open port.

Note: If you are connecting directly to a host, do not connect the cable at this time.

1. Fibre Channel cable
2. Power cord
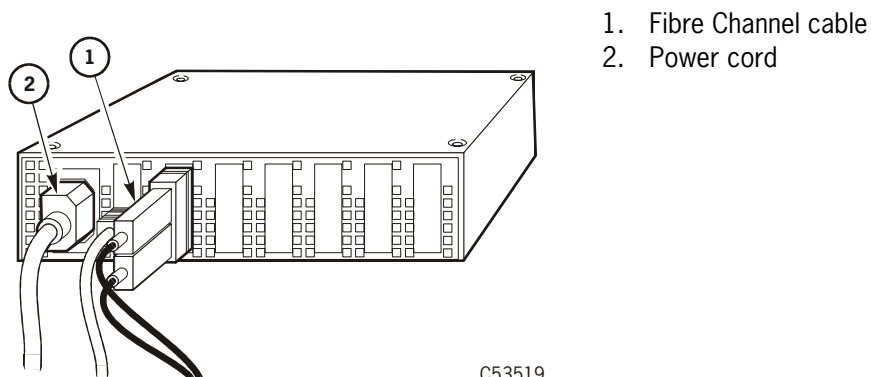
C53519

8. Proceed to "Power-On Desktop/CSL" on page 3-25.

SCSI Cables (Desktop/CSL)

The 9840 Tape Drive/CSL connects to a SCSI bus and supports *only* the differential alternative.

Note: Term power is not supplied by the 9840 Tape Drive, it must be supplied by the host bus adapter card.

All host systems should have either the SCSI ports labeled or the international symbols displayed (refer to Figure 3-7) to indicate the electrical configuration for that port.

Use the instructions below to install the SCSI cables to the desktop drive or CSL.:

Figure 3-7. SCSI International Symbols
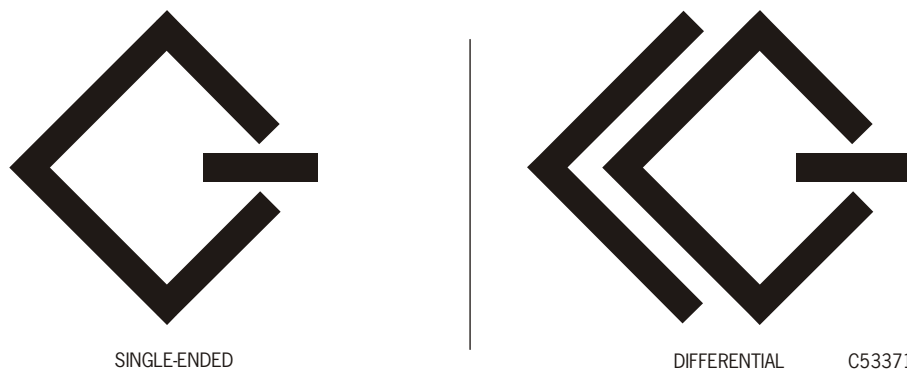
SINGLE-ENDED   DIFFERENTIAL   C53371

CAUTION:
Maximum cable length. **The maximum cable length for the differential alternative is 25 m (82 ft). Make sure that the total cable length (including all daisy-chain cables) from the host to the last device does not exceed the maximum length.**

1. Mark each cable with the drive position number and device address.

2. Route the cable(s) from near the host to the vicinity of the desktop drive.

   Note: Do not attach either end of the cable(s) at this time.

CAUTION:
Connector damage. **Be careful not to bend or damage the pins or connectors when connecting the cable to the drive.**

3. Connect the host SCSI cable to the lower 68-pin jack at the rear of the drive/CSL.

4. Install the terminator (part number 10148003) on the device at the end of the SCSI bus.
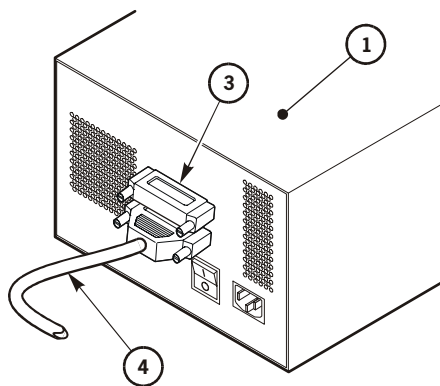
1. Desktop drive
2. CSL
3. SCSI terminator
4. SCSI cable
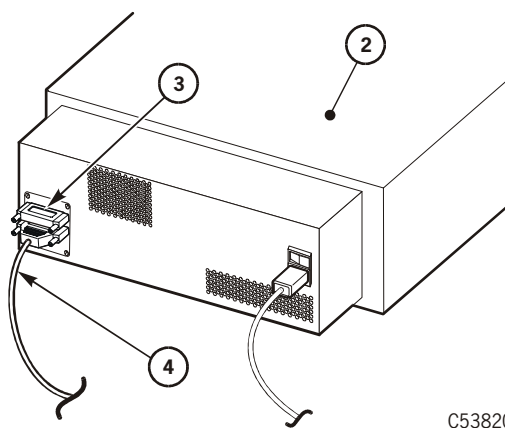
C53820

5. Proceed to "Power-On Desktop/CSL" on page 3-25.

Power-On Desktop/CSL

Use the instructions below to power-on the 9840 desktop drive or the CSL:

Note: Ensure the female end of the power cord is plugged into the drive/CSL.

1. Attach the male end of the power cord to a power outlet.

2. Press the power switch on the 9840 Tape Drive/CSL.

1. Desktop drive
2. CSL
3. Power switch
4. Power cord

C53821
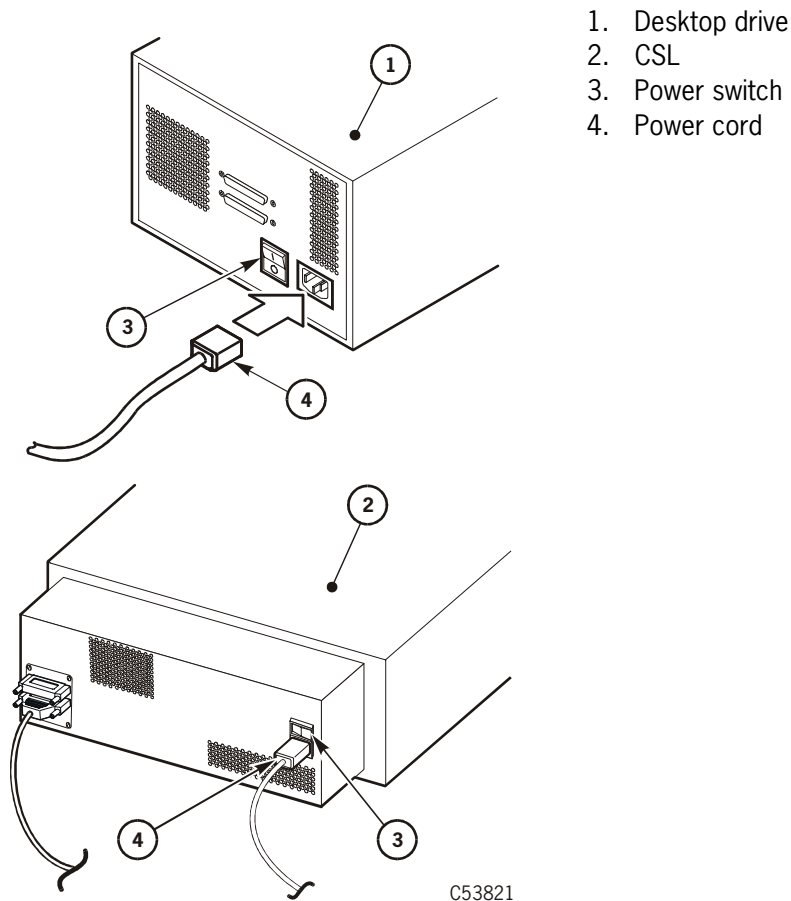
Note: The desktop drive and CSL shown above use a SCSI interface to the host.

3. Verify that the 9840 Tape Drive powers on.

   Note: A steady asterisk on the operator panel indicates a successful IPL completion, the drive is online, but not loaded with a cartridge.

4. Proceed to .

■ Rack

The instructions provided here are specific to the StorageTek model number RACK001. Six 9840Rxx Tape Drive rack-mount trays, six 9840Sxx CSL trays, or a combination of both can be installed in a rack.

Note: Install the RACK001 stabilizer before you insert a 9840R/9840S tray.

If you are using a different rack, make sure it does not have a front door. The instructions provided may not apply exactly to a different rack.

This section contains the following rack information:

Rack Safety and Precautions

WARNING:
***Possible personal injury*:**

- **The dual drive 9840R weighs 22.7 kg (50 lb) and the 9840S weighs 18.6 kg (41 lb) with tray slides. To install the unit into a rack or remove the unit from a rack might require more than one person.**

- **When you slide a drive unit out of the rack, you shift the rack's center of gravity. Ensure the rack is stable enough to withstand this shift.**

Observe the following safety precautions when you install 9840R or 9840S trays in the StorageTek RACK001:

- Do not allow rack elements to interfere with the tape drive's ventilation. The rack's internal ambient temperature should not exceed the recommended operating temperature range of the 9840Rxx/9840Sxx.

- Ensure that the combination of the 9840Rxx/9840Sxx with other equipment in the rack does not create an overcurrent condition in the power source. The combination of equipment in the rack must not exceed the rating plate amperage of the power distribution strip and/or the rated amperage of the facility's branch circuit.

- Ensure that all equipment in the rack has reliable earth ground, whether the equipment is connected directly to the branch circuit or to a power distribution strip.

  Note: The 9840R and 9840S rely on the ground pin of the power cord for their earth ground.

Installation Overview

CAUTION:
***Equipment damage.** **The RACK001 is only intended for the 9840 drive or CSL trays. Any other equipment plugging into the rack power strip must be approved by StorageTek and the appropriate safety agencies.**

Figure 3-8 provides an overview of the rack installation and the location of the stablizer.

Figure 3-8. Rack Installation Overview

C53253
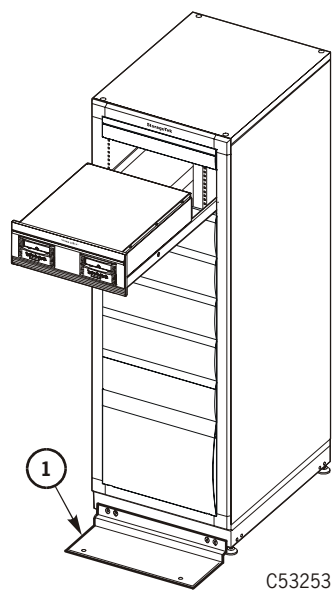
1.   Stabilizer

The rack ships with the following items installed:

*   A 2 EIU (88.5 mm/3.48 in.) filler at the top of the rack

*   Five 4 EIU (177 mm/6.97 in.) fillers in drive tray locations two through six

*   A 9 EIU (398 mm/15.7 in.) filler at the bottom of the rack

*   Fan tray at the rear of the rack

*   Power Distribution Unit (power strip) at the rear of the rack

There is an opening below the upper filler where the first drive or CSL tray will be installed. To install additional trays, you must remove the filler plates.

CAUTION:
***Equipment damage.* Do not attempt to move the rack once drive or CSL trays are installed. To prevent damage to the rack, you must remove all drive/CSL trays and the stabilizer before relocating the rack.**

Tools Required

The following tools are required to complete this installation:

- 1/2 in. open-end wrench
- 3/4 in. open-end wrench
- Assorted Torx screwdrivers
- Bubble level

Install Stabilizer

Use the instructions below to install the stabilizer plate on the rack:

1. Use a 3/4 in. wrench to lower the rack leveling pads, and while adjusting the pads use a bubble level to verify the rack is plum and level.

2. Use a 1/2 in. wrench to install the stabilizer on the front of the rack.

   Note: The stabilizer must remain connected to the rack. It should only be removed when you are relocating the rack.
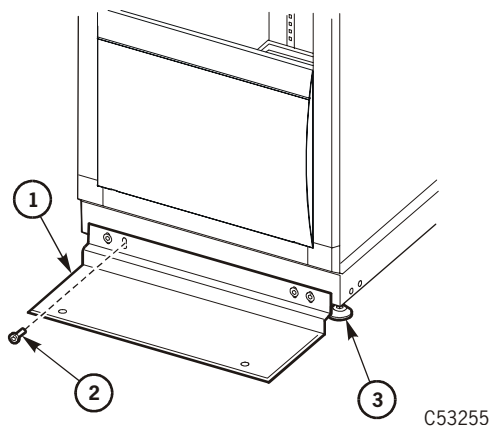
1. Stabilizer
2. Mounting screw (4X)
3. Leveling pad

C53255

Open the Rear Door

Follow the instructions below to open the rear door of the rack.

1. Lift the lock shield (see figure below).

2. If locked, use the key to unlock the door.

3. Press on the key cylinder and the door handle pops out.

4. Turn door handle counter-clockwise to unlatch, and open door by pulling on the handle.
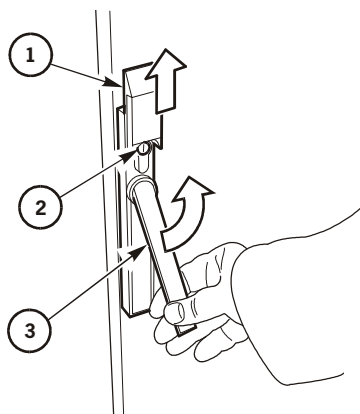
1. Lock shield
2. Key cylinder
3. Door handle

E53254

Install Optional Second Power Strip

Follow the instructions below to install a second power strip when more than four trays are to be powered in the equipment rack.

1. Unpack the power strip and mounting hardware.

2. If required, open the rack rear door.

3. Install captive nuts into holes 12 and 14, above the existing power strip.

   Note: Make sure captive nuts are installed on both vertical frame members.

4. Position second power strip, and secure with four screws.

Install Captive Nuts and Nut Plates for First Tray

Captive nuts are used to secure the tray to the rack while nut plates are used to secure the slide-rail assemblies to the rack. The procedure for installing captive nuts and nut plates is unique for each type of tray.

Install captive nuts and nut plates in the highest rack location by following the appropriate procedure. The drive tray procedure follows below while the CSL procedure begins on page 3-32.

If more that one tray is being installed in the rack, additional procedures are available at "Additional Tray Rack-hardware Installation" on page 3-35.

Drive Tray Nuts and Nut Plates

Use the instructions below to install the drive tray captive nuts (PN 3000517xx) and nut plates in the vertical frame members of the rack:

1. Locate the vertical frame members at the front of the rack.

2. Determine which holes the captive nuts are installed in. The drive tray uses holes 3 and 8 (counting down from the bottom edge of the upper spacer panel).

    Note: The cabinet may ship with captive nuts installed in the correct locations.

3. Go to Step 5, if the captive nuts are installed in the correct location.

4. Place the bottom edge of the nut into the hole, use a tool to push down on the upper edge of the nut, push the nut into the hole (see the following figure), and remove the tool.

1. Captive nut

E53256

5. Loosely attach nut plates for tray slide rails using two screws (see figure and instructions below).

   Note: Do not fully tighten the screws. The tray slide bracket will be inserted between the nut plate and the vertical frame member in a later step.

   a. At the front side of the cabinet, insert a nut plate into holes 10 and 11 (counting down from the bottom edge of the upper spacer panel) of *both* vertical frame members, and secure it with two screws.

   b. At the rear of the cabinet, insert a nut plate into holes 10 and 11 (counting down from the bottom of the fan tray) of *both* vertical frame members.

6. If you will not be installing CSL trays, go to .
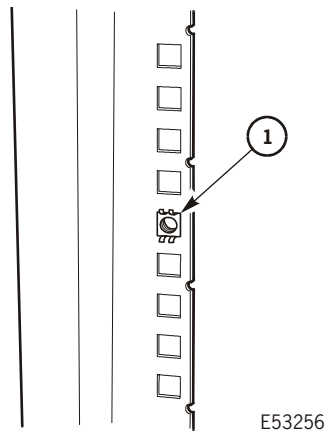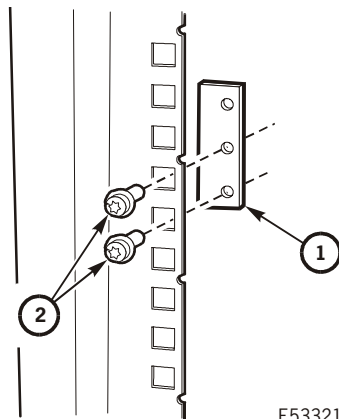
1. Nut plate
2. Screws (2)

E53321

CSL Tray Nuts and Nut Plates

Use the instructions below to install the CSL tray captive nuts (PN 3000517xx) and nut plates in the vertical frame members of the rack:

1. Locate the vertical frame members at the front of the rack.

2. Determine which holes the captive nuts are installed in. The CSL tray uses holes 6 and 8 (counting down from the bottom edge of the upper spacer panel).

3. Place the bottom edge of the nut into the hole, use a tool to push down on the upper edge of the nut, push the nut into the hole (see figure below), and remove the tool.

1. Captive nut

E53256

4. Loosely attach nut plates for tray slide rails using two screws (see figure and instructions below).

   Note: Do not fully tighten the screws. The tray slide bracket will be inserted between the nut plate and the vertical frame member in a later step.

   a. At the front side of the cabinet, insert a nut plate into holes 2 and 3 (counting down from the bottom edge of the upper spacer panel) of *both* vertical frame members, and secure it with two screws.

   b. At the rear of the cabinet, insert a nut plate into holes 2 and 3 (counting down from the bottom of the fan tray) of *both* vertical frame members.
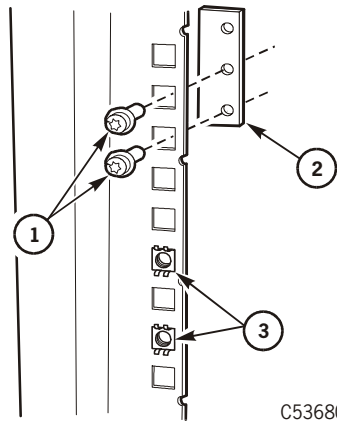
1. Screws (2)
2. Nut plate
3. Captive Nuts

C53680

Install Slide Rails

Use the instructions below to install the slide rails on the rack:

1. Loosely attach the slide bracket to the rear of the slide-rail assembly using two screws and nut plate (see figure below).

   Note: Do not fully tighten the screws. You must adjust the slide bracket to fit the slide rail between the vertical frame members.
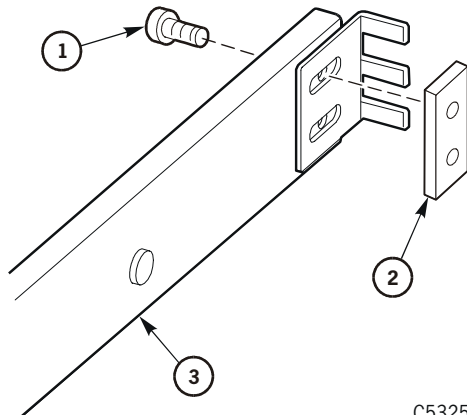
1. Slide bracket adjustment screws (2)
2. Nut plate
3. Slide rail

C53257

2. At the front of the cabinet, insert the slide-rail assembly between the vertical frame member and the nut plate.

3. Adjust the mounting bracket at the rear of the slide-rail assembly until it seats between the nut plate and the vertical frame member.

4. Use a T-25 driver to tighten the 10-32 screws only enough to prevent the slide-rail assembly from falling.
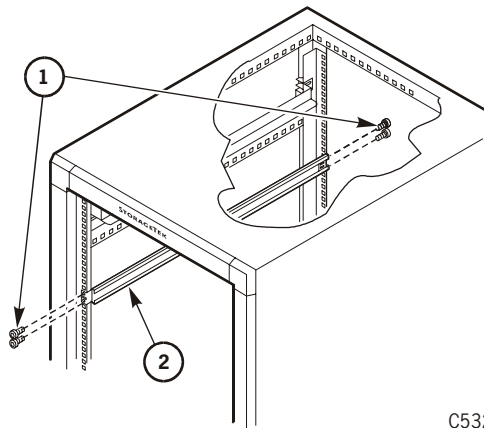
1. Slide-rail mounting screws (4)
2. Slide-rail assembly

C53258

5. Extend the slide rail out the front of the cabinet.

6. Position the slide rail so the center section clears the vertical frame member.

7. Tighten the nut plate screws.

8. Tighten the slide bracket screws at the rear of the slide assembly.

9. Repeat Steps 1 through Step 8 for the other slide assembly.
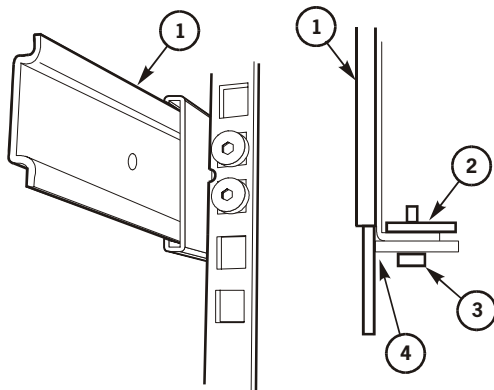
1. Slide rail
2. Nut plate
3. Screw
4. Slide clearance

C53507

10. Proceed to if this is the only tray being installed.

Additional Tray Rack-hardware Installation

The instructions in this section are used when installing drive or CSL trays in positions two through six on the RACK001. The drive tray instructions follow below while the CSL instructions begin on .

Drive Tray Additional Hardware

You will be removing a rack filler plate to enable installation of a drive tray.

1. Remove the decorative cover from the filler plate.

2. Remove the screws from the filler plate and remove the plate.

   Note: The filler plate uses holes 3 and 10.

3. Reposition the captive nut from hole 10 to hole 8.

   Note: Make sure to identify the starting point for numbering holes. You need to start below the lowest point in the tray mounting plate. If you start immediately below the slide-rail of the drive tray, the nut plate will be mounted too high.

   1. Captive nut

E53256
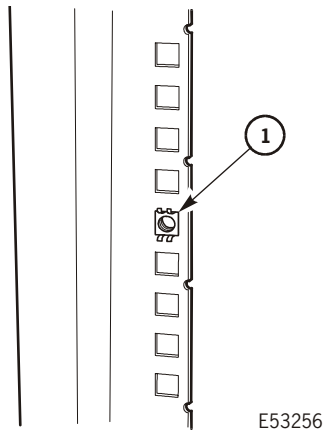
4. Insert a nut plate at the front vertical frame members in holes 10 and 11 using two screws (see the figure below).

   Note: Only turn the screws until a few threads are in the nut plate. In a later step, the slide-rail assembly will be inserted between the nut plate and the frame member.

5. Insert a nut plate at the rear vertical frame members in holes 10 and 11 using two screws.

6. Install slide rails by inserting them between the nut plates and vertical frame members.

7. Repeat Step 1 through Step 6 for each additional drive tray you will be installing.

8. Proceed to "Rack-mountable Tray" on page 3-38 if you will not be installing CSL trays.
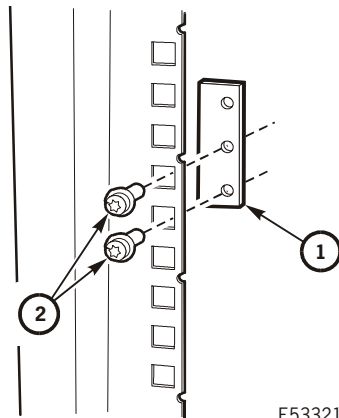
1. Hand tool
2. Captive nut

E53321

CSL Tray Additional Hardware

You will be removing a rack filler plate to enable installation of a CSL tray.

1. Remove the decorative cover from the filler plate.

2. Remove the screws from the filler plate and remove the plate.

    Note: The filler plate uses holes 3 and 10.

3. Reposition the captive nuts to holes 6 and 8.

    Note: Make sure to identify the starting point for numbering holes. You need to start below the lowest point in the tray mounting plate. If you start immediately below the slide-rail of the drive tray, the nut plate will be mounted too high.

4. At the front of the cabinet, insert a nut plate into holes 2 and 3.

    Note: Only turn the screws until a few threads are in the nut plate. In a later step, the slide-rail assembly will be inserted between the nut plate and the frame member.

5. At the rear of the cabinet, insert a nut plate into holes 2 and 3.

6. Install slide rails by attaching them at holes 10 and 11.

7. Repeat Steps 1 through Step 6 for each additional CSL you will be installing.

8. Proceed to "Rack-mountable Tray" on page 3-38 if you will not be installing drive trays.

1. Screws (2)
2. Nut plate
3. Captive nuts

C53680
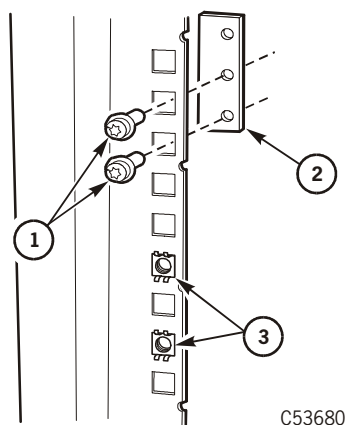
■ Rack-mountable Tray

This section contains the following information:

Install Tray Rails

The instructions in this section describe how to install the drive tray rails on both types of rack trays. The drive tray instructions follow below while the CSL instructions begin on page 3-39.

Drive Tray Rail

Use the instructions below to attach the slide rail to a drive tray:

1. Remove the inner portion (drive-tray rail) of the slide-rail assembly.

2. Install rails on the bottom edge of a drive tray (see figure below).

Notes:

1. The spring latch faces away from the drive tray and toward the outside of the tray. The spring latch must fit into the hole of the rack slide.

2. In later models, the spring latch is modified.
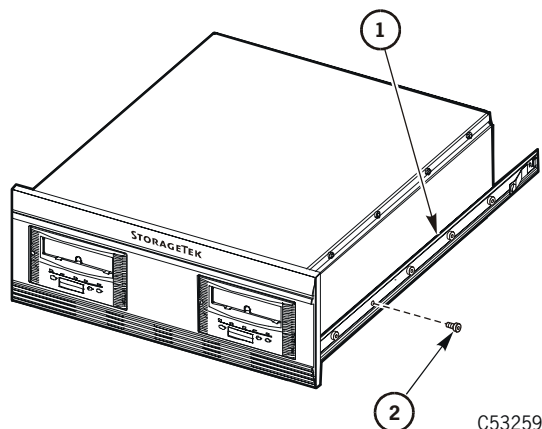
1. Drive tray rails (2)
2. Screws (5)

C53259

CSL Tray Rail

Use the instructions below to attach the slide rail to a CSL tray:

1. Remove the inner portion (drive-tray rail) of the slide-rail assembly.

2. Fasten rails on the top edge of the CSL tray (see the figure below) with screws.

Notes:

1. The spring latch faces away from the drive tray and toward the outside of the tray.
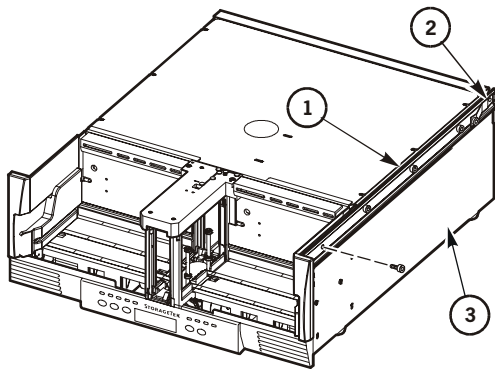
1. Drive tray rails (2)
2. Screws (4)

C53681

Insert Tray

Use the instructions below to insert and secure drive trays:

WARNING:
***Heavy object.* A single drive tray weighs 17.463 kg (38.5 lbs.), a CSL tray weighs 18.6 kg (41 lb), while a dual drive tray weighs 22.680 kg. (50.0 lbs.) Use two people when inserting the drive tray into the slide-rail assembly.**

1. Install the drive tray rails into the slide-rail assembly.

2. Press on spring latches, and push drive tray fully into the rack.

1. Spring latch

C53260
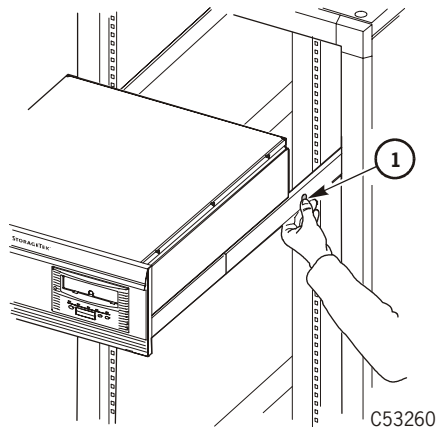
3. Ensure that the spacing between the mounting plates is 4 mm (.165 in.) as shown.

Note: You may need to loosen and reposition the front of the slide-rail assembly. This spacing allows room for the decorative covers.

4 mm
(.165)

C53372
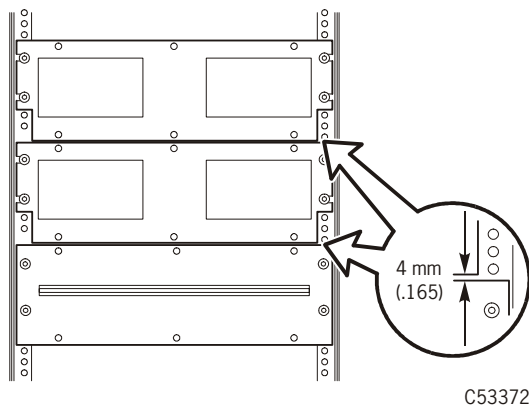
Secure Tray and Remove Shipping Insert

The instructions in this section describe how to secure trays to the rack and remove the shipping insert from the drive cartridge aperture. CSL instructions begin on .

Drive Tray

Use the instructions below to secure a drive tray to the rack, apply the decorative front cover, and remove the shipping insert:

1. Secure drive tray to rack with four 10-32 screws.
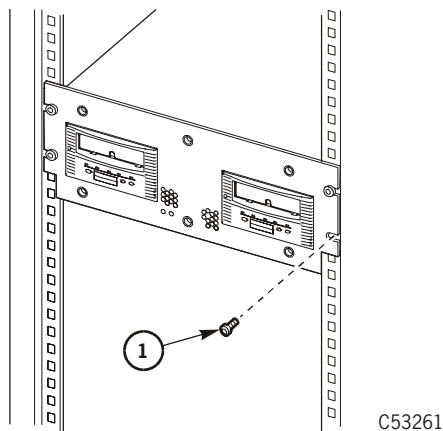
1. Drive tray mounting screws (4)

C53261

2. Install the drive tray decorative cover.

   Note: If cover does not fit, reposition the slide-rail assembly.
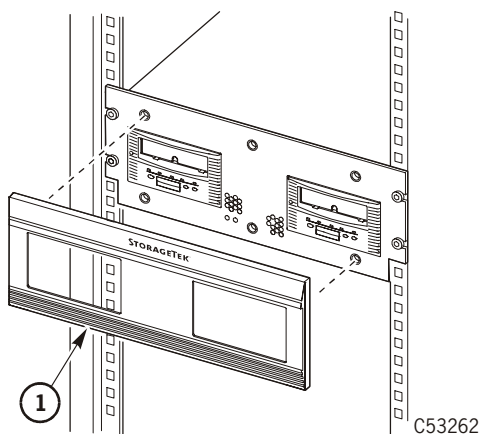
1. Decorative cover

STORAGETEK

C53262

3. Remove the shipping insert by squeezing both sides of the handle together and pulling it out from the drive.

1. Shipping insert

C53520
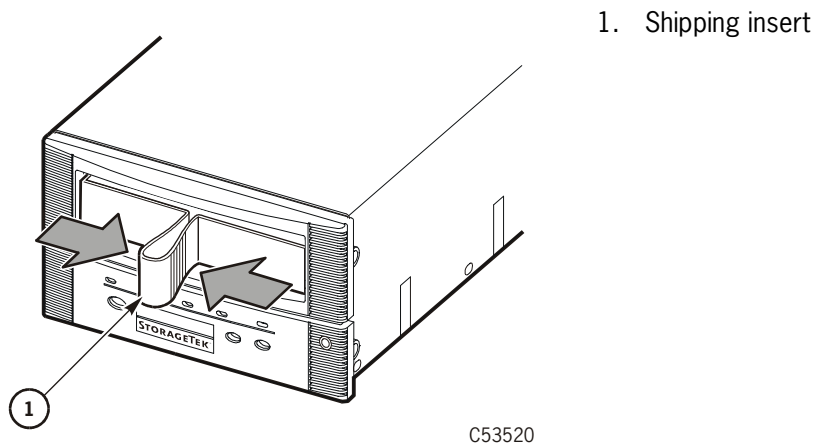
4. Repeat Step 3 if there is a second drive in the tray.

5. Store the shipping insert/s.

Note: The shipping insert should be installed in the drive whenever the drive tray is returned to StorageTek for any reason.

6. Repeat Steps 1 through 5 for all remaining drives.

Proceed to "Attach Tray Power Cord" on page 3-45 if you will not be installing a CSL tray.

CSL Tray

Use the instructions below to secure a CSL tray to the rack, attach the side panels, and remove the shipping insert:

1. Secure the CSL to the rack using four 10-32 screws. These screws mate with the captive nuts installed in previous steps.

2. Add the decorative side panel to the output bin side of the CSL (see the following figure).

3. Repeat Step 2 for the input bin side of the CSL.
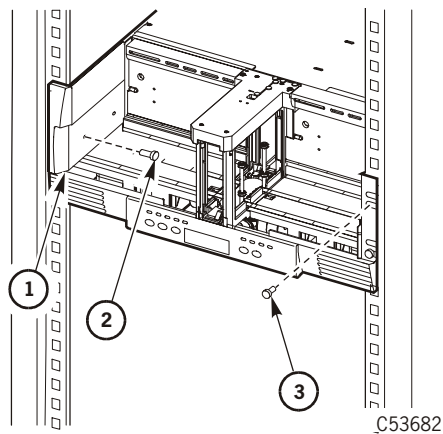
1. Side panel
2. Side panel mounting screw (2)
3. Drive tray mounting screws (4)

C53682

4. Remove the shipping insert (see figure) by performing these steps:

   a. Move the input bin slider to the right and hold it in this position.

   b. Reach through the CSL input bin to access the handle of the shipping insert.

   c. Squeeze both sides of the handle together and pull it out from the cartridge loading aperture.

   d. Continue to pull on the shipping insert handle until it reaches the mouth of the feed channel.

   e. Release pressure on the input bin slider and return it to the extended position.

   f. Press down on the cartridge stop mechanism at the base of the feed channel.

   g. Grasp the handle of the shipping insert and pull it out of the feed channel.

5. Store the shipping insert.

Note: The shipping insert should be installed in the drive whenever the CSL tray is returned to StorageTek for any reason.

6. Repeat Steps 1 through 5 if there are other CSL trays in the rack.

1. Feed channel
2. Shipping insert
3. Input bin
4. Cartridge stop mechanism

C53683
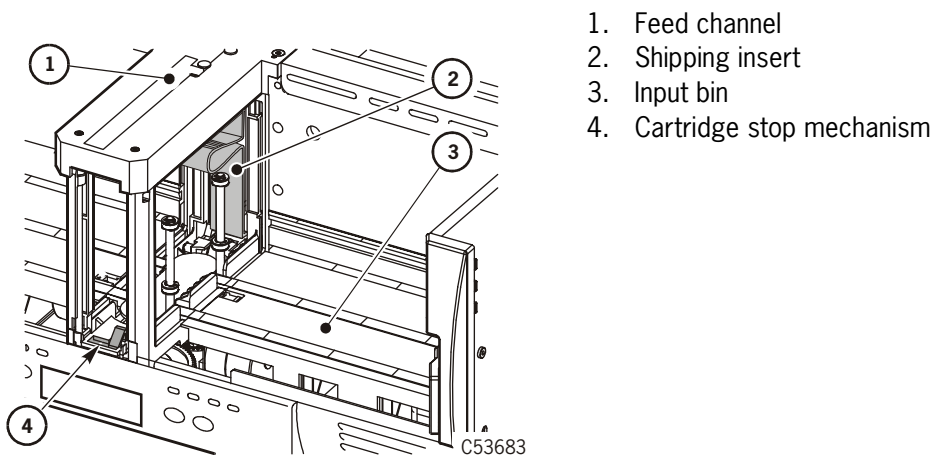
Attach Tray Power Cord

Use the instructions below to attach the power cord between a drive or CSL tray and the rack power distribution unit (PDU) power strip:

1. Attach the female end of the power cord, part number 10083590, to the AC receptacle on the tray.

   Note: The figure shows the location of the receptacle on a CSL tray. The receptacle on a drive tray is in a different location.

   If you are not using StorageTek RACK001, a different power cord may be required for the tray.

2. Attach the male end of the power cord to one of the 4-ganged outlets on the rack PDU power strip.

   Note: Earlier deliveries of StorageTek RACK001 may contain a PDU power strip which has a 6-ganged outlet group.

3. Repeat Step 1 and Step 2 for all remaining CSL or drive trays.

   Note: The RACK001 PDU power strip has a maximum of 12 Amps across the ganged outlets available for powering trays.

   The additional, single outlet is reserved for the rack fan power cord.

   When installing more than four trays, a second PDU power strip must be obtained and installed approximately 9 inches above the existing power strip (see "Install Optional Second Power Strip" on page 3-29).

   If you have the earlier, 6-ganged outlet PDU power strip, you should limit it to powering a maximum of four trays, and obtain a second PDU power strip for additional trays (see "Install Optional Second Power Strip" on page 3-29).

4. Slide the power cables into the brackets along the side of the frame.
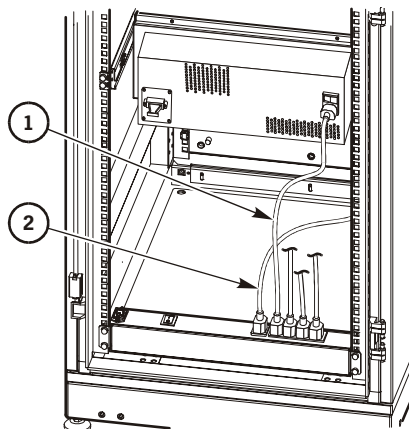
1. Tray power cord
2. Fan power cord

Install Host Interface Cables

The 9840 Tape Drive supports Fibre Channel and SCSI interfaces. This section contains:

- "Fibre Channel Cables (Rack-mount Tray)"
- "SCSI Cables (Rack-mount Tray)" on page 3-49

Fibre Channel Cables (Rack-mount Tray)

Use the instructions below to install Fibre Channel cables for a drive or CSL:

CAUTION:
Cable damage. **Fiber optic cables are easily damaged. Follow the guidelines in Chapter 2, "Safety and Handling" to prevent damage to the cables.**

1. Mark each Fibre Channel cable with the device address and port.

2. Route the cable(s) from near the host, hub, or switch to the rack.

   Note: Do not attach either end of the cable(s) at this time.

3. Route the Fibre Channel cable(s) for the first drive tray through the floor tile cutout then through the cable cutout in the floor of the rack, and up to the rear of the CSL or drive tray.

4. Leave enough slack in the cable(s) to bend and connect to the drive port(s).

5. Remove the rubber port plug from the selected drive port and clean the port.

   Note: If you are unfamiliar with the cleaning procedure, see "Clean Fibre Channel Components" on page 8-4.

6. Remove the cable connector covers and clean the cable ends with wipes.

   Note: If you are unfamiliar with the cleaning procedure, see "Clean Fibre Channel Components" on page 8-4.

CAUTION:
Equipment damage. **Do not force the fibre optic plug into the port connector.**

7. Connect the Fibre Channel cable to the desired port on the rear of the tray.

    Note: The connector is keyed so the cable can only be inserted one way.

CAUTION:
Cable damage. **If slack is not maintained in the cable, the weight of the cable may cause excessive stress at the cable connector.**

8. Insert the cable into the cable brackets along the side of the frame. Make sure to provide a drip loop to prevent stress at the cable connector.

9. Repeat Steps 3 through 8 if you will be using both ports of the drive.

    Note: If the drive tray has a second drive, repeat Step 3 through 9.
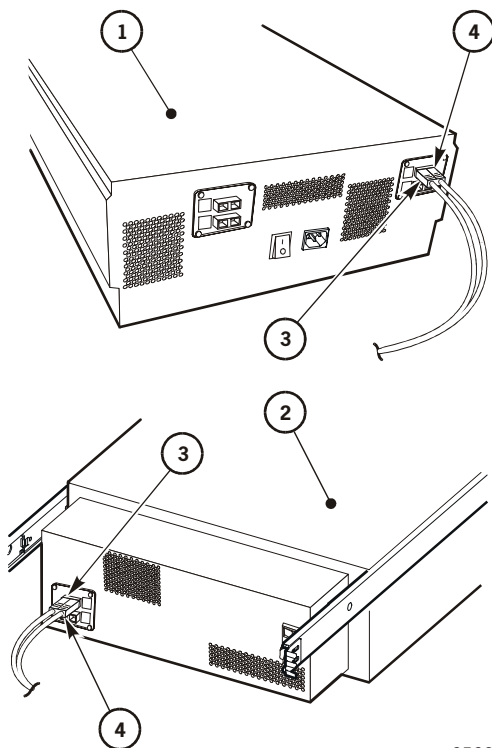
1. Manual drive tray (two drives installed)
2. CSL drive tray
    Note: Only one CSL can be installed per tray.

3. Port A (Fibre Channel cable)
4. Port B (Fibre Channel cable)

C53822

10. Route the cable(s) to the hub or switch and connect it to an open port.

   Note: If you are connecting directly to a host, *__do not__* connect the cable at this time. This will be done in a later section.

11. Repeat Step 3 through 10 for each additional Fibre Channel drive or CSL in the rack.

12. Go to if you are only installing Fibre Channel drive/CSL trays.
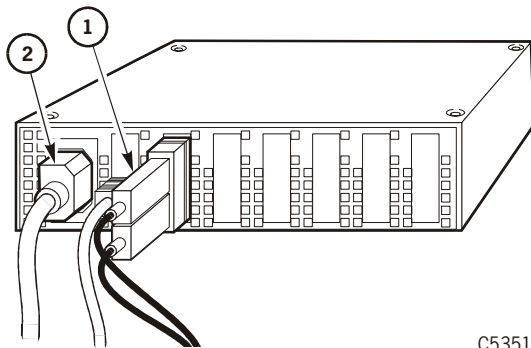
1.   Power cord
2.   Fibre Channel cable

C53519

SCSI Cables (Rack-mount Tray)

The 9840 Tape Drive connects to a SCSI bus and supports *only* the differential alternative.

Note: Term power is not supplied by the 9840 Tape Drive, it must be supplied by the host bus adapter card.

All host systems should have either the SCSI ports labeled or the international symbols displayed (Figure 3-9) to indicate the electrical configuration for that port.

Use the instructions below to install SCSI cables for a drive or CSL:

Figure 3-9. SCSI International Symbols
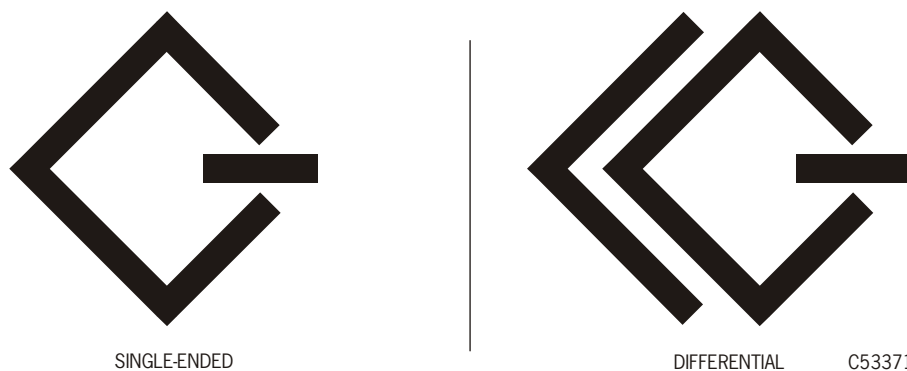
SINGLE-ENDED   DIFFERENTIAL   C53371

CAUTION:
Maximum cable length. **The maximum cable length for the differential alternative is 25 m (82 ft). Make sure that the total cable length (including all daisy-chain cables) from the host to the last device does not exceed the maximum length.**

1. Mark each cable with the device address; it is needed later to configure the drive/CSL.

2. Route the SCSI cable(s) from the host under the floor to the rack.

   Note: Do not attach either end of the cable(s) at this time.

3. Route the SCSI cable(s) for the first tray through the floor tile cutout then through the cable cutout in the floor of the rack, and up to the rear of the CSL or drive tray.

CAUTION:
Connector damage. **Be careful not to bend or damage the pins or connectors when connecting the cable to the drive or SCSI bus.**

4. Connect the cable to the 68-pin jack on the drive (see figure).

5. Insert the SCSI cable into the cable brackets along the side of the frame.
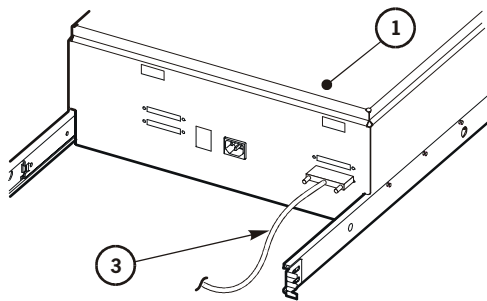
1. Drive tray (two drives installed)
2. CSL tray
3. SCSI cable
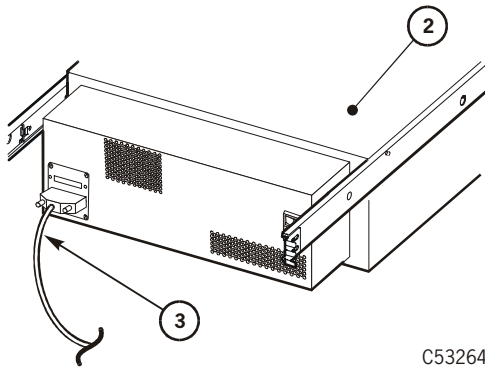
C53264

6. Connect the 457 mm (18 in.) daisy-chain cable (PN 310292001) from the second 68-pin connector to the next drive, if applicable (see the CSL drive tray in the figure).

   Note: Use a 343 mm (13.5 in.) daisy-chain cable (PN 10083616) for the manual-mount drive tray.

7. Install a terminator (PN 10148003) on the device at the end of the SCSI bus.

8. Repeat Step 2 through Step 7 for all other CSL or drive trays.

1. Drive tray (two drive installed)
2. CSL tray
3. SCSI daisy chain cable
4. SCSI terminator
5. SCSI cable to host

C53265
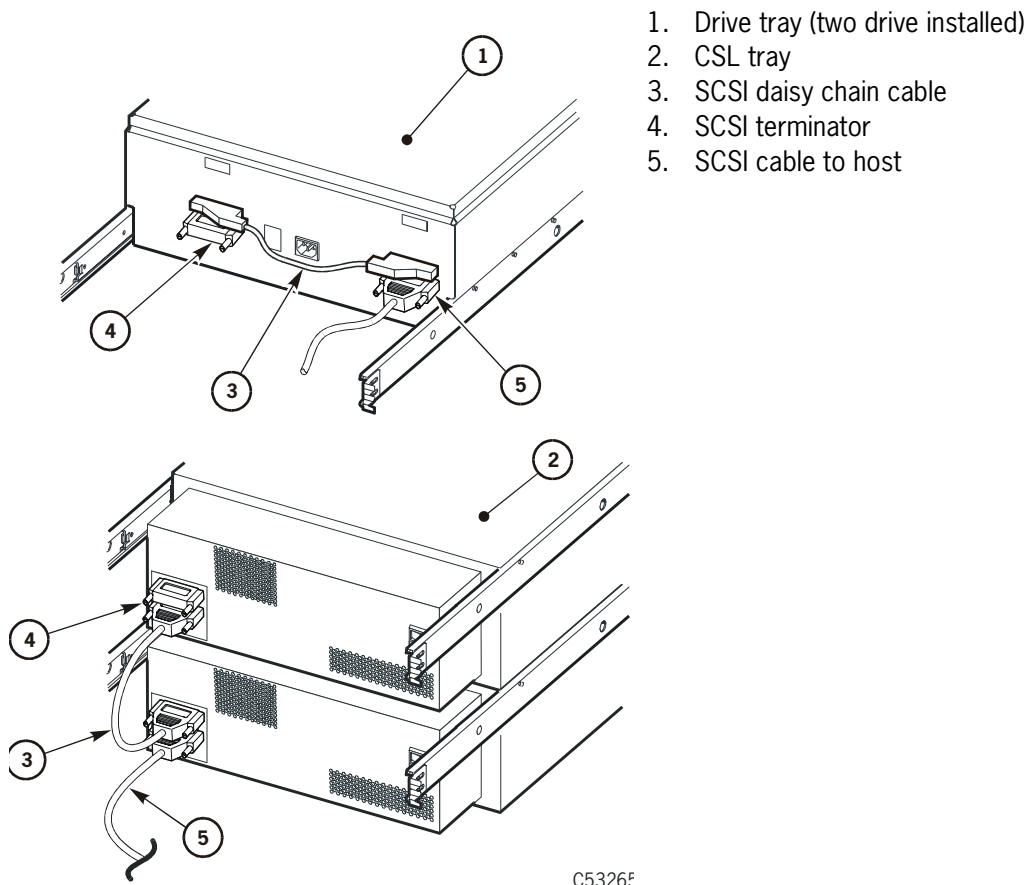
9. Go to "Power-On Rack" on page 3-52 if you are only installing SCSI drive/CSL trays.

Power-On Rack

1. Make sure the rack fan power cord is connected to the single outlet of the rack PDU power strip.

2. Attach the female end of the rack power cord to the connector on the left side of the rack PDU power strip (see figure).

   Note: When the RACK001 has more than four trays installed, a second PDU power strip must be obtained and installed approximately 9 inches above the existing power strip (see "Install Optional Second Power Strip" on page 3-29).

   The second PDU power strip, if installed, must be powered by a separate power cord and source.

3. Route the power cord/s through the floor of the rack, and attach the male end of the power cord to a power source.

   Note: To comply with safety agency standards, the socket/s shall be installed near the equipment and shall be easily accessible.
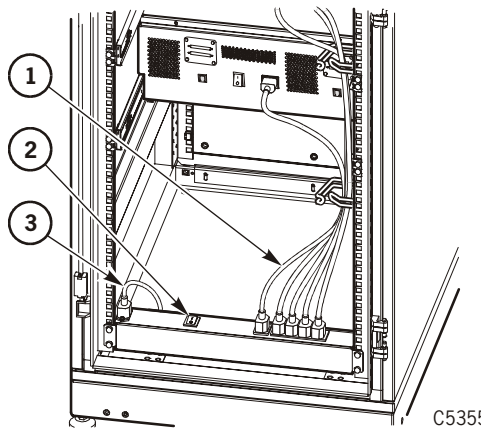
1. Fan power cord
2. PDU power switch
3. Input power cord to rack PDU

C5355

4. Place the PDU power switch/es to the ON position.

5. Press the power switch on each installed tray to the ON position.

6. Verify that all installed trays are operational.

   Note: A steady asterisk on the operator panel indicates a successful IPL completion, the drive is online, but not loaded with a cartridge.

7. Proceed to "Configure the Drive" on page 3-53.

■ Configure the Drive

After installation, make sure drive is properly configured as follows:

1. Obtain site specific configuration requirements.

2. Make sure the drive configuration settings match requirements.

    Note: For change drive configuration guidance, refer to:

    - "Fibre Channel Change Configuration Menu" on page 6-10
    - "SCSI Change Configuration Menu" on page 6-24

3. Close any open doors and replace any access covers of the library or the RACK001.

Table 3-3 provides a summary of configurable items.

Table 3-3. Fibre Channel and SCSI Configuration Items

Selection	Fibre Channel	SCSI
Compression	Yes	Yes
Data Security Erase	Yes	Yes
Port A/B Attributes[1]	Yes	N/A
SCSI Attributes[1]	N/A	Yes
Tape Bar Usage	Yes	Yes
Language	Yes	Yes
VolSafe	Yes	Yes
FullCode Load[2]	No	No
Emulation	Yes	Yes
Library Address[3]	Yes	Yes
CSL Power Up Mode	Yes	Yes

[1] Fibre Channel and SCSI attributes must be set to match specific site requirements.

[2] Full code load is preset to "No", and only applicable single firmware code is loaded in the drive EEPROM prior to shipment from StorageTek. Refer to FullCode Load Submenu, on page 6-18 or page 6-29 for additional FullCode information.

[3] Library address must be unique as required for specific site installation.

■ Install Interface Cables at Host

Install the free end of the interface cable (Fibre Channel or SCSI) to the applicable hub, switch, or host.

CAUTION:
For SCSI cables, remove power from the 9840 Tape Drive before connecting to the host.

Note: If you are attaching to a 50-pin SCSI bus, an adapter is required (part number 10148010).

■ Manually Load Cartridges

Test each installed drive to ensure it loads and unloads a cartridge correctly.

■ Return System to Operator

After installation and testing of the 9840 Tape Drive. Follow these steps before you turn the unit over to the customer:

1. Place the drive online (see Chapter 4, "Getting Started").

2. Return to the 9738 library installation documentation and complete the library installation, if applicable.

   Note: The 9738 library configuration must be updated to identify 9840 Tape Drives.

3. If applicable, provide the operator with training on the 9840 Tape Drive.

4. If applicable, provide training on placing a service call.

Getting Started

<div style="text-align: right">**4**</div>

This chapter describes only the most common manual operations. It includes instructions on operating the drive, and how to use the drive. This chapter contains:

Note: Refer to Chapter 6, "Menu System," for all drive operations.

■ Basic Operations

This section provides instructions on:

Power-on the Drive

Note: Refer to Chapter 5, "Cartridge Scratch Loader," for instructions to power-on a CSL.

1. To apply power to a desktop unit and/or rack-mountable drive tray:

   a. Make sure the power cord is connected to an AC source.

   b. Set the **Power** switch on the rear panel to ON.

2. To apply power to a library drive power supply that has a **Power** switch:

   a. Make sure the power cord is connected to a library power strip.

   b. Set **Power** switch to ON.

3. To apply power to a library drive power supply that does not have a **Power** switch, connect the power supply power cord to a library power strip.

4. Wait until the drive successfully completes IPL. Note the following:

    •   The "CC DIAGS" and "ASIA DIAGS" messages indicate that the IPL diagnostics are active. These messages require no action on your part.

    •   The drive powers on automatically to online mode if drive is operable and configuration error/s were not encountered.

    •   The drive powers on to offline mode if a configuration error was encountered and the "Fix_CfgErr" message displays; see note.

    •   "Memory Err" or "Boot Fail" may be displayed if an error occurs early in the IPL sequence. These errors cause the drive to hang; see note.

    Note: If any error displays, go to Table 7-2 on page 7-3 for a description of corrective action.

5. Inform the operator when the drive is available and can receive I/O from the host(s).

Power-off the Drive

Note: Refer to Chapter 5, "Cartridge Scratch Loader," for instructions to power-off a CSL.

1. Make sure I/O is not active to the drive from any host(s).

2. Unload a tape cartridge, if loaded, and remove it from drive.

3. Power-off the drive:

    a. For a desktop unit and/or rack-mountable drive tray, set the **Power** switch on the rear panel to OFF.

    b. For a library drive power supply that has a **Power** switch, set the **Power** switch to OFF.

    c. For a library drive power supply that does not have a **Power** switch, disconnect the power supply power cord.

Reset the Drive

Pressing the **IPL** switch resets the drive and reloads drive firmware into drive memory. (The same process occurs automatically at power-on).

To reset a drive that is already powered on:

1. Make sure a cartridge tape is not loaded in the drive.

2. Press **IPL**.

   - The *power* indicator flashes.

   - The display shows various messages indicating that the IPL is proceeding. These messages require no action on your part.

When the drive finishes a successful IPL:

- The *power* indicator is on steadily.
- The display shows `*` (an asterisk).
- The drive is now in the online state.

Place the Drive Offline

By default, the drive is in the online state following a successful IPL. To change the drive state to offline:

1. Cease all I/O activity from the host.

2. Press the **Menu** switch.

   The display shows `Online`, indicating the current state of the drive.

3. Press **Select** to place the drive offline.

   The display shows `Offline`, indicating a successful transition.

   Note: While the drive is offline, other menu options are available. Refer to Chapter 6, Menu System for additional instruction.

4. Press **Menu** until the display shows `Exit Menu?`.

5. Press **Select** to exit, or **Menu** to repeat Online/Offline selection.

   Note: If `Exit Menu?` is selected, the display shows `Offline,` alternating with the normal message, as a reminder that the drive is in the offline state.

Place the Drive Online

To change the drive state back to online:

1. Press **Menu**.

   The display shows `Offline`, indicating the offline state of the drive.

2. Press **Select** to place the drive online.

   The display shows `Online`, indicating a successful transition.

3. Press **Menu** until the display shows `Exit Menu?`

4. Press **Select** to exit, or **Menu** to repeat the Online/Offline selection.

View Drive Configuration

To view current drive configuration:

1. Press **Menu** to enter the menu system.

   a. If the display shows `Online`, go to step 2.

   b. If the display shows `Offline`, press **Select** to place the drive online

2. Press **Menu** until the display shows `View CFG ?`.

3. Press **Select** to enter the view configuration submenus. The display shows the first configuration setting.

4. Press **Menu** to step through the configuration settings.

5. Press **Select** to exit when the display shows `Exit CFG ?`, or press **Menu** to repeat the view configuration submenus.

6. Press Menu until the display shows `Exit Menu?`

7. Press **Select** to exit the menu system, or press **Menu** to repeat the Online/Offline selection.

View Firmware Release Level

To view the firmware release level:

1. Press **Menu** to enter the menu system.

2. Press **Menu** until the display shows a number in the following format:

   R$x.yy.zzzc$, where:

   > x is the major revision level
   > yy is the minor revision level
   > zzz is the integration number
   > c is the channel type, where
   >> `f` is Fibre Channel
   >> `s` is SCSI

3. Press **Menu** until the display shows `Exit Menu?`

4. Press **Select** to exit the menu system, or press **Menu** to repeat the Online/Offline selection.

■ Clean the Drive

When the *clean* indicator on the operator panel (Figure 1-12 on page 1-11 or Figure 1-13 on page 1-13 for the CSL) lights, it means that read/write errors occurred or a specific length of tape has passed over the read/write head. The 9840 Tape Drive write/read head assembly should be cleaned by a cleaning tape cartridge as soon as possible.

CAUTION:
Do not wet-clean (chemical-clean) a 9840 Tape Drive.

Do not clean the drive unless the *clean* indicator lights. Cleaning more frequently might damage the read/write head.

Clean the drive with the drive offline or online. Use the 9840 cleaning cartridge with the letter U in the media ID area (a dry-cleaning cartridge).

To clean the tape drive:

1. Unload the data cartridge tape if necessary.

2. Insert the cleaning cartridge in the drive.

   Notes:

   1. A CHK *xxxx* message means a cleaning cartridge failure, where the notation "*xxxx*" is a four-character hexadecimal fault symptom code (FSC). Try a different cleaning cartridge.

   2. A 9840 cleaning cartridge is limited to 100 cleanings. If the drive ejects the cleaning cartridge and displays Exp CLcart, the cartridge is used up. Discard the cleaning cartridge and use a new one.

3. Observe:

   a. The green *activity* indicator flashes to indicate cleaning is occurring.

   b. The cleaning cartridge ejects and the *clean* indicator turns off when cleaning is complete.

4. Remove the cleaning cartridge.

■ Cartridges

This section provides the following cartridge information:

Write Protect/Enable a Cartridge

The 9840 Tape Drive uses standard and VolSafe cartridges. The VolSafe cartridge can be distinguished from the standard cartridge by its yellow markings.

Switch Positions

Refer to Table 4-1 for explanation of the write protect switch positions.

Table 4-1. Write Protect Switch

Write Protect Switch	Standard Cartridge	VolSafe Cartridge
Unlocked	Data can be written on the cartridge.	Data can be appended to written data on the cartridge.
	Data can be read from the cartridge.	Data can be read from the cartridge.
Locked	Cartridge is write protected.	Cartridge is write protected.
	Data can *only* be read from the cartridge.	Data can *only* be read from the cartridge.

Process

Follow these instructions to write protect/enable a standard or VolSafe cartridge:

1. Hold the cartridge with the customer label side up and rear volser label towards you.

2. Locate the **Write-protect** switch on the right side of the cartridge (Figure 4-1 on page 4-7).

3. Move the switch to the front of the cartridge away from you for the write-protect position, or in toward you for the write-enable position.

Figure 4-1. Cartridges

REAR VIEW   C53678
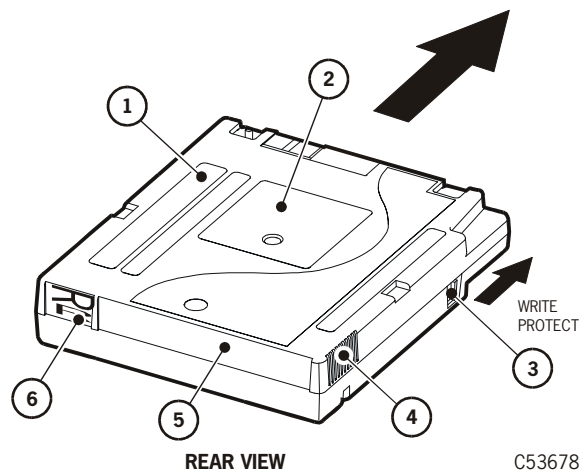
1. Manufacturer Label Area (yellow on VolSafe Cartridge)
2. Customer Label
3. Write Protect Switch (yellow on VolSafe Cartridge)
4. Finger Grips
5. VOLSER Label Area
6. Media Id (machine identifiable-yellow on VolSafe Cartridge)

Load a Cartridge Tape

> **Note:** Refer to Chapter 5, "Cartridge Scratch Loader," to load a cartridge tape into a CSL.

1. Manually insert a cartridge tape into the drive loading slot in the direction shown in Figure 4-1.

2. Observe the following messages on the display:

    - `Ready F` (file protected) message means a write-protected cartridge tape loaded successfully.

    - `Ready U` (file unprotected) message means a write-enabled cartridge tape loaded successfully.

    - `Ready A` (append only) message means a write-enabled VolSafe cartridge tape loaded successfully in a VolSafe-enabled drive.

    - `Load xxxx` message means an attempted load was unsuccessful, where "*xxxx*" is the FSC that caused the Load failure. See Table 7-2 on page 7-3 to resolve this condition.

Unload a Cartridge Tape

Note: Refer to Chapter 5, "Cartridge Scratch Loader," to unload CSL cartridges.

Pressing the **Unload** switch causes the cartridge in the drive to rewind and eject.

Pressing **Unload** once during a write operation causes the drive to try to write the remaining data before the cartridge tape unloads. A display of UnWr *xxxx* (unwritten data, where *xxxx* is the FSC) means that some data is not written to the tape. Pressing **Unload** a second time causes the unwritten data to be lost. Before you press **Unload** again, see "UnWr xxxx Indication" on page 7-12

To unload a cartridge tape:

1. Make sure the drive is not reading, writing, or selected from the host.

CAUTION:
DATA LOSS. DO NOT PRESS Unload TWICE DURING A WRITE OPERATION.

2. Press the **Unload** switch once

    Note: One of the following conditions occurs:

    -   The cartridge tape rewinds and ejects from the drive. Remove the cartridge tape from the drive.

    -   The cartridge tape rewinds but fails to eject. The display shows Load *xxxx*, where *xxxx* is the FSC.

    -   The cartridge tape is jammed and the drive requires service to resolve the problem (Refer to "Jammed Cartridge" on page 8-1).

Reclaim (Reformat) a Cartridge Tape

A 9840 tape cartridge, specially formatted or corrupt, can be reformatted as a data tape and returned (reclaimed) to normal use.

CAUTION:
***Tape damage:* Do not degauss a tape cartridge. A servo track is written on the tape at the factory. Degaussing the tape erases this track and renders the tape unusable and unrecoverable.**

To reclaim a cartridge:

1. Ask the operator to make sure the drive does not have I/O to/from the host.

2. Press the **Menu** switch, then press **Select** for Offline.

3. Press the **Menu** switch until you reach the Drive Operations menu. `Drv Menu?` displays.

4. Press the **Select** switch to enter Drive Operation submenus.

5. Press the **Menu** switch until `MakeDataTp` displays.

6. Press the **Select** switch to start.

    Note: Any tape cartridge in the drive ejects.

7. Load a write-enabled tape cartridge when `Ld Data Tp` displays.

    Notes:

    - Formatting starts automatically.

    - The green *activity* indicator flashes during the process.

    - The process erases previous data and reformats tape.

    - If `DatCrFailx` (where *x*=1) displays, an error has occurred. See Table 7-2 on page 7-3.

    - When formatting is done, the tape cartridge ejects.

8. Remove the tape cartridge.

    Note: To format another data tape, repeat Steps 7 and 8.

9. Exit the Drive Operations menu.

10. Return the drive to Online.

11. Exit the Menu system.

    Note: A steady `*` should display after exiting.

12. Inform the operator that the drive is ready.

■ Format a Diagnostic Dump Tape

Use the following procedure to format a 9840 tape cartridge with a special format that prepares it to collect a diagnostic dump.

1. Ask the operator to make sure the drive does not have I/O to/from the host.

   Note: In the enterprise environment, ask the operator to vary the drive offline.

2. Press the **Menu** switch, then press **Select** for Offline.

3. Press the **Menu** switch until you reach the Drive Operations menu. `Drv Menu?` displays.

4. Press the **Select** switch to enter Drive Operation submenus.

5. Press the **Menu** switch once. The `MakeDumpTp` submenu displays.

6. Press the **Select** switch to start.

   Note: Any tape cartridge in the drive ejects.

7. Load a write-enabled tape cartridge in the drive when `Ld Dump Tp` displays.

   Notes:

   - Formatting starts automatically.

   - The green *activity* indicator flashes during the process.

   - The process erases previous data and gives the tape cartridge a special dump tape ID coding.

   - If `DmpCrFailx` displays (where *x*=1 or 2), an error has occurred. See Table 7-2 on page 7-3.

   - When formatting is done, the tape cartridge ejects.

8. Remove the tape cartridge.

   Note: To format another dump tape, repeat Steps 7 and 8.

9. Exit the Drive Operations menu.

10. Return the drive to Online.

11. Exit the Menu system.

    Note: A steady * should display after exiting.

12. Inform the operator that the drive is ready.

■ Diagnostic Dump to Tape

Whenever an error occurs that creates diagnostic dump data, the red *service* and green *activity* indicators on the operator panel flash, to indicate new diagnostic data is being saved (dumped) to the EEPROM. Once the data is saved, the indicators stop flashing. The display now alternates between an `*`, and `xxxx:Dmpyy`, to indicate that a new uncollected dump is present and is available to download (collect) to tape or electronic files.

Note: The notation "`xxxx`" is the FSC of the fault that caused the dump, and `yy` = total number of uncollected dumps in the EEPROM.

Use the following procedure to collect diagnostic dump data from the drive EEPROM to a specially formatted, write-enabled tape cartridge. If formatting a tape is required, see "Format a Diagnostic Dump Tape" on page 4-10.

The dump to tape operation does not overwrite dumps already on the tape. New dumps append to earlier dumps already on the tape.

To collect a diagnostic dump to tape:

1. Ask the operator to make sure the drive does not have I/O to/from the host.

2. Load a write-enabled, formatted dump tape in the drive.

Notes:

- Data is automatically written to the tape from the drive's EEPROM.

- While data is being written to the tape, the green *activity* indicator flashes.

- When the process is done, the dump tape cartridge ejects.

- If `DmpWrFailx` displays (where *x*=1 or 2), an error has occurred. See Table 7-2 on page 7-3.

3. Remove the dump tape cartridge.

4. If drive is Offline, return it to Online.

5. Exit menu system.

   Note: A steady `*` should display after exiting.

6. Inform the operator that the drive is ready.

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Cartridge Scratch Loader

<div style="text-align: right">5</div>

This chapter covers the Cartridge Scratch Loader (CSL). It contains:

■ Overview

The CSL consists of a 9840 Tape Drive, a power supply, and a scratch loader. The CSL ships as a desktop or rack-mounted unit (Figure 5-1).

Note: Priority cartridges can be mounted in any mode of operation.

Figure 5-1. Desktop and Rack-mount CSL
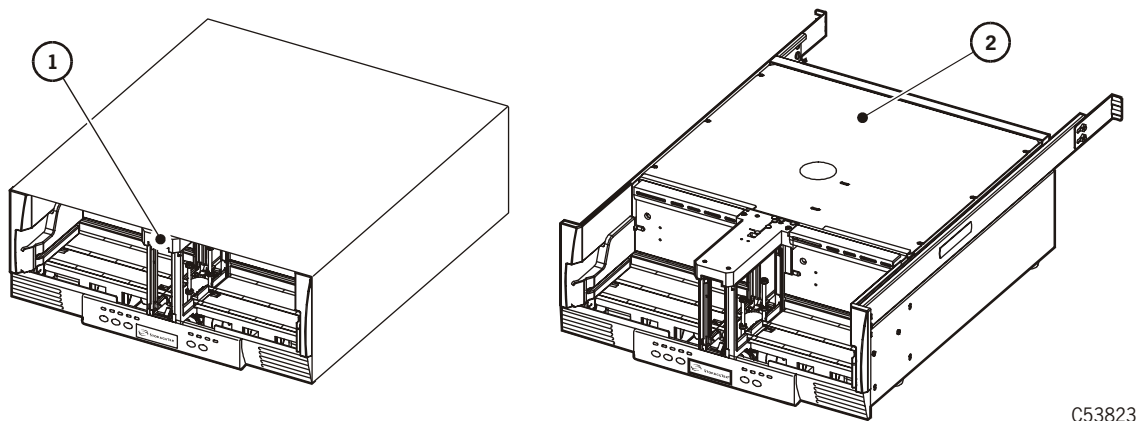
C53823

1. Desktop CSL
2. CSL for rack-mount tray

The CSL is an electromechanical device that can load and unload up to seven cartridge tapes. It also has a priority feed slot (open area of feed channel) to mount a priority cartridge into the tape drive.

Component Locations

Refer to Table 5-1 for CSL component descriptions and to Figure 5-2 for locations of the CSL components. Operators should become familiar with the CSL components listed below.

Note: The CSL desktop and the rack-mountable 19 inch tray unit (Figure 5-1 on page 5-1) components and locations are identical.

Table 5-1. CSL Component Descriptions

Component	Purpose
Operator Panel	Operates the 9840 Tape Drive and CSL
Output Bin	Houses ejected cartridges from the feed channel
Feed Channel	Inputs/outputs cartridges to/from 9840 Tape Drive and also used for priority mounts
Input Bin	Loads cartridges into the feed channel

Figure 5-2. CSL Component Locations
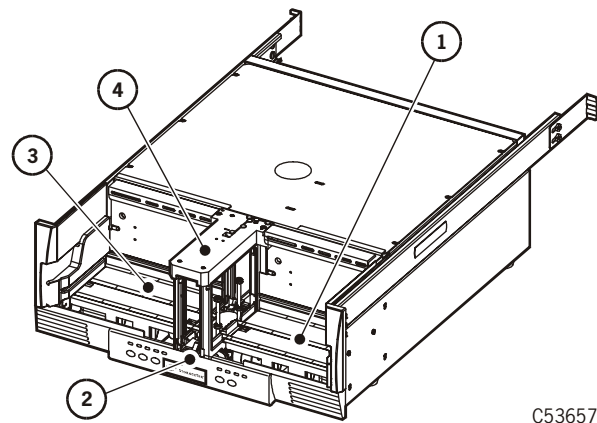
C53657

1. Input Bin
2. Operator Panel
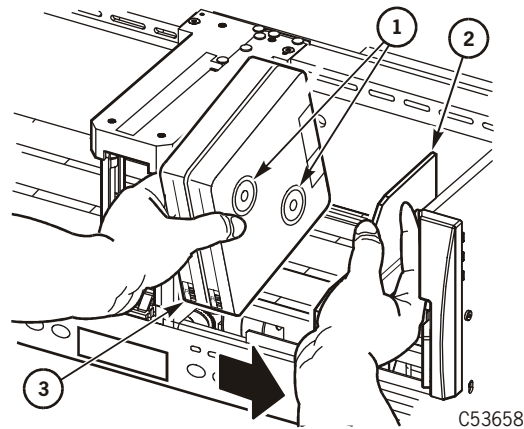3. Output Bin
4. Feed Channel

The client-server CSL desktop and the rack-mountable version use Fibre Channel and SCSI interfaces. The interface cable, power cord, and power switch are located on the rear of the unit. Figure 5-5 on page 5-6 illustrates the rack mount CSL.

Cartridge Routing

Cartridges are loaded into the CSL (Figure 5-3) vertically with the Media Id label (R) facing out towards the operator (reels to the right). Load cartridges into the input bin (right side of the CSL).

Note: Never load cartridges flat or with the cartridge reels to the left.

Figure 5-3. Cartridge Routing

C53658

1. Cartridge reels
2. Input bin bookend
3. Media ID label (R)

Figure 5-2 on page 5-2 provides all components of the CSL. The output bin is located on the left side of the CSL. The feed channel is in the middle of the CSL. Cartridges are shifted from the right to the left, from the input bin into the feed channel and from the feed channel into the output bin.

Note: The CSL is unable to prevent or detect miss-oriented cartridges. Ensure cartridges are always loaded correctly (Figure 5-3).

Cartridges are loaded into the drive as they are manually loaded by the operator. If the drive detects an incorrectly positioned cartridge, it forces a CSL failure condition or requests an unload operation from the CSL.

CSL Firmware Update/Load

Drive code release 1.28.10x, and up, combines the latest CSL released code with the 9840 Tape Drive code. The code load process is as follows:

Note: Drive code update/load must always be completed by a qualified technician.

1. When the code tape is loaded, the code loads into the drive EEPROM.

2. When the drive is IPLd and if the drive is installed in a CSL, the CSL code is checked.

3. If the code is different, the code will be updated within the CSL EEPROM.

   Note: If the code levels are the same, no download occurs.

4. The drive displays CSL Update (update takes approximately 1.5 minutes).

■ Desktop CSL

Refer to Figure 5-4 for the desktop CSL. This desktop unit has the feed channel, input bin, output bin, and operator panel identified. The desktop uses Fibre Channel and SCSI interfaces.

The desktop CSL is stackable up to a height of two units. Protective feet are installed on the bottom of the unit to allow for stability.
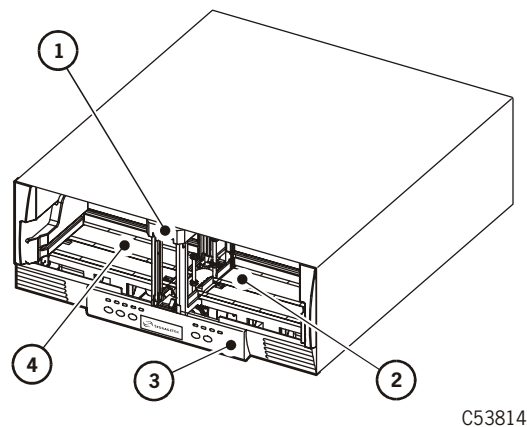
CAUTION:
*Equipment damage***: The desktop CSL weighs 50 lb and must not be stacked any higher than two units.**

*Personal injury***: Due to the weight of the CSL, two persons are recommended to lift or move the CSL.**

Note: The desktop has a power switch on the rear to control all enclosed electronics.

Figure 5-4. CSL Desktop Unit

C53814

1. Feed Channel
2. Input Bin
3. Operator Panel
4. Output Bin

Refer to Table 5-2 for the desktop dimensions.

Table 5-2. CSL Desktop Dimensions

| Dimension	Fibre Channel	SCSI
Width	19 in.	19 in.
Depth	30 in.	30 in.
Height	7.625 in.	7.625 in.
Weight	50 lb	50 lb

■ Rack

The StorageTek RACK001 may be used to install the rack mount CSL trays. Refer to Figure 5-5 for the StorageTek RACK001. This rack contains six CSLs. The rack may contain a combination of 9840 Tape Drives and CSLs.

Note: A customer may wish to use other racks to install the rack mount CSL trays. This is permissible.

The rack can have up to six CSLs with one per tray, up to 12 manual drives with two per tray, or a combination of CSLs and manual drives to fill the six slots. Different trays may have different interfaces.

Figure 5-5. RACK001 for CSL Trays

C53659
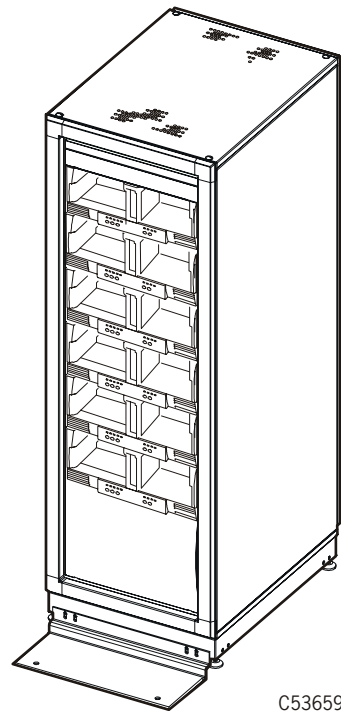
1. StorageTek RACK001

The rack and CSLs ship in separate containers. The CSLs must be installed within the rack by a qualified individual.

CAUTION:
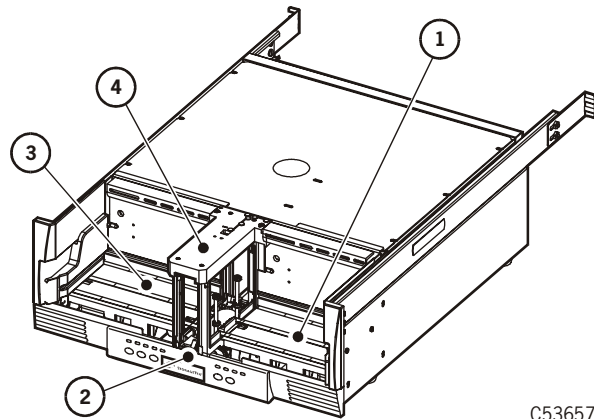*Personal injury*: **Due to the weight of the CSL, two persons are recommended to lift or move the CSL.**

■ Rack-mount CSL Tray

Refer to Figure 5-6 for the rack mount CSL. The rack mount CSL ships with either a Fibre Channel or SCSI interface.

Note: The slide rails are installed on the CSL in Figure 5-6.

This rack unit has the feed channel, input bin, output bin, and operator panel identified. The rack unit has a power switch on the rear to control all enclosed electronics.

Figure 5-6. Rack Mount CSL

C53657

1. Input Bin
2. Operator Panel
3. Output Bin
4. Feed Channel

CAUTION:
***Personal injury*: Due to the weight of the CSL, two persons are recommended to lift or move the CSL.**

Table 5-3 provides the rack mount CSL tray dimensions.

Table 5-3. Rack Mount CSL Tray Dimensions

| Dimension	Fibre Channel	SCSI
Width	ANSI/EIA 19-inch rack	ANSI/EIA 19-inch rack
Depth	30 in.	30 in.
Height	7.625 in.	7.625 in.
Weight	39 lb	39 lb

■ Operator Panel

Note: The 9840 Tape Drive and CSL operator panel use small push-button switches. The term switch or switches is used to identify them throughout this manual.

The operator panel (Figure 5-7) allows a human interface to the subsystem. The left half of the operator panel contains the indicators and switches specifically for the 9840 Tape Drive.

The right half of the operator panel contains the indicators and switches specifically for the CSL. They are:

- *operator* Indicator (6)
- *system* Indicator (7)
- *automatic* Indicator (8)
- *manual* Indicator (9)
- **Start** Switch (14)
- **Autoload Mode** Switch (15)

Figure 5-7. CSL Operator Panel
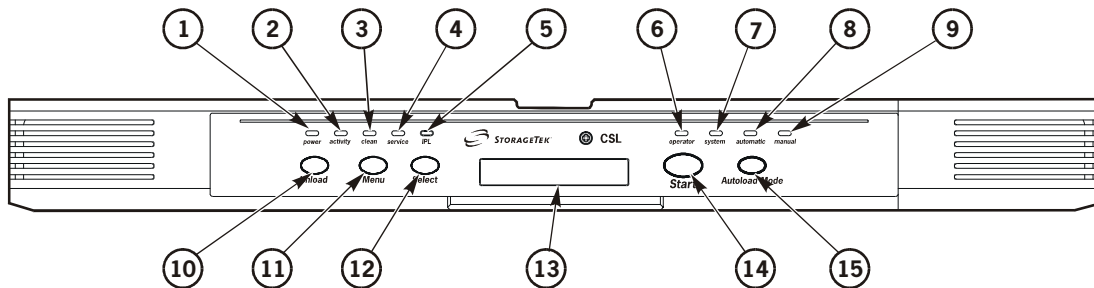
C53660

1. *power* indicator
2. *activity* indicator
3. *clean* indicator
4. *service* indicator
5. **IPL** switch
6. *operator* indicator
7. *system* indicator
8. *automatic* indicator
9. *manual* indicator
10. Unload switch
11. Menu switch
12. Select switch
13. Operator display
14. Start switch
15. **Autoload Mode** switch

Note: The **IPL** switch (5) only IPLs the drive. Use the **Power** switch on the back of the CSL to IPL the CSL.

Note: Only the CSL indicators and switches are discussed in this section. Refer to "Operator Panels" on page 1-7 for explanation of the 9840 Tape Drive indicators and switches.

CSL Switches

Refer to Table 5-4 for CSL operator panel switch descriptions.

Note: Refer to "Operator Panels" on page 1-7 for explanation of the 9840 Tape Drive switches.

Table 5-4. CSL Operator Panel Switches

Switch	Description
Start Switch (CSL only)	Pressing this switch restarts CSL operation after the operator empties a full output bin or replenishes an empty input bin. Also used to restart CSL operation after clearing a misfed cartridge. **Notes:** 1. Remove the cartridge before pressing the **Start** switch. 2. Press the **Start** switch twice when there is a load failure or solid *operator* indicator (red) on the CSL. Pressing the switch twice re initializes the CSL.
Autoload Mode Switch (CSL only)	Pressing this switch changes the operation of the CSL to one of three modes: System, Automatic, or Manual. **Notes:** 1. Select the mode of operation by using the **Autoload Mode** switch. 2. Press the **Start** switch to set the mode of operation. The CSL powers on in the default mode selected in the drive configuration menu. The default mode is overridden when the switch is used to select a new setting. The CSL remains in the selected mode while the drive is powered on. This does not change the IPL default mode in the drive configuration menu. • **System** allows host to control CSL. • **Auto** allows CSL to operate automatically. • **Manual** allows manual operations only.

CSL Indicators

The CSL operator panel indicators (Figure 5-8) are described in Table 5-5 on page 5-11.

Note: Refer to "Operator Panels" on page 1-7 for explanation of the 9840 Tape Drive indicators.

Figure 5-8. CSL Operator Panel Indicators
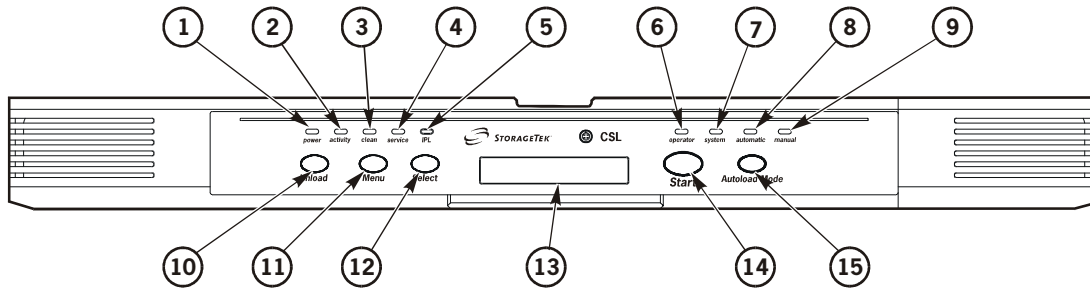
C53660

1. *power* indicator
2. *activity* indicator
3. *clean* indicator
4. *service* indicator
5. IPL switch
6. *operator* indicator
7. *system* indicator
8. *automatic* indicator

9. *manual* indicator
10. Unload switch
11. Menu switch
12. Select switch
13. Operator display
14. Start switch
15. Autoload Mode switch

Note: The IPL switch (5) only initiates an IPL of the drive. Use the **Power** switch on the back of the CSL to IPL the CSL.

**Table 5-5. CSL Operator Panel Indicators**

Indicator	Figure 5-8 Number	Description	Explanation
operator (red) (CSL only)	6	When flashing:	The CSL detected an operator-intervention condition. Do the following as required: • See if input bin empty • Verify if a mode change is in progress • Remove cartridge(s) from output bin • Load cartridge(s)
		When flashing and **xxxx** is displayed:	It asks for the specific tape indicated in the display
		When constantly on:	It indicates an error condition. To correct, fix jam (remove cartridge in feed channel) and press **Start** switch. Refer to "Jammed Cartridge" on page 5-30.
system (green) (CSL only)	7	Indicates CSL is in System mode**:** allows host to control CSL.	
automatic (green) (CSL only)	8	Indicates CSL is in Auto mode: allows CSL to operate automatically.	
manual (green) (CSL only)	9	Indicates CSL is in Manual mode: allows manual operations only.	

■ Power On/Off CSL

This section provides a process to power on/off the CSL. Figure 5-9 provides locations of the **Power** switch, power cord, terminator, and cable for a CSL SCSI interface.

Note: The CSL **Power** switch and power cord are located on the rear of the CSL. The switch and cord are in the same locations on a SCSI or Fibre Channel CSL.

Figure 5-9. CSL Power

C53661
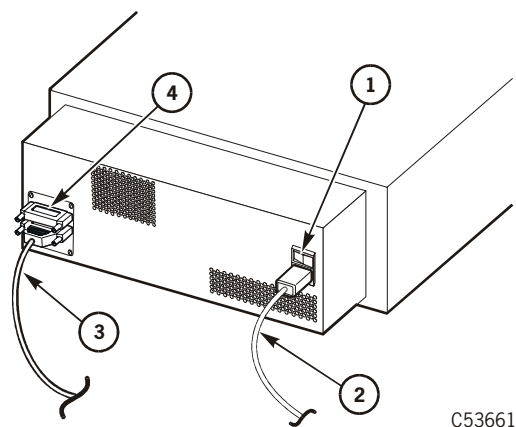
1. **Power** switch
2. Power cord
3. SCSI cable
4. Terminator

Power On

1. Ensure the power cord is attached to the receptacle on the rear of the CSL.

Note: The power cord and applicable interface cable (SCSI) should have been attached during initial installation.

2. If the power cord is not attached to the CSL, do the following:

   a. Attach the female end of the power cord to the CSL receptacle.

   b. Attach the male end of the power cord to a power outlet.

3. Press the **Power** switch on the rear of the CSL to ON (1).

4. Verify that the CSL powers on.

Note: A steady asterisk on the operator panel indicates a successful IPL completion, the drive is online, but not loaded with a cartridge.

Power Off

1. Press the **Unload** switch to eject the cartridge from the CSL.

2. Ask the operator to ensure that the drive has no I/O from the host.

3. Use the operator panel to place the CSL offline.

Note: Refer to Chapter 6, "Menu System." for instructions to place the CSL offline.

4. Press the **Power** switch on the rear of the CSL to OFF (0). This will power off the CSL.

Figure 5-10. CSL Power Switch

C53661
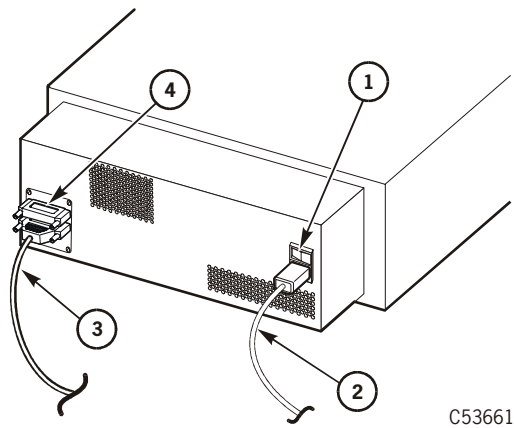
1. **Power** switch
2. Power cord
3. SCSI cable
4. Terminator

5. Verify that the CSL powers off.

Note: All indicators are off and the operator panel is blank.

■ CSL Cartridge Loading/Unloading

This section contains procedures to load and unload cartridges within the CSL.

Cartridge Loading

Note: Engineering recommends no drive activity during cartridge loading. This ensures that no drive errors are induced.

To correctly load a cartridge into the input bin, follow these instructions and refer to Figure 5-11.

- Load cartridges into the CSL vertically with the Media Id label (R) right side up and facing out towards the operator (reels to the right).

- Never load cartridges with the cartridge reels to the left.

- Never load cartridges flat within the CSL. This causes an instant CSL failure.

Figure 5-11. Cartridge Loading

C53658
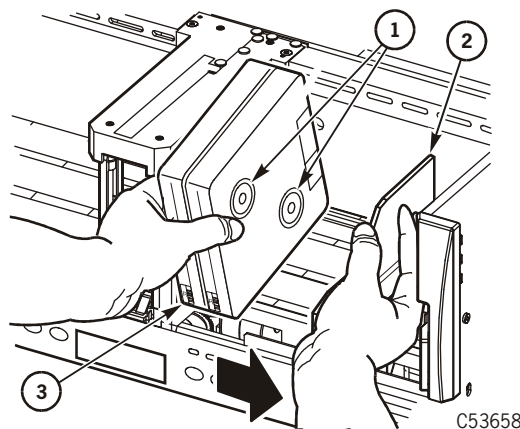
1. Cartridge reels
2. Input bin bookend
3. Media ID label (R)

1. Move the CSL spring-loaded bookend to the right and hold it in this position while loading cartridges.

2. Load cartridges into the CSL vertically with the Media Id label (R) facing out towards the operator (reels to the right).

3. Verify that the customer label (if used) is on the left side of the cartridge (toward the feed channel).

4. Tilt the cartridge back slightly.

5. Insert the bottom-back edge of the cartridge into the CSL input bin.

6. Slide the front edge of the cartridge into the CSL.

7. Slowly release the CSL spring-loaded bookend and ensure it touches the loaded cartridges.

8. Check that all loaded cartridges are seated correctly.

   Note: Ensure that cartridges are aligned vertically and horizontally within the input bin and that the spring-loaded bookend is pressed firmly against the cartridges.

Cartridge Unloading

Cartridges are ejected from the feed channel into the output bin (Figure 5-12). One to seven cartridges may be ejected into the CSL output bin.

Note: When unloading cartridges from the CSL output bin, ensure the spring-loaded bookend does not slam into the feed channel.

To correctly unload a cartridge from the output bin, follow these instructions and refer to Figure 5-12:

1. Move the CSL spring-loaded bookend to the left and hold it in this position while unloading cartridges.

2. Grasp the cartridge(s) and tilt the cartridge back slightly.

3. Remove the cartridge(s).

4. Slowly allow the CSL spring-loaded bookend to touch the feed channel.

   Note: Allowing the output or input bin bookend to slam into the feed channel may cause drive errors.

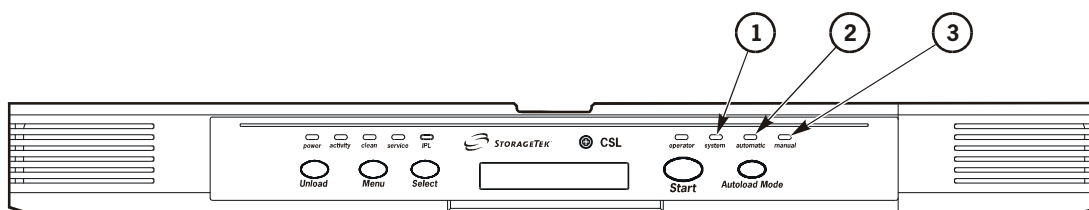**Figure 5-12. Cartridge Unloading**
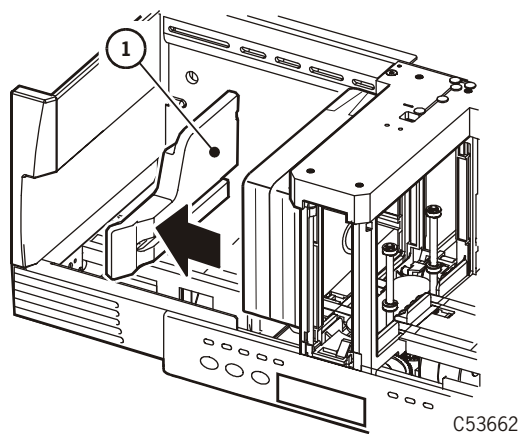
C53662

1. Output bin bookend

■ Modes of Operation

The CSL has three distinct modes of operation (Figure 5-13). They are:

- System Mode
- Automatic Mode
- Manual Mode

Figure 5-13. CSL Modes of Operation

C53663

1. *system* indicator
2. *automatic* indicator
3. *manual* indicator

When power is applied to the CSL, illumination of one of the mode LEDs indicates the CSL is receiving power and is ready for operation. The *operator* indicator may also light, indicating a required manual intervention.

System Mode

The system mode allows the host (enterprise only) to control the CSL. The CSL stays in the system mode until changed from the operator panel or until the drive sends a mode change command. The drive changes the mode of operation at IPL to the mode set in the configuration on the operator panel.

Note: If the input bin is empty while the CSL is in *System* mode, the input bin must be replenished, and the **Start** switch must be pressed to restart the CSL operation.

If a `Load Display` command has been sent to the CSL from the host, a cartridge will be loaded.

If a `Load Display` command has *not* been sent to the CSL from the host, a cartridge will not load until a `Load Display` command is received from the host to mount a cartridge.

Mount Message

When the CSL receives a mount message from the host, one of the following occurs:

- If the drive is empty and the feed channel contains a cartridge which hasn't been previously loaded, the cartridge loads into the drive.

- If the drive and the feed channel are empty, but at least one cartridge is available in the input bin, then the cartridge loads into the drive.

- Refer to "Priority Mount Mode" on page 5-20 to physically mount a priority cartridge directly into the CSL.

Unload Message

When the CSL receives an unload message, the cartridge in the drive moves to the feed channel. The CSL sequences as follows:

- If the output bin is not full, the cartridge is placed into the output bin.
- If the output bin is full, the cartridge remains in the feed channel, and the *operator* indicator blinks until the cartridge is removed and the **Start** switch is pressed.

    Note: Refer to "Cartridge Removal from Feed Channel" on page 5-22 to remove a priority mounted cartridge from the feed channel.

- If a mount has been pre-queued then, if possible, the next cartridge is mounted with only one cartridge shift operation.

Place CSL in System Mode

1. Press the **Autoload Mode** switch until the *system* indicator illuminates.

2. Press the **Start** switch to set the System mode.

3. Load up to seven cartridges in the input bin.

4. Press the **Start** switch.

    Note: The CSL does not respond to the **Start** switch if a cartridge is not in the input bin of the loader.

5. Unload the output bin when necessary.

Automatic Mode

The automatic mode allows the CSL to operate without operator intervention. Cartridges automatically loads from the input bin into the drive. Cartridges are loaded in the order they were inserted and unloaded into the output bin when the operating system is finished with the tape.

> **Note:** If the input bin is empty while the CSL is in *Automatic* mode, the input bin must be replenished, and the **Start** switch must be pressed to restart the CSL operation.
>
> Refer to "Priority Mount Mode" on page 5-20 to physically mount a priority cartridge directly into the CSL.

Unload Message

Upon receiving an unload message from the host, the CSL acts identically to the unload in the system mode with a subsequent pre-queued mount of the next cartridge into the drive automatically if possible. The CSL sequences as follows:

- If the output bin is not full, the cartridge is placed into the output bin.

- If the output bin is full, the cartridge remains in the feed channel, and the *operator* indicator blinks until the cartridge is removed from the output bin and the **Start** switch is pressed.

  > **Note:** Refer to "Cartridge Removal from Feed Channel" on page 5-22 to remove a priority mounted cartridge from the feed channel.

- If a mount has been pre-queued then, if possible, the next cartridge is mounted with only one cartridge shift operation.

Example

A job requires a specific order of cartridges to execute.

1. Load the cartridge tapes into the input bin in the order they will be used.

2. Press the **Start** switch.

   > **Note:** The CSL automatically inserts cartridges into the feed channel in the order they were inserted in the input bin and ejects them into the output bin when the operating system has finished with each tape.

Place CSL in Automatic Mode

1. Press the **Autoload Mode** switch until the green *automatic* indicator illuminates.

2. Press the **Start** switch to set the Automatic mode.

3. Load up to seven cartridges in the input bin in the required sequence (left to right, in the order they will be used).

4. Press the **Start** switch.

5. Unload the output bin when the job is complete or as necessary.

Manual Mode

In manual mode, the operator has complete control over CSL and drive operation. While the CSL is in manual mode:

- You may wait for a cartridge mount request and then mount a cartridge.

- You may receive requests for multiple cartridge mounts and load the requested volumes into the input tray.

- You may remove individual cartridges as they are ejected from the feed channel or wait until the output bin is full before removing them.

Note: In Manual mode, however, you must press the **Start** switch *each time* to load a cartridge into the drive.

Refer to "Priority Mount Mode" on page 5-20 to physically mount a priority cartridge directly into the CSL.

Unload

Upon receiving an unload command from the drive, the CSL acts identically to the unload in the system mode.

After the unload is successfully completed the CSL pauses until the **Start** switch is pressed. Pressing the **Start** switch loads the next available cartridge. The CSL sequences as follows:

- If the output bin is not full, the cartridge is placed into the output bin.

- If the output bin is full, the cartridge remains in the feed channel, and the *operator* indicator blinks until the cartridge is removed from the output bin and the **Start** switch is pressed.

   Note: Refer to "Cartridge Removal from Feed Channel" on page 5-22 to remove a priority mounted cartridge from the feed channel.

- If a mount has been pre-queued then, if possible, the next cartridge is mounted with only one cartridge shift operation.

Place CSL in Manual Mode

1. Press the **Autoload Mode** switch until the green *manual* indicator illuminates.

2. Press the **Start** switch to set the Manual mode.

3. When a mount message appears on the operator panel or system console, place the requested volumes in the input bin.

4. Press the **Start** switch.

5. Unload the output bin when necessary.

Priority Mount Mode

The CSL is a sequential scratch loader. An operator can physically mount a priority cartridge directly into the unit. The host may issue a `Load Display` command with required volser. This command may be issued during any CSL mode of operation informing the operator to place the cartridge into the feed channel (Figure 5-14).

Note: The output bin holds only seven cartridges. If you are going to load a priority cartridge into the feed channel, ensure the output bin is unloaded or has space for the priority mounted cartridge.

To mount a priority cartridge, review:

- "CSL in System Mode"
- "CSL in Automatic Mode" on page 5-21
- "CSL in Manual Mode" on page 5-22

Figure 5-14. Priority Mounting a Cartridge

C53664
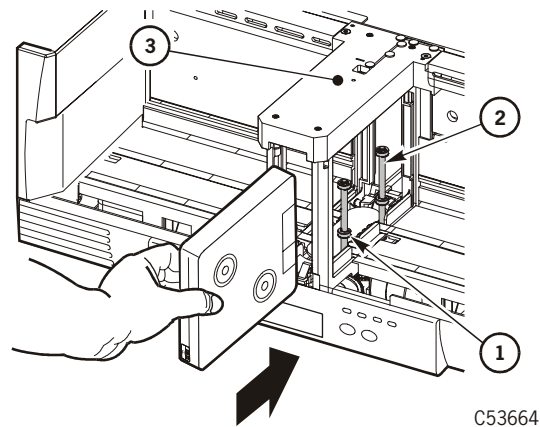
1. First index rod
2. Second index rod
3. Feed channel

CSL in System Mode

When the CSL is in the system mode and the drive is not loaded, follow these procedures to load a priority cartridge:

1. Verify that the drive is currently unloaded and the index rods are on the right (Figure 5-14).

2. Insert the priority cartridge into the CSL feed channel (Figure 5-14):

   a. Insert the cartridge past the cartridge stop mechanism. See Figure 5-15.

   b. Do not insert the cartridge past the first index rod (Figure 5-15).

> **Note:** If the cartridge is *not* inserted into the CSL feed channel properly (Figure 5-15), the CSL *cannot* insert the cartridge into the drive slot.

3. Check to ensure the *operator* indicator is flashing.

4. Press the **Start** switch to feed the cartridge into the drive and to clear the flashing *operator* indicator.

Figure 5-15. Priority Mount Cartridge

C53665
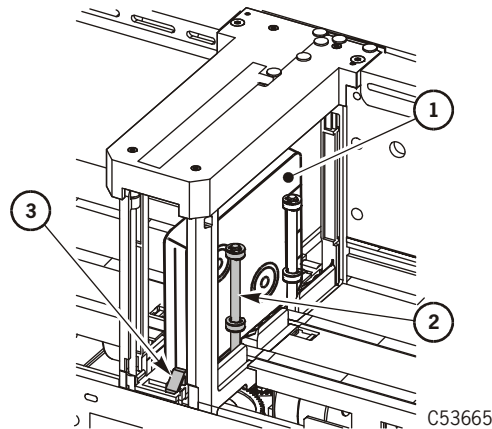
1. Cartridge
2. First index rod
3. Cartridge stop mechanism

CSL in Automatic Mode

The automatic mode is used for sequential mounting of cartridges from the input bin into the drive. When the CSL is in the automatic mode and the drive is not loaded, follow these procedures to load a priority cartridge:

1. If there are no cartridges in the input bin, the *operator* indicator flashes to signal you to insert a priority (single) cartridge into the feed channel. Press the **Start** switch to resume CSL operation.

2. If the input bin is not empty, the mode must be changed to manual mode to mount the priority cartridge. This prevents the next cartridge from being automatically loaded.

Note: Refer to Figure 5-15 to correctly load a cartridge into the feed channel

CSL in Manual Mode

This mode is used for sequential mounting of cartridges from the input bin into the drive. The operator controls each mount by pressing the **Start** switch before each mount. When the CSL is in the manual mode and the drive is not loaded, follow these procedures to load a priority cartridge:

1. If there are no cartridges in the input bin, the *operator* indicator flashes signaling you to put a cartridge into the feed channel.

2. Press the **Start** switch to resume CSL operation.

Note: Refer to Figure 5-15 on page 5-21 to correctly load a cartridge into the feed channel.

Cartridge Removal from Feed Channel

If the output bin is full (seven cartridges), and you load an eighth cartridge into the feed channel for a priority mount, the cartridge *cannot* eject into the output bin. The cartridge ejects into the feed channel (Figure 5-16). You must physically remove the cartridge from the feed channel.

Follow these instructions to remove the eighth cartridge from the feed channel:

1. Remove all cartridges from the input and output bins.

2. Push the cartridge stop mechanism down (Figure 5-16).

3. Grasp the cartridge and remove it from the feed channel.

Figure 5-16. Cartridge Stop Mechanism

C53665
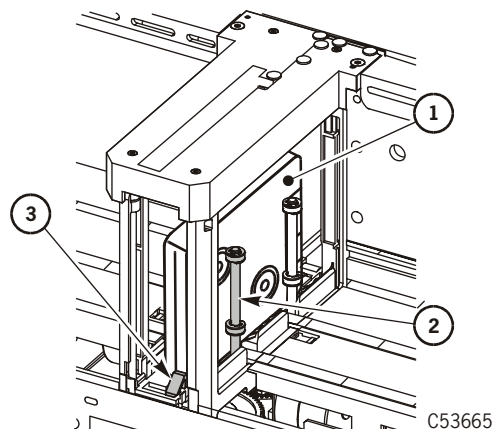
1. Cartridge
2. First index rod
3. Cartridge stop mechanism

■ Error and Recovery

Note: Refer to Chapter 7, "Error and Recovery," for specific drive errors.

Errors may be encountered anytime during operation of the CSL. CSL errors, recovery, and FSCs are discussed in this section.

Note: The 4EXX FSCs are for the CSL only.

Operator Indicator

When the *operator* indicator (call out 6) is flashing (Figure 5-17), the CSL detected an operator-intervention condition. Refer to Table 5-5 on page 5-11 for a description of the *operator* indicator.

Figure 5-17. CSL Operator Panel
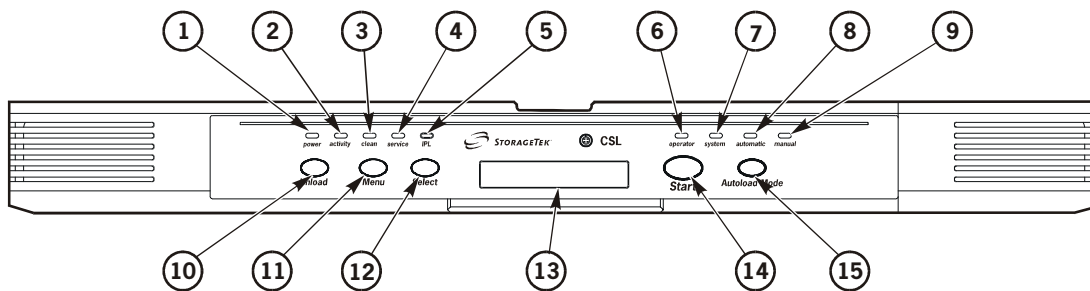
C53660

1. *power* indicator
2. *activity* indicator
3. *clean* indicator
4. *service* indicator
5. IPL switch
6. *operator* indicator
7. *system* indicator
8. *automatic* indicator
9. *manual* indicator
10. Unload switch
11. Menu switch
12. Select switch
13. Operator display
14. Start switch
15. Autoload Mode switch

Note: The IPL switch (5) initiates IPL of the drive only. Use the **Power** switch on the back of the CSL to initiate IPL of the CSL.

When the *operator* indicator is on constantly, the CSL has detected an error condition (usually a jammed, incorrectly loaded, or tipped cartridge).

- Refer to "Jammed Cartridge" on page 5-30 for the procedure to remove a jammed cartridge.

- Refer to "Drive Failure to Load" on page 5-24 to unload an incorrectly loaded cartridge.

- If cartridges are tipped in the input bin and will not load, reposition the cartridges to clear the malfunction.

Drive Failure to Load

Cartridges may be loaded into the CSL incorrectly (priority mount or from the input bin). Sometimes, cartridges are loaded with the cartridge reels to the left (Figure 5-18). When this is done, the CSL attempts to load the cartridge into the drive. This type of a load causes an instant CSL failure.

CAUTION:
Never load cartridges with the cartridges reels to the left. Only load cartridges with the cartridges reels to the right.

Incorrect Load Process

This is the process of events when cartridges are loaded incorrectly into the CSL. The cartridge reels are facing to the left (Figure 5-18). You cannot see them in Figure 5-18.

1. The CSL attempts to load the cartridge into the drive.

2. The CSL loads the cartridge approximately three-quarters of the way into the drive.

3. The drive senses the cartridge is loaded incorrectly.

4. The CSL moves the cartridge out of the drive and to the cartridge stop mechanism (Figure 5-18).

Figure 5-18. Ejected Cartridge (Failure to Load)

C53666
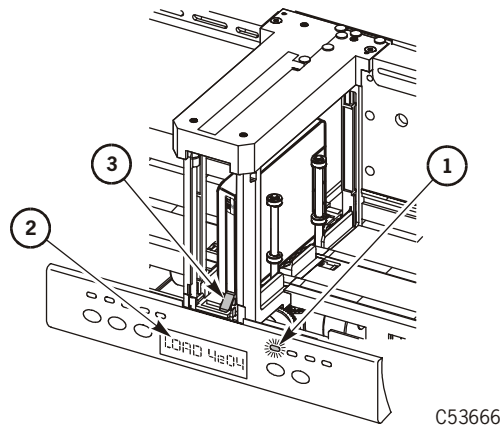
1. *operator* indicator
2. Display
3. Cartridge stop mechanism

5. Fault Symptom Code (FSC) `LOAD 4E04` displays on the operator panel and the *operator* indicator is on constantly.

Recovery Process

1. Remove the incorrectly loaded cartridge:

   a. Press down on the cartridge stop mechanism (Figure 5-18 on page 5-24).

   b. Grasp the cartridge and pull it from the feed channel.

2. Clear the CSL error.

   a. Press the **Start** switch (Figure 5-17 on page 5-23) to clear the solid *operator* indicator.

   b. After the **Start** switch is pressed, the *operator* indicator blinks and the operator display still shows LOAD 4E04 until a successful load or you press the **Unload** switch (Figure 5-18 on page 5-24) to clear the display.

3. Ensure all remaining cartridges to be loaded are placed within the input bin correctly (cartridge reels to the right).

4. The CSL is now ready for normal operations.

Failure to Unload Cartridge

Cartridges may fail to unload from the drive. When this malfunction occurs, the drive or CSL may be the defective FRU. The defective FRU is dependent on how far the cartridge is ejected from the drive and its relationship to the feed roller (Figure 5-19).

- If the cartridge fails to unload and *does not* eject on the feed roller (Figure 5-19 on page 5-26), the drive is the defective FRU.

- If the cartridge fails to unload and *does* eject on the feed roller (Figure 5-19 on page 5-26), the CSL is most likely the defective FRU.

   Note: Defective FRU Probability is: 90% CSL, 10% drive.

Have a qualified technician remove and replace the drive or CSL.

Figure 5-19. Feed Roller

C53824
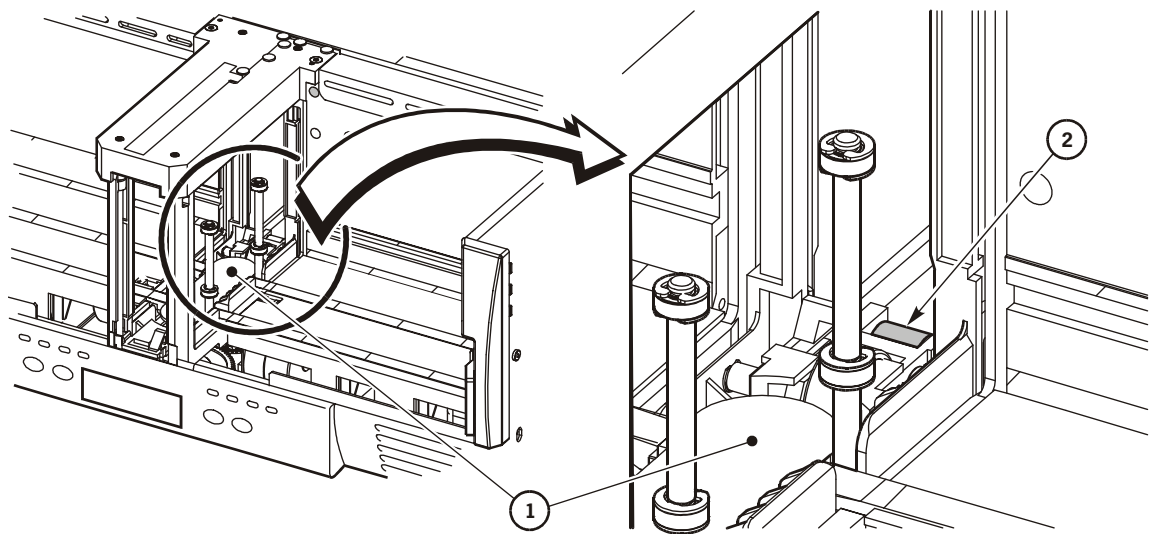
1. Feed channel area
2. Feed roller

Clearing CSL Errors

Refer to the following process to clear CSL errors. Follow the directions explicitly.

Note: Any time the *operator* indicator is flashing or on solid, clear the obvious error. Refer to Table 5-5 on page 5-11 for a description of the *operator* indicator.

1. After correcting the error, press the **Start** switch (Figure 5-17 on page 5-23, call out 14) to clear the o*perator* indicator.

2. If pressing the **Start** switch did not clear the indicator, press the **Start** switch twice.

   Note: Press the **Start** switch twice when there is a load failure or solid *operator* indicator (red) on the CSL. Pressing the switch twice re initializes the CSL.

3. If pressing the **Start** switch twice did not clear the *operator* indicator, power cycle the CSL to bring it back online. Refer to "Power On/Off CSL" on page 5-12 to correctly power cycle the CSL. Figure 5-20 on page 5-27 shows the location of the power switch.

4. If power cycling the CSL did not clear the *operator* indicator, the CSL must be replaced by a qualified technician.

Figure 5-20. CSL Rear View
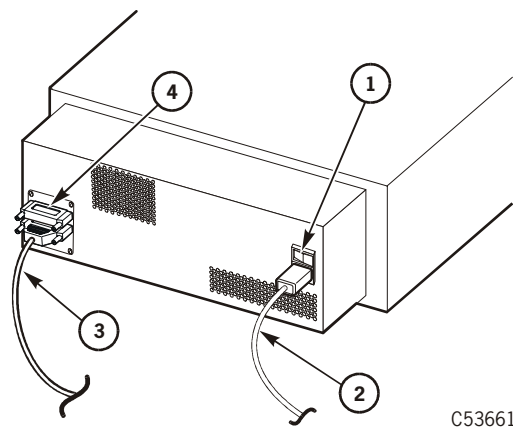
C53661

1. Power switch
2. Power cord
3. SCSI cable
4. Terminator

Fault Symptom Codes

Perform the following sequence of checks if a CSL error occurs.

1. Check the CSL *operator* indicator to see if it is flashing (operator summoned) or on solid (failure). Clear the obvious error.

2. If the CSL does not indicate any problems, check the FSC list (Table 5-6).

3. Check sense data at the host for any FSC in addition to the information provided in Table 5-6.

Note: Some malfunctions are caused by communications errors between the CSL and the drive, and also by internal software. If the malfunctions continue, force a dump of the drive for engineering evaluation.

Table 5-6 provides the 4EXX FSCs, suspected malfunction, and possible fix.

Table 5-6. CSL FSCs

FSC	Malfunction	Fix
4E04	Cartridge installed incorrectly (180 degrees out, cartridge reels to left).	Insert cartridge correctly. Install cartridge with reels to the right. See "Recovery Process" on page 5-25.
	Drive replaced within the CSL, and 4E04 displays when cartridge is loaded.	Drive may not be aligned correctly within CSL. Have a qualified technician remove, replace, and align the drive.
4E05	SCSI load command rejected due to no CSL being attached to the drive.	Check the black control cable between the drive and CSL. Final action: have a qualified technician replace the drive.
4E0C	SCSI load command cannot be performed. The CSL is not in the System mode.	Select the System mode.
4E0D	SCSI load command cannot be performed. There is no cartridge in the input bin or feed channel.	Load cartridge.
	Note: The 4E0D FSC may occur after a cleaning cartridge has been unloaded.	
4E11	ESCON load command is rejected due to no CSL being attached to the drive.	Have a qualified technician check the black control cable between the drive and CSL. Final action: have a qualified technician replace the drive.

Table 5-6. CSL FSCs

FSC	Malfunction	Fix
4E23	CSL encountered an error during an unload.	1. Check the CSL for any error condition. 2. Remove the cartridge. 3. Press the **Start** switch once. **Note:** LOAD 4E23 will display until you press the **Load** or **Start** switch.
4E2D	SCSI load command failed due to the CSL no longer in the System mode. The mode was changed during the load.	Return CSL to System Mode.
4E31	SCSI load command failed due to the CSL no longer in the System mode. The mode was changed during the load. This error occurs immediately after a cleaning or dump cartridge has just been unloaded.	Return CSL to System Mode.
4E34	SCSI load command failed due to no cartridge being available to load. This error only occurs immediately after a cleaning or dump cartridge has just been unloaded and the CSL is in the Automatic mode.	Load a cartridge.

■ Jammed Cartridge

A jammed cartridge in a CSL is not a common malfunction. A jammed cartridge unloads from the drive and remains on the feed roller (Figure 5-21). It does *not* eject fully into the feed channel.

You must know how to remove jammed cartridges when the malfunction occurs. Follow the procedures in this section to remove a jammed cartridge.

See Figure 5-21 for the CSL manual unload device (MUD) screw location. The MUD screw is located to the right of the feed channel.

Notes:

- Only use the MUD mechanism to remove jammed cartridges (cartridges still in the 9840 Tape Drive) or to reset the drive for shipping (cartridges not on the feed roller).

- The MUD screw must be turned clockwise (CW) to remove jammed cartridges.

- The MUD screw must be turned counterclockwise (CCW) to reset the drive to its shipping position and to install and lock the shipping insert into the drive.

Figure 5-21. 9840 Tape Drive Manual Unload Device
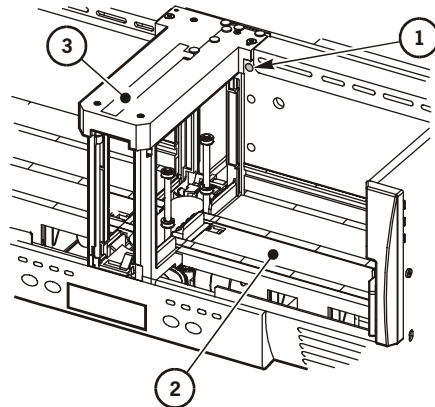
C53667

1. MUD screw
2. Input bin
3. Feed channel

1. Power off the CSL if power is applied ().

2. Remove all cartridges from the input and output bins.

3. Locate the MUD screw within the CSL input bin (upper-left area).

Note: The CSL MUD screw is located to the right of the feed channel.

1. Mud screw
2. Input bin
3. Feed channel
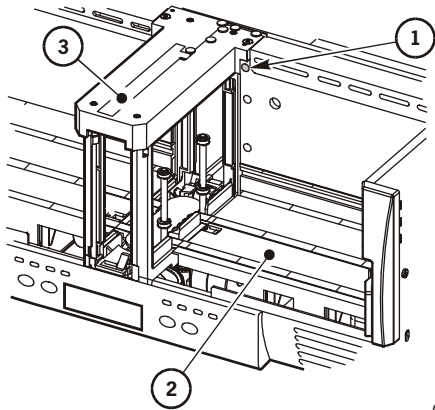
C53667

4. Obtain a long-common 1/8 in. screwdriver and insert it into the MUD slot.

5. Press against the spring-loaded MUD screw until it stops.

   Note: Do not turn the screwdriver CCW when removing a jammed cartridge.

6. Slowly turn the screwdriver CW to remove the jammed cartridge (may take approximately ten turns).

   a. Turn the MUD screw until it will not turn any further. This action lowers the reel motors within the drive.
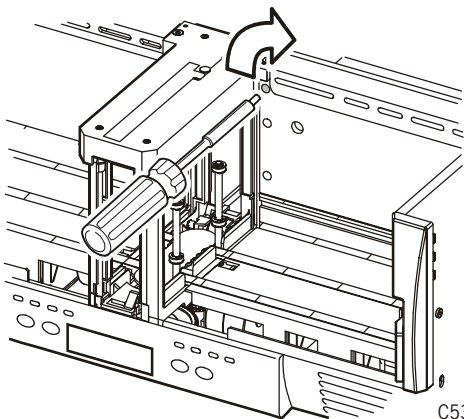
C53668

b. Turn the MUD screw CW until the cartridge rests on the feed roller.

Note: Feed roller is callout number 2 in figure below.
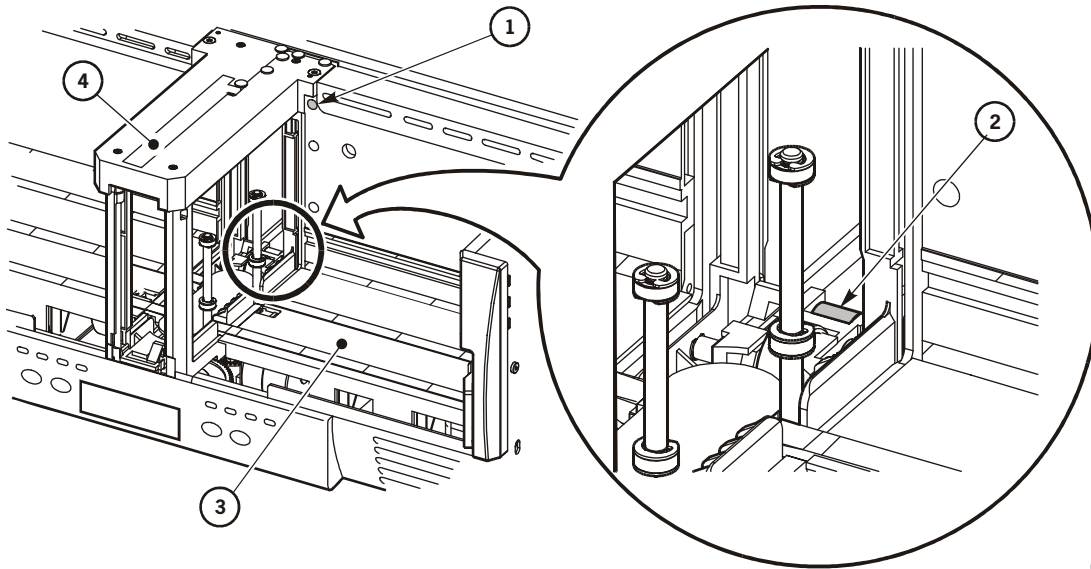
C53669

1. MUD screw
2. Feed roller (**DETAIL A**)
3. Input bin
4. Feed channel

7. Remove the screwdriver.

8. Remove the cartridge from the 9840 Tape Drive.

   Note: The cartridge *will not* eject completely out of the CSL. It will *only* eject out of the drive and stop deep inside the feed channel on the feed roller.

   a. Use both hands and reach between the input bin and output bin bookends.

   b. Grasp the cartridge with your fingers.

   c. Slowly work the cartridge out of the drive through the feed channel.
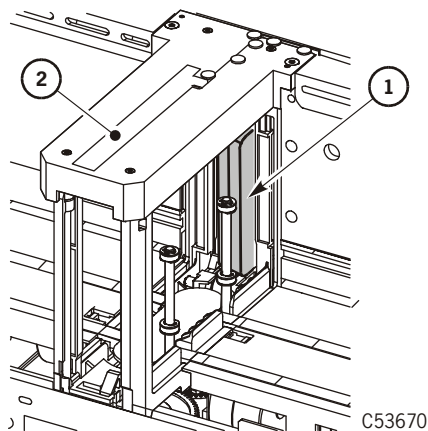
1. Cartridge
2. Feed channel

C53670

9. Work the cartridge through the feed channel to the cartridge stop mechanism.

   a. Push down on the cartridge stop mechanism.

   Note: This allows the cartridge to be removed from the front of the feed channel.

   b. Grasp the cartridge and remove it from the feed channel.

1. Cartridge
2. First index rod
3. Cartridge stop mechanism

C53665
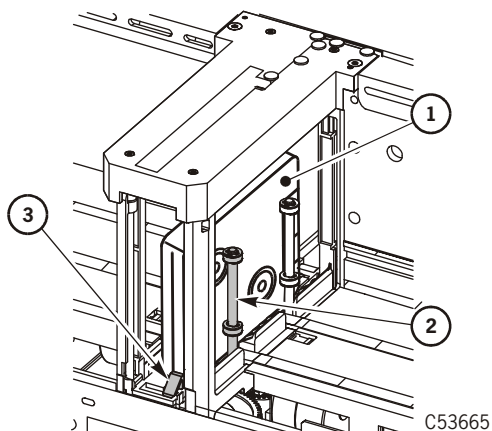
10. Power on the CSL.

11. Refer to "Power On/Off CSL" on page 5-12 for the power on procedures.

Notes:

- Refer to the figure below for location of the power switch.

- If cartridges continue to jam, the CSL is defective and must be replaced by a qualified technician.

1. Power switch
2. Power cord
3. SCSI cable
4. Terminator

C53661
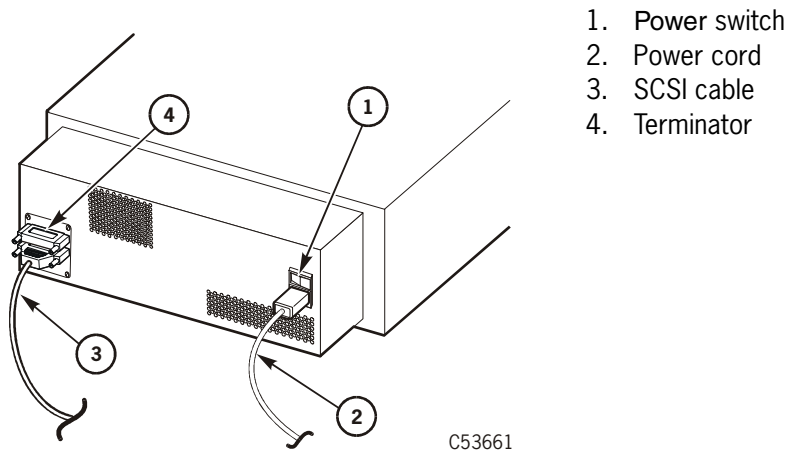
■ Shipping Insert

This section contains instructions to remove, install, and lock a shipping insert into the CSL. The shipping insert must always be inserted and locked into the CSL. Read caution below.

CAUTION:
If the shipping insert is not locked into the tape drive, the drive head will become damaged in shipment.

When you receive a new CSL, you must remove the shipping insert. Figure 5-22 provides the location of the shipping insert within the CSL feed channel.

Figure 5-22. Shipping Insert

C53671
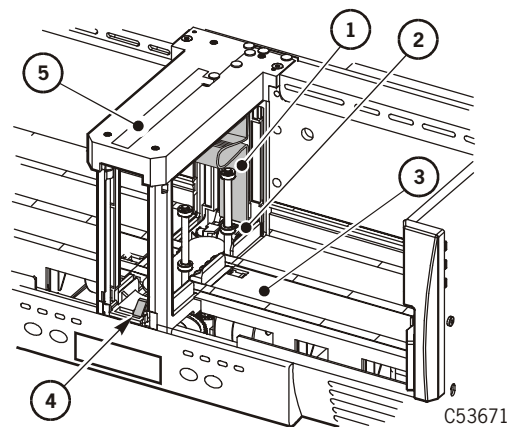
1. Shipping insert
2. Feed roller
3. Input bin
4. Cartridge stop mechanism
5. Feed channel

Removal

Follow these instructions to remove the shipping insert from the CSL.

1. Locate the shipping insert within the feed channel.

2. Push the input bin bookend to right of the input bin and hold it in place.

3. Reach through the input bin and squeeze the shipping insert handle together.

Note: Squeezing the handle unlocks the shipping insert from the drive.

4. Slide the shipping insert out through the feed channel to the cartridge stop mechanism.

5. Push down on the cartridge stop mechanism and remove the shipping insert.

1. Shipping insert
2. Feed roller
3. Input bin
4. Cartridge stop mechanism
5. Feed channel

C53671

6. Store the shipping insert.

Install and Lock

Follow these instructions to properly install and lock the shipping insert into a CSL. Before you can lock the shipping insert into the CSL, you *must* use the MUD screw (Figure 5-23) to raise the reel motors and to lower the cleaning brush within the drive.

CAUTION:
If the shipping insert is not locked into the tape drive, the drive head will become damaged in shipment.

Notes:

- Only use the MUD mechanism to reset the drive for shipping.

- The MUD screw must be turned CCW to reset the drive to its shipping position and to install and lock the shipping insert into the drive.

Figure 5-23. MUD Screw in CSL
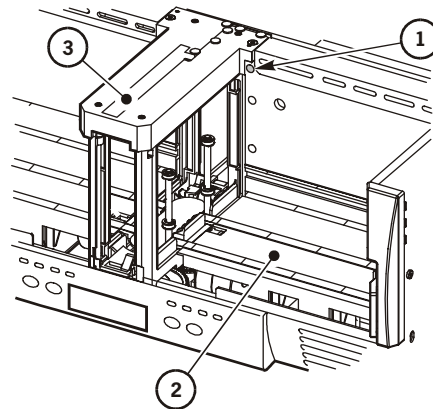
C53667

1. MUD screw
2. Input bin
3. Feed channel

1. Power off the CSL if power is applied.
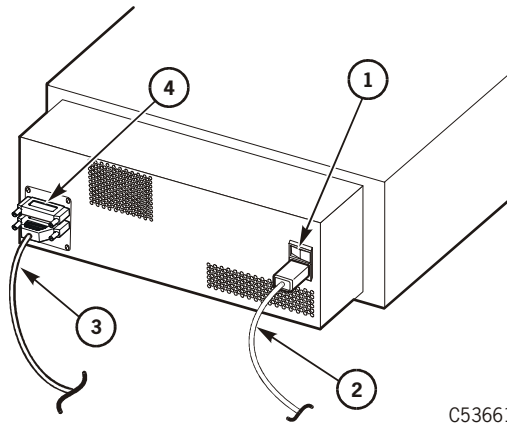
1. **Power** switch
2. Power cord
3. SCSI cable
4. Terminator

C53661

2. Locate the MUD screw to the right side of the feed channel.

3. Obtain a long-common 1/8 in. screwdriver and insert it into the MUD slot.

4. Press against the spring-loaded MUD screw until it stops.
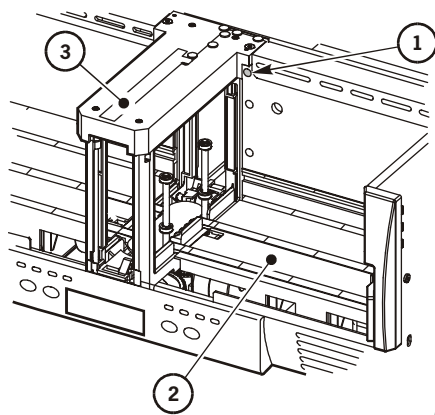
1. MUD screw
2. Input bin
3. Feed channel

C53667

Note: Do not turn the screwdriver CW when preparing the drive for a shipping insert.

5. Slowly turn the screwdriver CCW to raise the reel motors and to lower the cleaning brush.

   Note: When the MUD screw will not turn any further, the reel motors are raised and the cleaning brush is lowered.

C53672
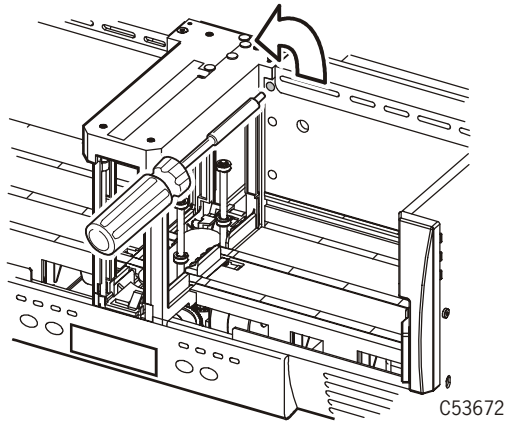
6. Remove the screwdriver.

7. Insert and lock the shipping insert in the 9840 Tape Drive.

   Note: Some force must be used to insert the shipping insert past the feed roller.

8. Gently pull the shipping insert outward to verify it is locked within the carriage.

C53671
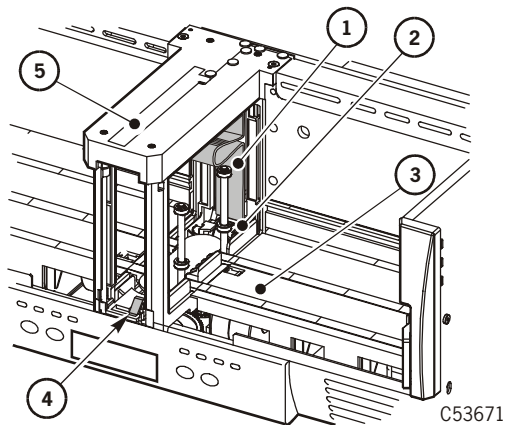
1. Shipping insert
2. Feed roller
3. Input bin
4. Cartridge stop mechanism
5. Feed channel

9. Send the defective CSL to StorageTek.

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Menu System

This chapter describes the menu system for the 9840 Tape Drive and how to perform specific operations using the menus and submenus, such as:

- Review drive configuration and firmware release level
- Reconfigure the drive
- Special drive operations

When the drive is online, you can view the current configuration settings and firmware level. When the drive is offline, you can change the configuration settings or perform special drive operations.

This chapter contains:

The single-page menu trees show sequences graphically. You can use them if you do not need detailed instructions. The multi-page menu tables have more instructions and detail for less experienced users.

Note: Drives are preset to manufacturing's default settings. Therefore, all drives must be reconfigured to specific requirements upon installation.

You must use the operator panel **Menu** switch (1, Figure 6-1), **Select** switch (2, Figure 6-1), and display (3, Figure 6-1) to access all menus and submenus. Press the **Menu** switch to navigate from one menu item to the next. Press the **Select** switch to enter a submenu and navigate through the options in the submenu.

Figure 6-1. Operator Panels
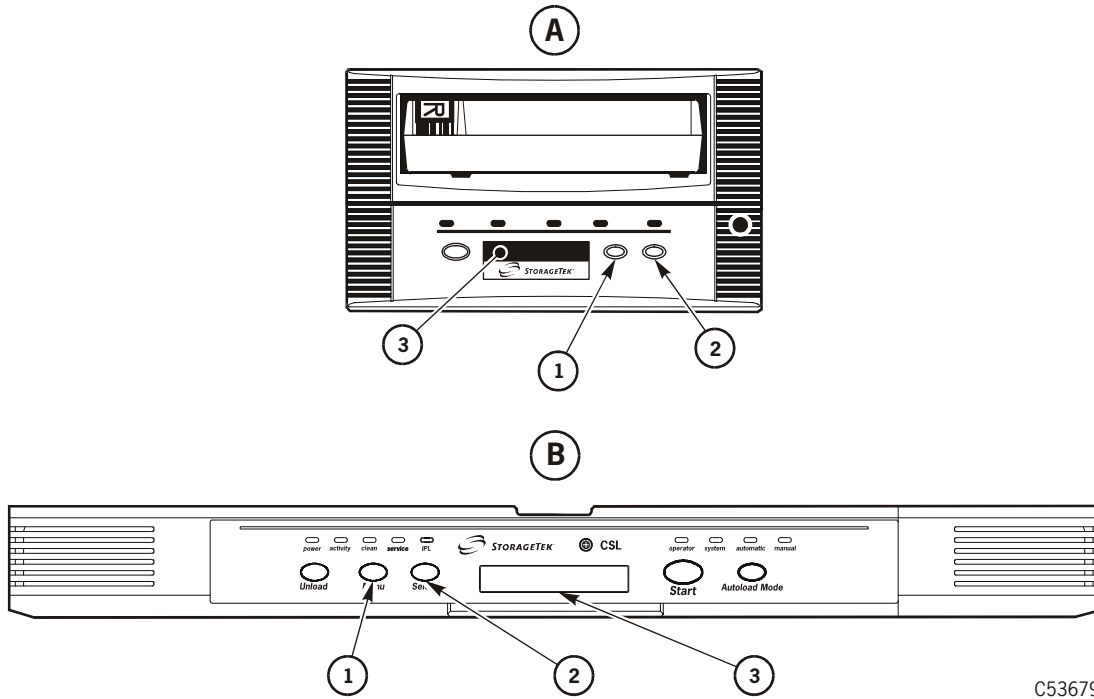
A is the standard operator panel. **B** is the CSL operator panel.

1. Menu Switch
2. Select Switch
3. Display

■ Menu Structure Overview

Figure 6-2 shows an overview of the 9840 main menu system.

When the **Menu** switch on the Operator Panel is pressed, the first main menu allows selection of Online (default) or Offline main menus. Pressing the **Select** switch toggles the option, and pressing the **Menu** switch advances the display to the next main menu.

Figure 6-2. Main Menu System

Online/Offline	View/Change Configuration	Drive Operations	Drive Firmware	CSL Firmware	Exit Menu
Entry Point to Other Menus.	Drive Configuration Submenus View - Online Change - Offline	Drive Operations Submenus (Offline Only)	No Submenus Shows Drive Firmware Release Level	No Submenus Shows CSL Firmware Release Level (None = No CSL)	No Submenus Exits Menu System
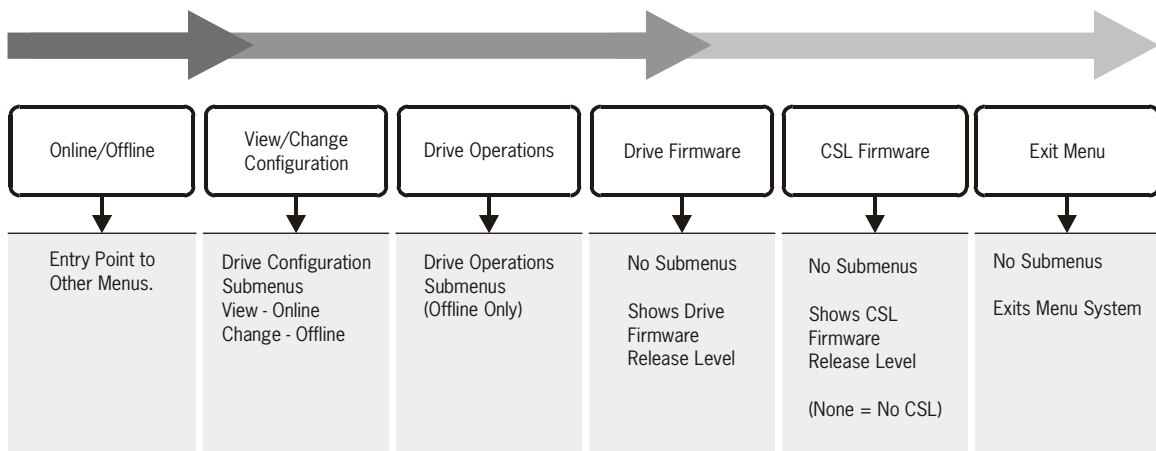
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View/Change Configuration main menu views drive configuration settings in Online, or allows drive configuration changes when Offline. Invoke the submenus by pressing the **Select** switch, or advance to the next main menu item by pressing the **Menu** switch.

The Drive Firmware Main Menu displays the drive firmware release level. The CSL Firmware Main Menu displays the CSL firmware release level (when the drive is installed in a CSL), or **CSL NONE** (when not installed in a CSL).

The Exit Menu provides two choices:

- Exit the menu system by pressing the **Select** switch
- Loop back to the Online/Offline Main Menu item by pressing the **Menu** switch.

If you exit the menu system with the drive Offline, the Operator Panel will alternately flash Offline as a reminder that drive status is still Offline. This reminder will flash until the drive is placed back Online, or powered-off.

■ Menu Operations

Menu operations for Online and Offline are very similar. Online menus only provide viewing of current settings and/or status. Offline menus allow option selections and/or change to various settings. In both menu systems, press Select to toggle/increment options, or to answer "Yes". Press Menu to advance to the next menu, or to answer "No".

Online Main Menu Operation

When the drive is Online, the main menus shown on are active. With Online selected, press Menu (one or more times) to advance to the View Configuration (**View CFG ?**) Main Menu, where you will have two choices:

- Press Select (Yes) to view configuration submenus which display the current drive configuration settings.

- Press Menu (No) to bypass, and advance to the next main menu.

Notes:

1. Fibre Channel interface drives provide for Port A and B Enable/ Disable selection before the View Configuration Main Menu appears.

2. The View Configuration submenus vary slightly relative to specific interface type.

The view-only Firmware Release Main Menu displays the drive's firmware code release level in the following format: R$x.yy.zzzc$; where x = major revision level, y = minor revision level, z = integration number, and c = channel interface type (**f** for Fibre Channel, and **s** for SCSI).

When a 9840 drive is installed in a CSL, the view-only CSL Firmware Release Main Menu displays the CSL's firmware code release level in the following format: CSL $x.y.zz$; where x = major revision level, y = minor revision level, and z = integration number. **CSL None** is displayed when the drive is not installed in a CSL.

The Main Exit Menu (**Exit Menu?**) allows choice of exiting menu system by pressing Select (Yes); or, looping back to the Online/Offline Main Menu by pressing Menu (No).

Figure 6-3 provides an overview of the online menus and submenus.

Figure 6-3. Online Main Menus and Submenus

View Configuration	View Drive Configuration (Fibre Channel)	View Drive Configuration (SCSI)	View Drive Firmware Level	View CSL Firmware Level	Exit Menu
Entry Point to View Configuration Menus	Compress Mode	Compress Mode	No Submenus	No Submenus	No Submenus
	Data Security Erase (DSE) Mode	DSE Mode	View Drive Firmware Release Level	View CSL Firmware Release Level	Exits Menu System
	Port A and B Attributes	SCSI ID		(None = No CSL)	
	Tape Bar Usage	SCSI Target Negotiation Mode			
	Language Selection	SCSI Speed Mode			
	VolSafe Usage	SCSI Width Mode			
	Full Code	Tape Bar Usage			
	Emulation Mode	Language Selection			
	Library Address	VolSafe Usage			
	CSL Power Up Mode	Full Code			
	World Wide Name (H)	Emulation Mode			
	World Wide Name (L)	Library Address			
	Serial Number	CSL Power Up Mode			
	Exit or Loop	World Wide Name (H)			
		World Wide Name (L)			
		Serial Number			
		Exit or Loop			

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Offline Main Menu Operation

When the drive is Offline, the main menus shown on Figure 6-4 on page 6-7 are active. With Offline selected, press **Menu** (one or more times) to advance to the Change Configuration (**Chng CFG ?**) Main Menu, where you will have two choices:

- Press **Select** (Yes) to enter change configuration submenus which display options to change drive configuration settings.

- Press **Menu** (No) to bypass, and advance to the next main menu.

Note: Fibre Channel interface drives provide for Port A and B Enable/Disable selection before the Change Configuration Main Menu appears.

The Change Configuration submenus allow you to change drive configuration settings. Options vary, depending on the type of channel interface in the drive.

The Drive Operations (**Drv Menu ?**) menu allows you to perform:

- Initial Program Load (IPL) from a tape (loads new firmware code into the drive EEPROM from a code tape)

- Create a dump tape (format a tape cartridge to receive dump data)

- Create a code tape (copy firmware from drive EEPROM onto a tape)

- Create a data tape (format a tape cartridge to receive data)

- Rebuild Media Information Region (MIR)

- Run diagnostic routines.

Note: See the drive operations menu tree (Figure 6-10 on page 6-34) for additional information.

Press **Select** (Yes) to enter submenus, or **Menu** (No) to bypass, and advance to the next main menu.

The view-only Firmware Level and CSL Firmware Level Main Menus function the same as they did for Online Main Menu Operation.

The Main Exit Menu, like it did for Online Main Menu Operation, provides a choice to exit the menu system or loop-back to the Online/Offline Main Menu.

Figure 6-4 provides an overview of the offline menu operations.

Figure 6-4. Offline Main Menu and Submenus

Change Configuration	Change Drive Configuration (Fibre Channel)	Change Drive Configuration (SCSI)	Drive Operations	View Drive Firmware Level	View CSL Firmware Level	Exit Menu
Entry Point to Change Configuration Menus	Compress Mode	Compress Mode	IPL from Tape (Update MC)	No Submenus	No Submenus	No Submenus
	DSE Mode	DSE Mode	Make Dump Tape	View Drive Firmware Release Level	View CSL Firmware Release Level	Exits Menu System
	Port A and B Attributes	SCSI ID	Make Code Tape		(None = No CSL)	
	Tape Bar Usage	SCSI Target Negotiation Mode	Make Data Tape			
	Language Selection	SCSI Speed Mode	Rebuild MIR			
	VolSafe Usage	SCSI Width Mode	Write/Read Diagnostic			
	Full Code	Tape Bar Usage	Servo Head Diagnostic			
	Emulation Mode	Language Selection	Servo Load/ Unload Diagnostic			
	Library Address	VolSafe Usage	Exit or Loop			
	CSL Power Up Mode	Full Code				
	World Wide Name (H)	Emulation Mode				
	World Wide Name (L)	Library Address				
	Save if Needed	CSL Power Up Mode				
	Exit or Loop	World Wide Name (H)				
		World Wide Name (L)				
		Save if Needed				
		Exit or Loop				

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■ Explanation of Menu Trees

Figure 6-6 through Figure 6-10, later in this chapter provide graphic operational sequences for the menu operations:

Use the legend, shown in Figure 6-5, as an aid to navigate the Menu Trees. There are only two Operator Panel switches used for the menu system: **Menu** and **Select**. The boxes show menu displays.

Figure 6-5. Menu Trees Legend
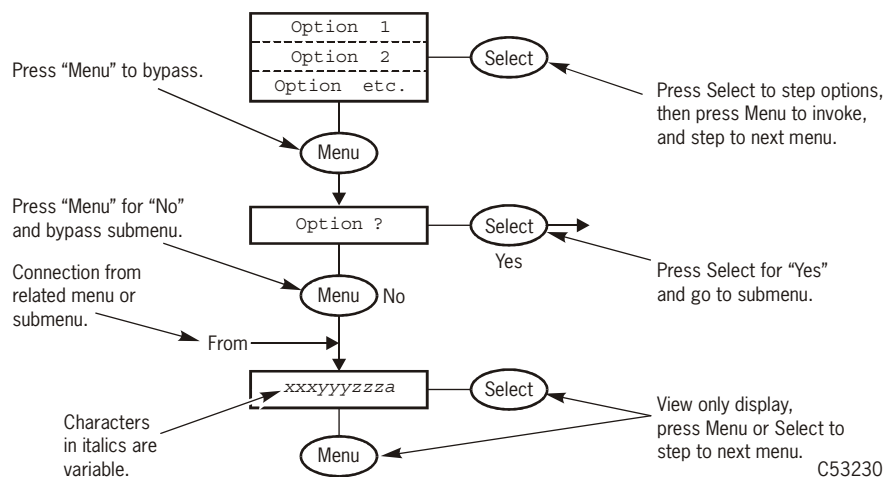
Pressing the **Menu** switch advances the menu display along the flow direction, sets a menu option after selection, or answers "No" to a menu choice question. Pressing the **Select** switch toggles/increments menu options or answers "Yes" to a menu choice question. When there is not an option, selection, or choice presented, such as during view-only menus, pressing **Select** has same result as pressing **Menu**.

To enter variable characters or digits, press **Select** to start the change mode. (The left-most variable character/digit begins to flash.) Each additional press of the **Select** switch increments the value one step. When the desired value is displayed, press **Menu** to set the value and advance flash to next variable character/digit. When the last variable character/digit has been set, **Menu** accepts entry and advances display to the next menu, or **Select** restarts the change mode.

■ Fibre Channel View Configuration Status

Figure 6-6 provides a menu tree for viewing a Fibre Channel configuration.

Figure 6-6. Menu Tree—View Fibre Channel Configuration

Notes:

1. Firmware release level.
2. Port A steps to view PrtB?
3. Port B steps to Tape Bar Y/N.
4. Current language selection desplayed.
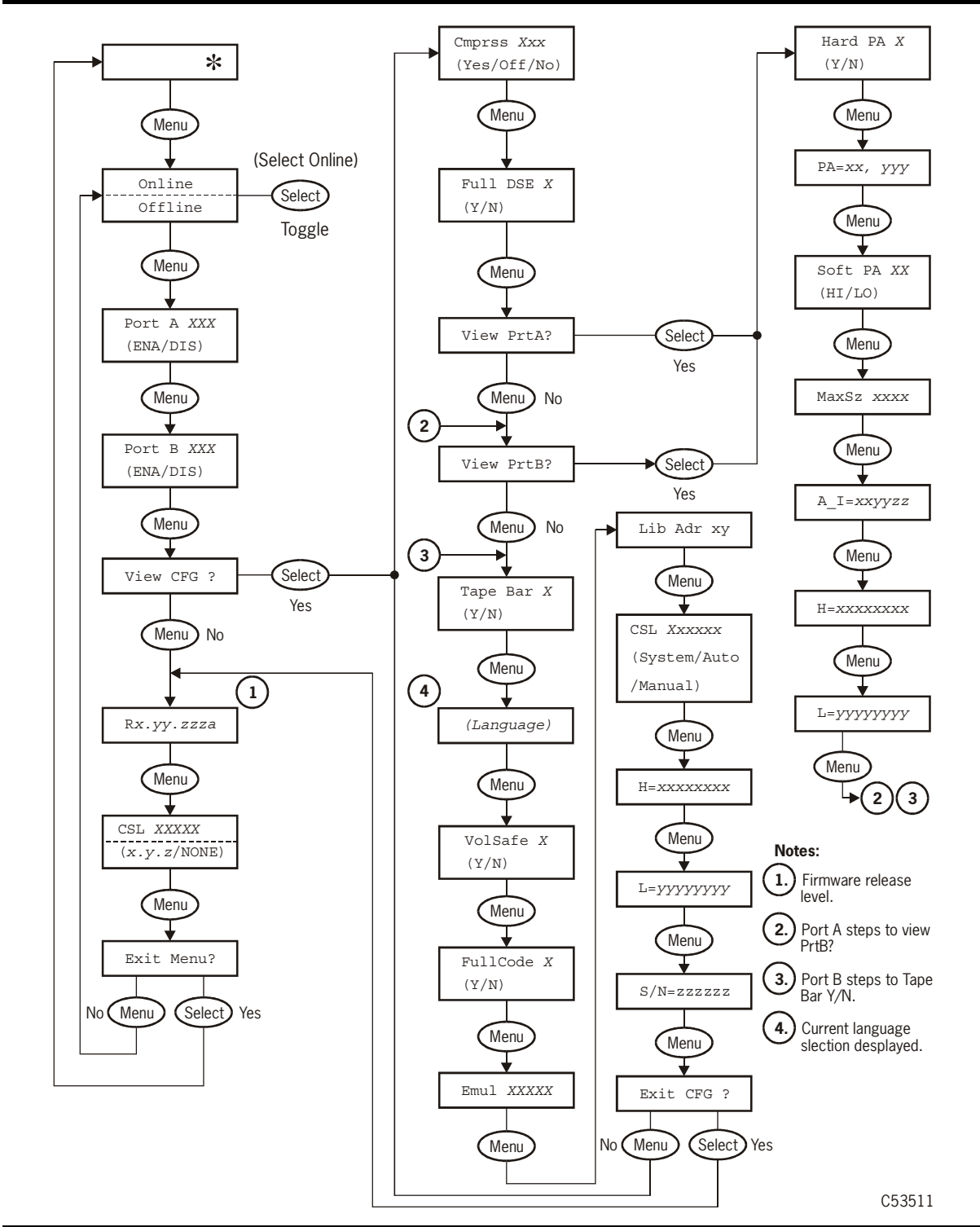
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■ Fibre Channel Change Configuration Menu

provides a menu tree for changing a Fibre Channel configuration

Figure 6-7. Menu Tree—Change Fibre Channel Configuration (Sheet 1 of 3)
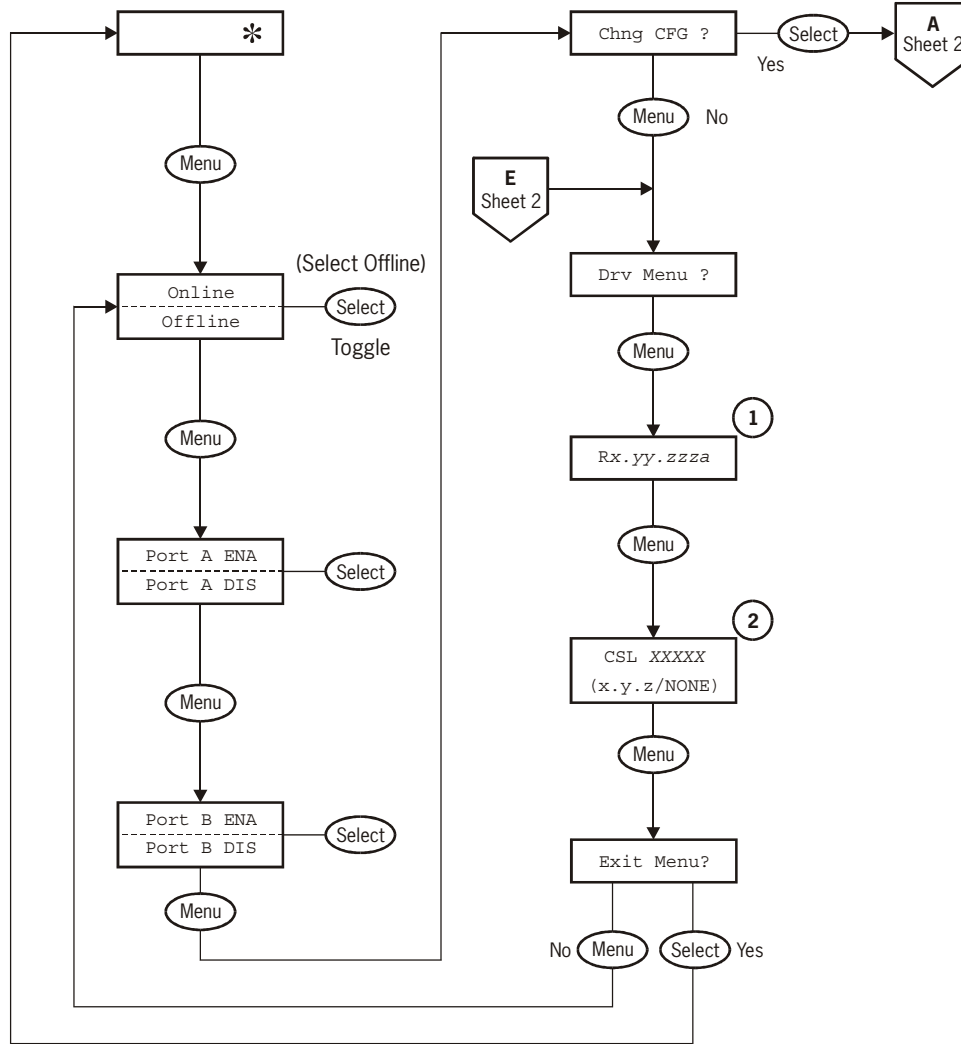
Notes:

1. Firmware release number.

2. CSL Firmware release number only appears when drive is installed in a CSL.

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Figure 6-7. Menu Tree—Change Fibre Channel Configuration (Sheet 2 of 3)
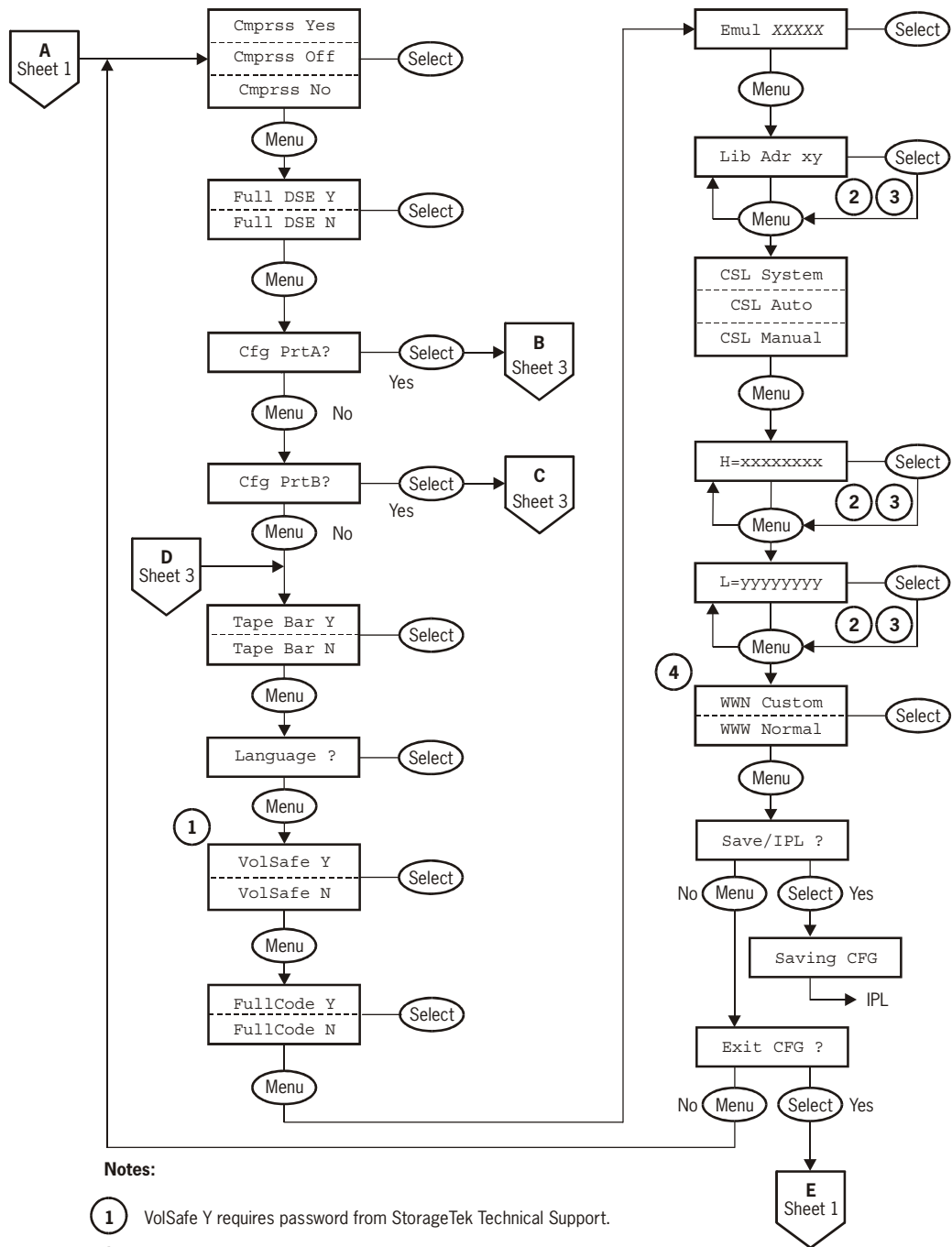
Notes:

1. VolSafe Y requires password from StorageTek Technical Support.

2. When all digits are steady, press Menu to accept; or press Select to restart change mode.

3. Press Select to step flashing digit. Press Menu to set.

4. Normal resets WWN to factory preset.

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Figure 6-7. Menu Tree—Change Fibre Channel Configuration (Sheet 3 of 3)

Notes:

1. When all digits are steady, press Menu to accept; or press Select to restart change mode.

2. Press Select to step flashing digit. Press Menu to set.

3. Normal resets WWN to factory preset.

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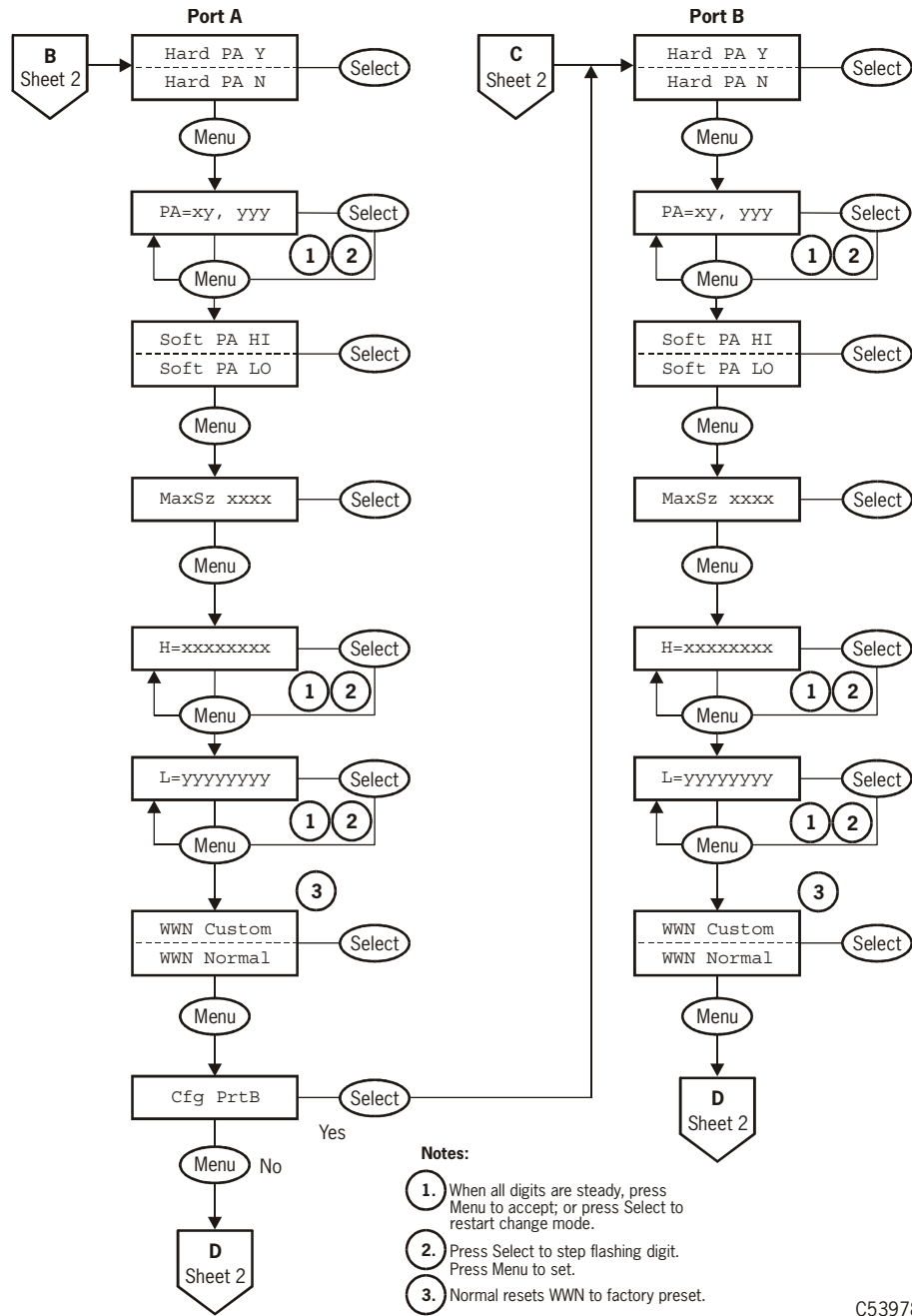
Table 6-1 provides detailed instructions to change configuration of a Fibre Channel drive when the drive is offline.

Table 6-1. Menu Table—Fibre Channel Configuration

Options	Notes	Procedure
Online/Offline Main Menu		
`Online/` `Offline`	Defaults to Online at power-on. `Offline` must be selected to change configuration settings. `OffLn Pend` may display while waiting for a system response or diagnostics completion.	1. If required, press Menu repeatedly until `Online` or `Offline` is displayed. 2. If `Online`, press Select to toggle option to `Offline`. 3. Press Menu to advance to the Port A Enable/Disable menu.
Port A Enable/Disable Menu		
	Defaults to enabled (ENA).	1. Press Menu to bypass, **or**
`Port A ENA`	Port A enabled. (Normal for single port configuration.)	2. Press Select to toggle option; then, press Menu to set, and advance to the Port B Enable/Disable menu.
`Port A DIS`	Port A disabled (DIS). `DIS Pend` or `ENA Pend` may display while waiting for a system response.	
Note: Manufacturing ships drive with the **Port A ENA** option selected.		
Port B Enable/Disable Menu		
	Defaults to ENA.	1. Press Menu to bypass, **or**
`Port B ENA`	Port B enabled.	2. Press Select to toggle option; then, press Menu to set, and advance to the Change Configuration (Chng CFG) Main Menu.
`Port B DIS`	Port B disabled. (Normal for single port configuration.) `DIS Pend` or `ENA Pend` may display while waiting for a system response.	
Note: Manufacturing ships drive with the **Port B ENA** option selected.		
Change Configuration Main Menu		
`Chng CFG ?`	This is the entry point to the Configuration submenus.	1. Press Select to enter Configuration submenus, **or** 2. Press Menu to bypass.

Table 6-1. Menu Table—Fibre Channel Configuration (Continued)

Options	Notes	Procedure
Compress Mode Submenu		
	Defaults to last saved selection.	1. Press **Menu** to bypass, **or**
`Cmprss Yes`	When **Yes** is selected, data is compressed, by default. Host can request no data compression.	2. Press **Select** until the desired option is displayed; then, press **Menu** to set, and advance to next submenu.
`Cmprss Off`	When **Off** is selected, data is not compressed, and host request has no effect.	
`Cmprss No`	When **No** is selected, data is not compressed, by default. Host can request data compression.	
Note: Manufacturing ships drive with the **Cmprss Yes** option selected.		
Data Security Erase Mode Submenu		
	Defaults to last saved selection.	1. Press **Menu** to bypass, **or**
`Full DSE Y`	`Full DSE Y` writes a random binary pattern on the media, over-writing existing data, from the point of an "Erase" command, to the End of Tape.	2. Press **Select** to toggle option; then, press **Menu** to set, and advance to next submenu.
`Full DSE N`	`Full DSE N` writes data on the media that indicates valid data does not exist beyond the point of an "Erase" command.	
Note: Manufacturing ships drive with the **Full DSE Y** option selected.		
Port A Attributes Submenu		
`Cfg PrtA ?`	View or change Port A attributes as defined in the Port A/B Attributes Submenus.	1. Press **Select** (Yes) to enter the Port A/B Attributes submenus, **or**
		2. Press **Menu** (No) to bypass.
Port A/B Hard Physical Addressing Submenu		
	Defaults to last saved selection.	1. Press **Menu** to bypass, **or**
`Hard PA N`	`PA N` uses a new physical address each time.	2. Press **Select** to toggle option; then, press **Menu** to set, and advance to next submenu.
`Hard PA Y`	`PA Y` uses same assigned physical address each time.	
Note: Manufacturing ships drive with **Hard PA N** option selected.		

Table 6-1. Menu Table—Fibre Channel Configuration (Continued)

Options	Notes	Procedure
Port A/B Hard Physical Address Submenu		
PA=xx,ddd	Defaults to last saved selection. **xx** is the hex display physical address. **ddd** is the decimal index into the ALPA table (valid indexes are **000–125**. Engineering recommends that Port A addresses be even numbers and Port B addresses be odd numbers As you manually change the decimal index digits (**ddd**), the hex display (**xx**) automatically changes. Pressing **Select** when all digits are steady, starts the change mode. The left-most **d** digit begins flashing and will toggle between **0-1** (only valid values) with each press of **Select**. Pressing **Menu** sets the digit at the displayed value and advances flashing to the next digit. Each press of **Select** will increment the flashing digit up one value (**0-9** valid). Pressing **Menu** sets the digit at the displayed value, and advances flashing to the last digit. When the last digit is set, pressing **Menu** advances menu to next submenu. Pressing **Select** will restart the change mode with left-most digit.	1. Press **Select** to start change mode; **or**, press **Menu** to bypass. 2. Press **Select** to increment digit until desired value is displayed, then press **Menu** to set. 3. Repeat step 2 for each digit. 4. Press **Menu** to advance to the next submenu; or, press **Select** to restart change mode.
Port A/B Soft Physical Addressing Submenu		
Note: Skip this menu if Hard Physical Addressing is being used.		
Soft PA LO	Defaults to last saved selection. Searches for a soft loop ID in descending order (**125** to **0**)	1. Press **Menu** to bypass, **or** 2. Press **Select** to toggle option; then, press **Menu** to set, and advance to the next submenu.
Soft PA HI	Searches for a soft loop ID in ascending order (**0 to 125**)	

Table 6-1. Menu Table—Fibre Channel Configuration (Continued)

Options	Notes	Procedure
Port A/B Maximum Data Size Submenu		
`MaxSz 2112`	Selects frame size.	1. Press **Menu** to bypass, **or**
`MaxSz 2048`	Engineering recommends a setting of **2048**.	2. Press **Select** until desired option is displayed; then, press **Menu** to set, and advance to the next submenu.
`MaxSz 1280`		
`MaxSz 1024`		
`MaxSz  768`		

Note: Manufacturing ships drive with the `MaxSz 2112` option selected.

Options	Notes	Procedure
Port A/B World-Wide Name Submenu		

Note: Firmware release level 1.30.111, and up, can create a "Custom" WWN as required for special circumstances.

When Custom WWNs are to be used, Port A, Port B, and Drive Node WWNs should *all* be changed to designated Custom WWNs to meet special circumstances.

Make sure a Custom WWN is unique, and registered in Host interface software. Unregistered or duplicate WWNs will cause Host interface anomalies.

Options	Notes	Procedure
	Defaults to last saved selection.	1. Press **Select** to start change mode; **or**, press **Menu** to bypass.
`H=xxxxxxxx`	`H=xxxxxxxx,` together with `L=yyyyyyyy,` comprise the unique 64-bit WWN that identifies this specific port.	2. Press **Select** to increment digit until desired value is displayed, then press **Menu** to set.
`L=yyyyyyyy`		
	Pressing **Select** when all digits are steady starts the change mode. The left-most hexadecimal digit begins flashing and will increment up one value with each additional press of **Select**.	3. Repeat step 2 for each digit.
		4. Press **Menu** to advance to the next submenu; or, press **Select** to restart change mode.
	Pressing **Menu** sets the flashing digit at displayed value (**0-F**), and advances flashing to the next digit. When the last digit is set, a second press of **Menu** advances menu to next submenu. Pressing **Select** restarts the left-most digit flashing.	

Note: Manufacturing generates a "Normal" WWN and stores it in the drive EEPROM.

Table 6-1. Menu Table—Fibre Channel Configuration (Continued)

| Options	Notes	Procedure
Port A/B Custom/Normal WWN Submenu		
Note: This submenu only appears if a Custom WWN is in use, or is being created.		
`WWN Custom`	Custom is default selection.	1. Press **Menu** to invoke a Custom WWN, and advance to the next submenu; **or,**
`WWN Normal`	Normal selection recalls the stored Normal WWN from the drive EEPROM.	2. Press **Select** to toggle option; then, press **Menu** to reset WWN to the stored Normal WWN, and advance to the next submenu.
	Currently, a password (use 500) is required to save a new Custom WWN, or to reset a Custom WWN back to the stored Normal WWN. Password requirement will not be in future firmware releases.	
Note: If valid Password is not entered, change to the WWN will not be saved.		
Port B Attributes Submenu		
`Cfg PrtB ?`	View or change Port B attributes as defined in the preceding Port A/B Attributes Submenus, starting on page 6-14.	1. Press **Select** (Yes) to enter the Port A/B Attributes submenus, **or**
		2. Press **Menu** (No) to bypass.
Tape Bar Submenu		
`Tape Bar Y`	Selects a barchart that displays how much tape is written and how much tape has been read.	1. Press **Menu** to bypass, **or**
`Tape Bar N`	Deselects the barchart display.	2. Press **Select** to toggle option; then, press **Menu** to set, and advance to the next submenu.
	See "Tape Bar" on page 1-14 for additional information.	
Note: Manufacturing ships drive with the `Tape Bar N` option selected		
Language Selection Submenu		
	Defaults to last saved selection.	1. Press **Menu** to bypass, **or**
`Language ?`	Selects display language: **English**, **Espanol**, **Francais**, **Italiano**, or **Deutscher**.	2. Press **Select** until desired option is displayed; then, press **Menu** to set, and advance to the next submenu.
Note: Manufacturing ships drive with the `English` option selected		

Table 6-1. Menu Table—Fibre Channel Configuration (Continued)

Options	Notes	Procedure
VolSafe Selection Submenu		
	Defaults to last saved selection.	1. Press **Menu** to bypass, **or**
VolSafe Y	When **VolSafe Y** is selected, a password (Contact StorageTek Technical Support) must also be entered before VolSafe is enabled.	2. Press **Select** to toggle option; then, press **Menu** to set.
VolSafe N	When **VolSafe N** is selected, VolSafe is disabled.	3. If applicable, press **Select** to start password entry. The left-most character begins flashing.
		4. Press **Select** to increment until desired character is displayed, then press **Menu** to set.
		5. Repeat step 4 for each character.
		6. Press **Menu** to advance to the next submenu; **or**, press **Select** to restart.

Note: Manufacturing ships drive with the **VolSafe N** option selected.

Options	Notes	Procedure
Full Code Load Submenu		
	Defaults to last saved selection.	1. Press **Menu** to bypass, **or**
FullCode Y	When **FullCode Y** is selected, all available drive code images are downloaded to the EEPROM. This enables the drive to be used to create a code tape with all images which then could be used to update other drives.	2. Press **Select** to toggle option; then, press **Menu** to set, and advance to the next submenu.
FullCode N	When **FullCode N** is selected, only the specific code image for the drive is downloaded to EEPROM. This option allows more EEPROM space for dumps and event logs, but disables the drive from creating code tapes.	

Note: Manufacturing ships drive with only one code image, and **FullCode N** selected.

CodCrFail3 displays if you try to make a code tape from a drive with only one image loaded. (Code release level 1.30.109 and up, displays **CHK A738**.)

To enable a drive to create code tapes, select **FullCode Y**, and load the desired code release level from a valid source.

Table 6-1. Menu Table—Fibre Channel Configuration (Continued)

Options	Notes	Procedure
Emulation Mode Submenu		
Emul XXXXX	Defaults to last saved selection.	1. Press **Menu** to bypass, **or**
	Emul STD is Native.	2. Press **Select** until desired option is displayed; then, press **Menu** to set and advance to the next submenu.
	Emul 3590 is 3590B (AS400).	
	Emul SD-3	
	Emul F2483	
	Emul 3490E is 3490E11 (AS400).	
	Emul 7	
	Emul STD s	
	Emul 3590s	
	Emul 12	
	Emul 13	
	Emul 14	
	CAUTION: DECREASED CAPACITY. Emul STD s **and** Emul 3590s **selections use a portion of tape length for recording. DO NOT USE these selections unless instructed to do so by StorageTek Engineering.**	

Note: Manufacturing ships drive with the **Emul STD** option selected. Std identifies the drive to the host relative to actual (Native) model.

Table 6-1. Menu Table—Fibre Channel Configuration (Continued)

Options	Notes	Procedure
Library Address Submenu		
`Lib Adr xy`	Defaults to last saved selection. Pressing **Select** when both characters are steady, starts the change mode. The **x** character begins flashing and will increment up, one value with each additional press of **Select**. Pressing **Menu** sets flashing character at displayed value (**0-F**), and advances to the **y** character. For 9738 libraries, the addresses of all drives stay at the factory preset (**FF**).	1. Press **Select** to start change mode; **or**, press **Menu** to bypass. 2. Press **Select** to increment until desired value is displayed, then press **Menu** to set. 3. Repeat step 2 for **y** character. 4. Press **Menu** to advance to the next submenu; or, press **Select** to restart change mode.
Note: Manufacturing ships drives with **Lib Adr FF** selected.		
CSL Power On Mode Submenu		
	Defaults to last saved selection. Selects the default operation of the CSL when powering on:	1. Press **Menu** to bypass, **or** 2. Press **Select** until desired option is displayed; then, press **Menu** to set and advance to next submenu.
`CSL System`	• **CSL System** allows the host to control the CSL.	
`CSL Auto`	• **CSL Auto** allows the CSL to operate automatically.	
`CSL Manual`	• **CSL Manual** allows manual operations only.	
Note: Manufacturing ships drives with **CSL Auto** option selected.		

Table 6-1. Menu Table—Fibre Channel Configuration (Continued)

Options	Notes	Procedure
Drive Node World-Wide Name Submenu		

Note: Firmware release level 1.30.111, and up, can create a "Custom" WWN as required for special circumstances.

When Custom WWNs are to be used, Port A, Port B, and Drive Node WWNs should *all* be changed to designated Custom WWNs to meet special circumstances.

Make sure a Custom WWN is unique, and registered in Host interface software. Unregistered or duplicate WWNs will cause Host interface anomalies.

Options	Notes	Procedure
	Defaults to last saved selection.	1. Press **Select** to start change mode; **or**, press **Menu** to bypass.
H=xxxxxxxx **L=yyyyyyyy**	**H=xxxxxxxx,** together with **L=yyyyyyyy,** comprise the unique 64-bit WWN that identifies this specific drive.	2. Press **Select** to increment digit until desired value is displayed, then press **Menu** to set.
	Pressing **Select** when all digits are steady starts the change mode. The left-most hexadecimal digit begins flashing and will increment up one value with each additional press of **Select**.	3. Repeat step 2 for each digit. 4. Press **Menu** to advance to the next submenu; or, press **Select** to restart change mode.
	Pressing **Menu** sets the flashing digit at displayed value (**0-F**), and advances flashing to the next digit. When the last digit is set, a second press of **Menu** advances menu to next submenu. Pressing **Select** restarts the left-most digit flashing.	
Drive Node Custom/Normal WWN Submenu		

Note: This submenu only appears if a Custom WWN is in use, or is being created.

Options	Notes	Procedure
WWN Custom **WWN Normal**	Custom is default selection. Normal selection recalls the stored Normal WWN from the drive EEPROM. Currently, a password (use 500) is required to save a new Custom WWN, or to reset a Custom WWN back to the stored Normal WWN. Password requirement will not be in future firmware releases.	1. Press **Menu** to invoke Custom WWN, and advance to the next submenu; **or**, 2. Press **Select** to toggle option; then, press **Menu** to reset WWN to the stored Normal WWN, and advance to the next submenu.

Note: If valid password is not entered, change to the WWN will not be saved.

Table 6-1. Menu Table—Fibre Channel Configuration (Continued)

Options	Notes	Procedure
Save Configuration Submenu		
`Save/IPL ?`	This submenu appears only if the drive configuration was changed.	1. Press **Select** (Yes) to save changes and initiate IPL; **or**,
	Saving CFG displays for 2 seconds after pressing **Select**.	2. Press **Menu** (No) to cancel changes.
	After saving configuration, a Fibre Channel drive automatically performs IPL.	
	Save Fails displays for RAM problems. See Table 7-2 on page 7-3 for instructions.	
Exit Configuration Submenu		
`Exit CFG ?`	This submenu allows you to exit CFG, or to repeat the CFG submenus.	1. Press **Select** (Yes) to exit CFG, **or**
		2. Press **Menu** (No) to loop back to the Compress Mode Submenu.
Main Exit Main Menu		
`Exit Menu?`	This menu allows you to exit the menu system, or to stay in, with an opportunity to return the drive to Online before exiting the menu system.	1. Press **Select** (Yes) to exit the menu system, **or**
	If the drive is not returned to Online before exiting the menu system, the display will flash **Offline** every few seconds as a reminder that drive is still Offline.	2. Press **Menu** (No) to return to the Online/Offline main menu.
		3. If applicable, IPL the drive to invoke the changes.

■ SCSI View Configuration Status

Figure 6-8 provides a menu tree for viewing a SCSI configuration.

Figure 6-8. Menu Tree—View SCSI Configuration

Notes:

1. Firmware release level.

2. Current language selection.

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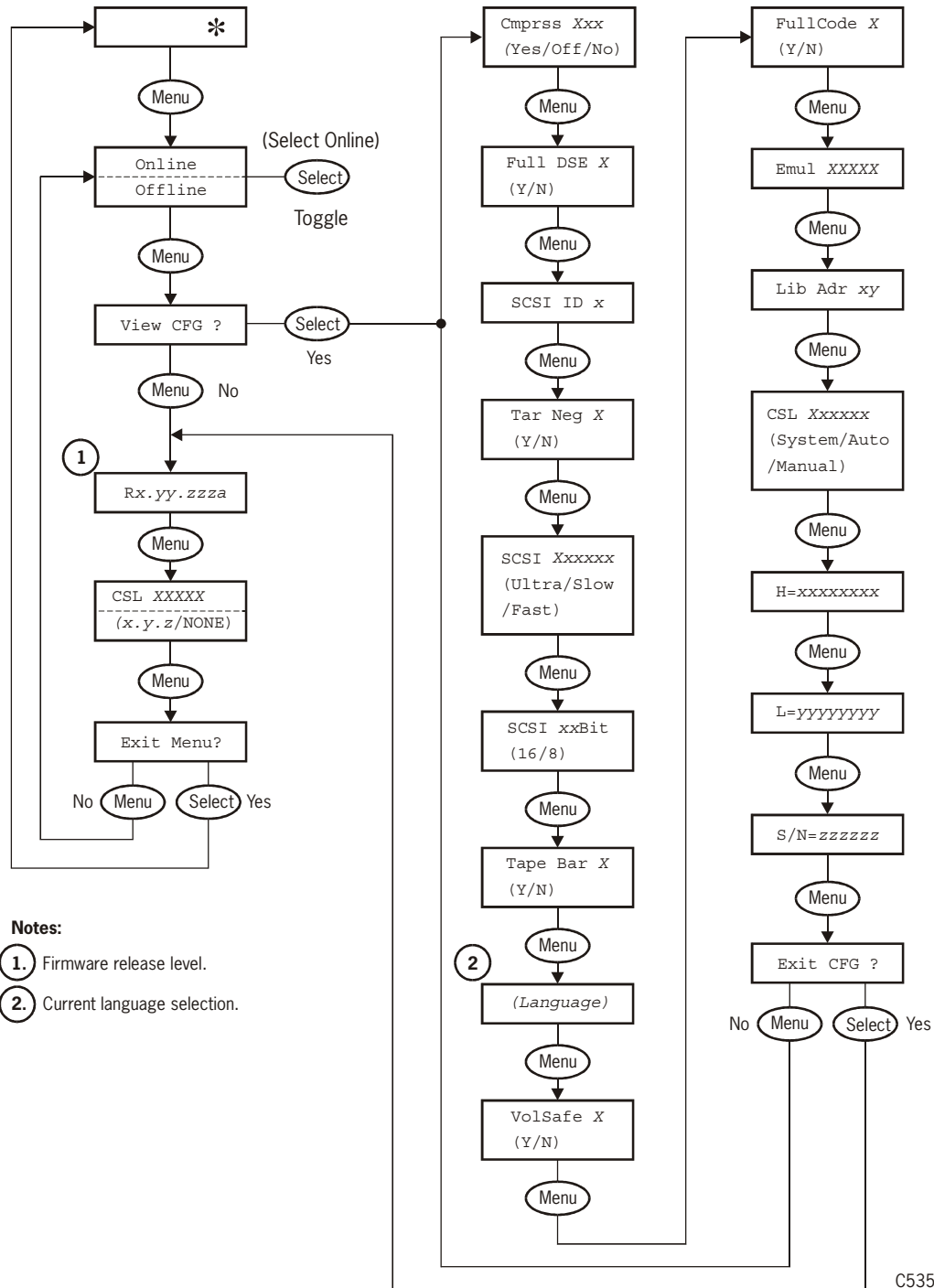
■ SCSI Change Configuration Menu

Figure 6-9 provides a menu tree for changing a SCSI configuration.

Figure 6-9. Menu Tree—Change SCSI Configuration (Sheet 1 of 2)

Notes:

1. Firmware release number.

2. CSL Firmware release number only appears when drive is installed in a CSL.

Figure 6-9. Menu Tree—Change SCSI Configuration (Sheet 2 of 2)

Notes:

1. VolSafe Y requires password from StorageTek Technical Support.

2. When all digits are steady, press Menu to accept; or press Select to restart change mode.

3. Press Select to step flashing digit. Press Menu to set.

4. Normal resets WWN to factory preset.
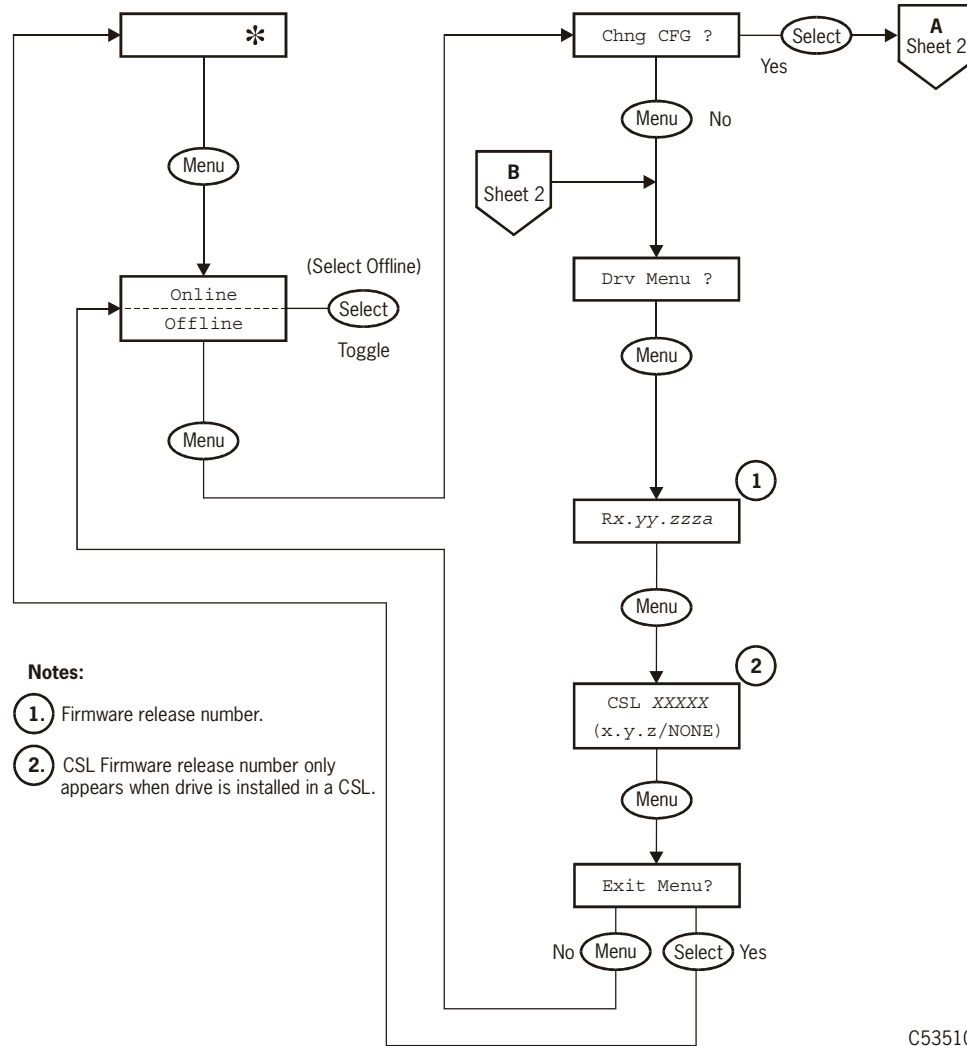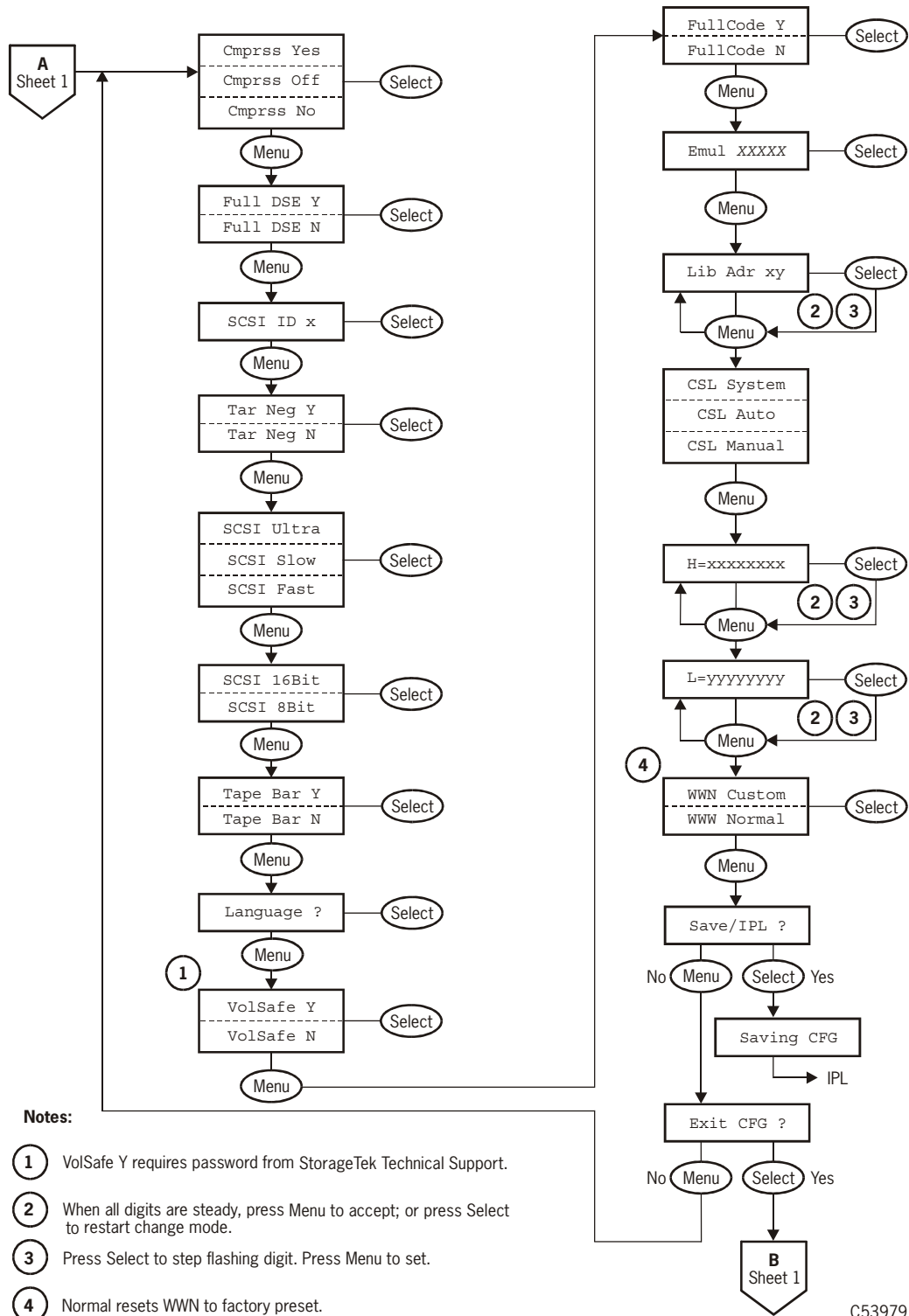
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Table 6-2 provides detailed instructions to change configuration of a SCSI drive when the drive is offline.

Table 6-2. Menu Table—SCSI Configuration

Options	Notes	Procedure
Online/Offline Main Menu		
`Online/ Offline`	Defaults to Online at power-on. `Offline` must be selected to change configuration settings. `OffLn Pend` may display while waiting for a system response or diagnostics completion.	1. If required, press Menu repeatedly until `Online` or `Offline` is displayed. 2. If `Online`, press Select to toggle option to `Offline`. 3. Press Menu to advance to Change Configuration main menu.
Change Configuration Main Menu		
`Chng CFG ?`	This is the entry point to the Configuration submenus.	1. Press Select to enter Configuration submenus, **or** 2. Press Menu to bypass.
Compress Mode Submenu		
	Defaults to last saved selection.	1. Press Menu to bypass, **or**
`Cmprss Yes`	When `Yes` is selected, data is compressed, by default. Host can request no data compression.	2. Press Select until the desired option is displayed; then, press Menu to set, and advance to next submenu.
`Cmprss Off`	When `Off` is selected, data is not compressed, and host request has no effect.	
`Cmprss No`	When `No` is selected, data is not compressed, by default. Host can request data compression.	

Note: Manufacturing ships drive with the `Cmprss Yes` option selected.

Table 6-2. Menu Table—SCSI Configuration (Continued)

Options	Notes	Procedure
Data Security Erase Mode Submenu		
	Defaults to last saved selection.	1. Press **Menu** to bypass, **or**
Full DSE Y	**Full DSE Y** writes a random binary pattern on the media, over-writing existing data, from the point of an "Erase" command, to the End of Tape.	2. Press **Select** to toggle option; then, press **Menu** to set, and advance to next submenu.
Full DSE N	**Full DSE N** writes data on the media that indicates valid data does not exist beyond the point of an "Erase" command.	
Note: Manufacturing ships drive with the **Full DSE Y** option selected.		
SCSI ID Submenu		
SCSI ID x	Defaults to last saved selection. Pressing **Select** when the x character is steady, starts the change mode. The **X** character begins flashing and will increment up, one value with each additional press of **Select.** Pressing **Menu** sets flashing character at displayed value. Establishes the SCSI ID of the drive. The value range **0–7** is for narrow (8bit) bus width, and **0–F** is for wide (16bit) bus width.	1. Press **Select** to start change mode; **or**, press **Menu** to bypass. 2. Press **Select** to increment until desired value is displayed, then press **Menu** to set. 3. Press **Menu** to advance to the next submenu; or, press **Select** to restart change mode.
Note: Manufacturing ships drive with the **SCSI ID 6** address option selected.		
SCSI Target Negotiation Mode Submenu		
	Defaults to last saved selection.	1. Press **Menu** to bypass, **or**
Targ Neg Y **Targ Neg N**	When **Yes** is selected, it allows the drive control unit to initiate negotiations with the host to clarify the SCSI transmission speed, in case the host had not done so.	2. Press **Select** to toggle option; then, press **Menu** to set, and advance to next submenu.
Note: Manufacturing ships drive with the **Targ Neg N** option selected.		

Table 6-2. Menu Table—SCSI Configuration (Continued)

Options	Notes	Procedure
SCSI Bus Speed Submenu		

`SCSI Ultra`
 	
`SCSI Fast`
 	
`SCSI Slow`
	Defaults to last saved selection.
	
	Selects channel transmission speed for the drive to match the drive with the host capabilities.
	
	Ultra = 40MB/s (16Bit width)
	        20MB/s (8Bit width)
	
	Fast = 20MB/s (16Bit width)
	        10MB/s (8Bit width)
	
	Slow = 10MB/s (16Bit width)
	        5MB/s (8Bit width)
		1. Press **Menu** to bypass, **or**
		
		2. Press **Select** until the desired option is displayed; then, press **Menu** to set, and advance to next submenu.

Note: Manufacturing ships drive with the **SCSI Ultra** option selected.		
SCSI Bus Width Submenu		

`SCSI 16Bit`
 	
`SCSI 8Bit`
	Defaults to last saved selection.
	
	Selects channel width for the drive to match the drive with the host configuration.
		1. Press **Menu** to bypass, **or**
		
		2. Press **Select** to toggle option; then, press **Menu** to set, and advance to next submenu.

Note: Manufacturing ships drive with the **SCSI 16Bit** option selected.		
Tape Bar Submenu		

`Tape Bar Y`
 	
`Tape Bar N`
	Selects a barchart that displays how much tape is written and how much tape has been read.
	
	Deselects the barchart display.
	
	See "Tape Bar" on page 1-14 for additional information.
		1. Press **Menu** to bypass, **or**
		
		2. Press **Select** to toggle option; then, press **Menu** to set, and advance to the next submenu.

Note: Manufacturing ships drive with the **`Tape Bar N`** option selected		
Language Selection Submenu		
`Language ?`	Selects display language: **English**, **Espanol**, **Francais**, **Italiano**, or **Deutscher**.	1. Press **Menu** to bypass, **or** 2. Press **Select** until desired option is displayed; then, press **Menu** to set, and advance to the next submenu.
Note: Manufacturing ships drive with the **`English`** option selected		

Table 6-2. Menu Table—SCSI Configuration (Continued)

Options	Notes	Procedure
VolSafe Selection Submenu		
	Defaults to last saved selection.	1. Press **Menu** to bypass, **or**
VolSafe Y	When **VolSafe Y** is selected, a password (Contact StorageTek Technical Support) must also be entered before VolSafe is enabled.	2. Press **Select** to toggle option; then, press **Menu** to set.
VolSafe N	When **VolSafe N** is selected, VolSafe is disabled.	3. If applicable, press **Select** to start password entry. The left-most character begins flashing.
		4. Press **Select** to increment until desired character is displayed, then press **Menu** to set.
		5. Repeat step 4 for each character.
		6. Press **Menu** to advance to the next submenu; **or**, press **Select** to restart.

Note: Manufacturing ships drive with the **VolSafe N** option selected.

Options	Notes	Procedure
Full Code Load Submenu		
	Defaults to last saved selection.	1. Press **Menu** to bypass, **or**
FullCode Y	When **FullCode Y** is selected, all drive code images are downloaded to the EEPROM. This enables the drive to be used to create a code tape with all images which then could be used to update other drives.	2. Press **Select** to toggle option; then, press **Menu** to set, and advance to the next submenu.
FullCode N	When **FullCode N** is selected, only the specific code image for the drive is downloaded to EEPROM. This option allows more EEPROM space for dumps and event logs, but disables the drive from creating code tapes.	

Note: Manufacturing ships drive with only one code image, and **FullCode N** selected.

CodCrFail3 displays if you try to make a code tape from a drive with only one image loaded. (Code release level 1.30.109 and up, displays **CHK A738**.)

To enable a drive to create code tapes, select **FullCode Y**, and load the desired code release level from a valid source.

Table 6-2. Menu Table—SCSI Configuration (Continued)

Options	Notes	Procedure
Emulation Mode Submenu		
`Emul XXXXX`	Defaults to last saved selection.	1. Press **Menu** to bypass, **or**
	`Emul STD` is Native.	2. Press **Select** until desired option is displayed; then, press **Menu** to set and advance to the next submenu.
	`Emul 3590` is 3590B (AS400).	
	`Emul SD-3`	
	`Emul 3`	
	`Emul F2483`	
	`Emul 5`	
	`Emul 3490E` is 3490E11 (AS400).	
	`Emul 7`	
	`Emul STD s`	
	`Emul 3590s`	
	`Emul 11`	
	`Emul 12`	
	`Emul 13`	
	`Emul 14`	
	CAUTION: DECREASED CAPACITY. `Emul STD s` **and** `Emul 3590s` **selections use a portion of tape length for recording. DO NOT USE these selections unless instructed to do so by StorageTek Engineering.**	

Note: Manufacturing ships drive with the `Emul STD` option selected. Std identifies the drive to the host relative to actual (Native) model.

Table 6-2. Menu Table—SCSI Configuration (Continued)

Options	Notes	Procedure
Library Address Submenu		
`Lib Adr xy`	Defaults to last saved selection. Pressing **Select** when both characters are steady, starts the change mode. The **x** character begins flashing and will increment up, one value with each additional press of **Select**. Pressing **Menu** sets flashing character at displayed value (**0-F**), and advances to the **y** character. For 9738 libraries, the addresses of all drives stay at the factory preset (**FF**).	1. Press **Select** to start change mode; **or**, press **Menu** to bypass. 2. Press **Select** to increment until desired value is displayed, then press **Menu** to set. 3. Repeat step 2 for **y** character. 4. Press **Menu** to advance to the next submenu; **or**, press **Select** to restart change mode.
Note: Manufacturing ships drive with **Lib Adr FF** selected.		
CSL Power On Mode Submenu		
	Defaults to last saved selection. Selects the default operation of the CSL when powering on:	1. Press **Menu** to bypass, **or** 2. Press **Select** until desired option is displayed; then, press **Menu** to set and advance to next submenu.
`CSL System`	• `CSL System` allows the host to control the CSL.	
`CSL Auto`	• `CSL Auto` allows the CSL to operate automatically.	
`CSL Manual`	• `CSL Manual` allows manual operations only.	
Note: Manufacturing ships drive with `CSL Auto` option selected.		

Table 6-2. Menu Table—SCSI Configuration (Continued)

Options	Notes	Procedure
Drive Node World-Wide Name Submenu		

Note: Firmware release level 1.30.111, and up, can create a "Custom" WWN as required for special circumstances.

Make sure a Custom WWN is unique, and registered in Host interface software. Unregistered or duplicate WWNs will cause Host interface anomalies.

Options	Notes	Procedure
	Defaults to last saved selection.	1. Press **Select** to start change mode; **or**, press **Menu** to bypass.
H=xxxxxxxx **L=yyyyyyyy**	**H=xxxxxxxx,** together with **L=yyyyyyyy,** comprise the unique 64-bit WWN that identifies this specific drive.	2. Press **Select** to increment digit until desired value is displayed, then press **Menu** to set.
	Pressing **Select** when all digits are steady, starts the change mode. The left-most hexadecimal digit begins flashing and will increment up one value with each additional press of **Select**.	3. Repeat step 2 for each digit. 4. Press **Menu** to advance to the next submenu; or, press **Select** to restart change mode.
	Pressing **Menu** sets the flashing digit at displayed value (**0-F**), and advances flashing to the next digit. When the last digit is set, a second press of **Menu** advances menu to next submenu. Pressing **Select** restarts the left-most digit flashing.	
Drive Node Custom/Normal WWN Submenu		

Note: This submenu only appears if a Custom WWN is in use, or is being created.

Options	Notes	Procedure
WWN Custom	Custom is default selection.	1. Press **Menu** to invoke Custom WWN, and advance to the next submenu; **or**,
WWN Normal	Normal selection recalls the stored Normal WWN from the drive EEPROM.	
	Currently, a password (use 500) is required to save a new Custom WWN, or to reset a Custom WWN back to the stored Normal WWN. Password requirement will not be in future firmware releases.	2. Press **Select** to toggle option; then, press **Menu** to reset WWN to the stored Normal WWN, and advance to the next submenu.

Note: If valid password is not entered, change to the WWN will not be saved.

Table 6-2. Menu Table—SCSI Configuration (Continued)

Options	Notes	Procedure
Save Configuration Submenu		
Save/IPL ?	This submenu appears only if the drive configuration was changed. **Saving CFG** displays for 2 seconds after pressing **Select**. After saving configuration, a SCSI drive automatically performs IPL. **Save Fails** displays for RAM problems. See Table 7-2 on page 7-3 for instructions.	1. Press **Select** (Yes) to save changes and initiate IPL; **or**, 2. Press **Menu** (No) to cancel changes.
Exit Configuration Submenu		
Exit CFG ?	This submenu allows you to exit CFG, or to repeat the CFG submenus.	1. Press **Select** (Yes) to exit CFG, **or** 2. Press **Menu** (No) to loop back to the Compress Mode Submenu.
Main Exit Main Menu		
Exit Menu?	This menu allows you to exit the menu system, or to stay in, with an opportunity to return the drive to Online before exiting the menu system. If the drive is not returned to Online before exiting the menu system, the display will flash **Offline** every few seconds as a reminder that drive is still Offline.	1. Press **Select** (Yes) to exit the menu system, **or** 2. Press **Menu** (No) to return to the Online/Offline main menu. 3. If applicable, IPL the drive to invoke the changes.

■ Drive Operations Menu

Figure 6-10 provides a menu tree for drive operations. This menu is only available when the drive is Offline. Each option invokes a submenu to bypass, or perform the listed tape utility.

Figure 6-10. Menu Tree—Drive Operations

Notes:

1. See interface Menu Tree.
2. Offline only.
3. Firmware release number.
4. Insert Firmware tape.
5. Insert Write-Enabled tape.
6. Insert tape requiring MIR.
7. If using a CSL to build the MIR on a tape, press the start switch to load a tape after inserting into the feed channel.
8. Insert known good scratch tape.

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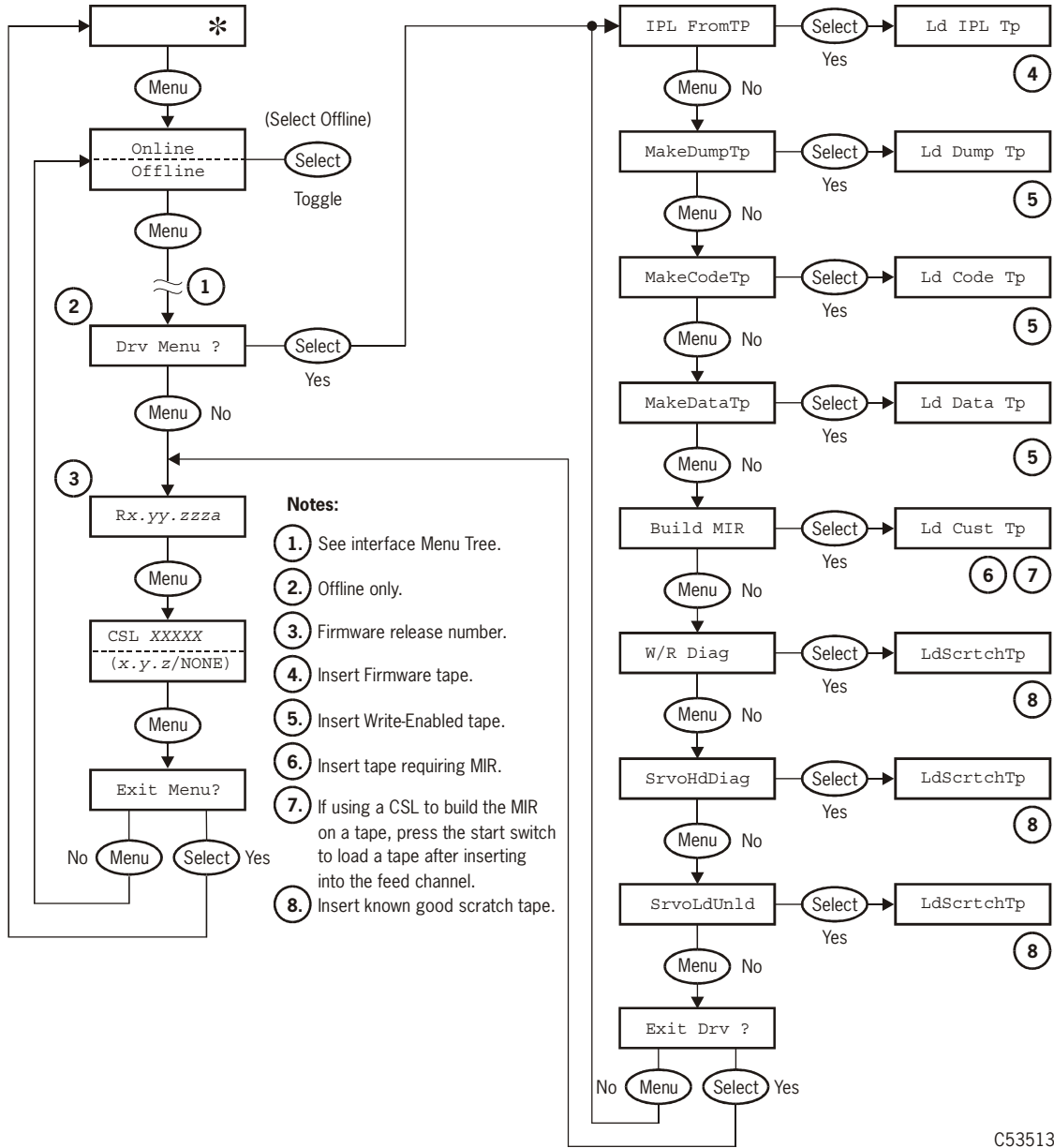
Table 6-3 provides detailed instructions to:

- Update drive firmware
- Format a dump tape
- Copy firmware
- Reformat tapes
- Build an MIR
- Perform drive diagnostics.

Table 6-3. Menu Table—Drive Operations

Options	Notes	Procedure
Online/Offline Main Menu		
`Online/ Offline`	Defaults to Online at power-on. `Offline` must be selected to enter Drive Operation menus. `OffLn Pend` may display while waiting for a system response or diagnostics completion.	1. If required, press Menu repeatedly until `Online` or `Offline` is displayed. 2. If `Online`, press Select to toggle option to `Offline`. 3. Press Menu repeatedly until `Drv Menu ?` is displayed.
Drive Operation Main Menu		
`Drv Menu ?`	This is the entry point to the Drive Operations submenus.	1. Press Select to enter the Drive Operations submenus, **or** 2. Press Menu to bypass the Drive Operations submenus.

Table 6-3. Menu Table—Drive Operations (Continued)

Options	Notes	Procedure
Code Update Submenu		
`IPL FromTP`	IPL From Tape, updates the drive firmware from a firmware tape inserted in the drive. If a normal tape is present in the drive when this function is activated, it ejects. When the update is done, the drive automatically ejects the firmware tape, performs IPL, and goes Online. If **CodUpFailsx** (Code Update Fail Number x) or **CHK xxxx** displays, refer to Table 7-2 on page 7-3 for instructions.	1. Press **Menu** to bypass, **or** 2. Press **Select** to activate. 3. When **Ld IPL Tp** displays, insert the write-protected firmware tape containing the desired code level.
Dump Tape Submenu		
`MakeDumpTp`	Make Dump Tape, formats a tape; but, it does not collect diagnostic data. Tapes used to obtain dump data must first be formatted this way to accept dump data. If a normal tape is present in the drive when this function is activated, it ejects. Old data on tape being formatted will be erased. If **DmpCrFailx** (Dump Create Fail Number x) or **CHK xxxx** displays, refer to Table 7-2 on page 7-3 for instructions.	1. Press **Menu** to bypass, **or** 2. Press **Select** to activate. 3. When **Ld Dump Tp** displays, insert a write-enabled tape. 4. When the tape ejects, insert another tape, or press **Menu** to advance to the next submenu.

Table 6-3. Menu Table—Drive Operations (Continued)

Options	Notes	Procedure
Create Code Tape Submenu		
MakeCodeTp	Make Code Tape, copies all firmware images from the drive EEPROM to a tape. This tape may then be used to update other drives using the Code Update submenu. If a normal tape is present in the drive when this function is activated, it ejects. If **CodCrFailx** (Code Create Fail Number *x*) or **CHK *xxxx*** displays, refer to Table 7-2 on page 7-3 for instructions. **CodCrFail3** or **CHK A738** displays if you try to make a code tape form a drive which has only one image loaded.	1. Make sure FullCode option is set to Yes. If required, exit Drive Operations Menu and enter Change Configuration Menu to change option. 2. Press **Menu** to bypass, **or** 3. Press **Select** to activate. 4. When **Ld Code Tp** displays, insert write-enabled tape. 5. When the tape ejects, insert another tape, or press **Menu** to advance to the next submenu. 6. Write-protect the new code tape.

Note: Only drives set to **FullCode Y** and which have all images loaded into EEPROM can make valid code tapes.

Options	Notes	Procedure
Reclaim Tape Submenu		
MakeDataTp	Make Data Tape, reformats tapes so they can be reused as normal data tapes. This is referred to as "reclaiming." If a normal tape is present in the drive when this function is activated, it ejects. Old data on tape being formatted will be erased. If **DatCrFailx** (Data Create Fail Number *x*) or **CHK *xxxx*** displays, refer to Table 7-2 on page 7-3 for instructions.	1. Press **Menu** to bypass, **or** 2. Press **Select** to activate. 3. When **Ld Data Tp** displays, insert write-enabled tape. 4. When tape ejects, insert another tape, or press **Menu** to advance to the next submenu.

Table 6-3. Menu Table—Drive Operations (Continued)

Options	Notes	Procedure
Build Media Information Region (MIR)		
Build MIR	The 9840 tape drive uses information recorded at the beginning of each tape, in an area known as the Media Information Region (MIR), to access and manage that tape while mounted on the drive. Make sure drive is unloaded before activating Build MIR. **Rebuild MIR** flashes on the operator panel while the MIR is rebuilding. A 9840 MIR rebuild takes approximately 40 minutes for a full tape. If **BldMIRFail** (Build MIR Fail) or **CHK *xxxx*** displays, refer to Table 7-2 on page 7-3 for instructions.	1. Press **Menu** to bypass, **or** 2. Press **Select** to activate. 3. When **Ld Cust Tp** displays, insert tape requiring MIR. 4. If using a CSL to build the MIR on a tape, press the **Start** switch to load the tape after inserting it into the feed channel. 5. When the MIR is rebuilt, and the tape ejects, insert another tape, or press **Menu** to advance to the Exit Drive Submenu.

Table 6-3. Menu Table—Drive Operations (Continued)

Options	Notes	Procedure
Write/ Read Diagnostic Submenu		
`W/R Diag`	Write/Read Diagnostics test the drive write/read function by writing/reading data to/from a scratch tape.	1. Press **Menu** to bypass, **or**
	A tape cartridge, if present, ejects when this option is selected.	2. Press **Select** to activate.
	Make sure a known good, scratch (formatted for data) tape cartridge is available. The diagnostic routine is designed and intended to check drive functions, NOT tape media. A faulty tape cartridge will cause unexpected/misleading errors.	3. When **LdScrtchTp** displays, insert known good, write-enabled scratch tape cartridge.
		4. If a diagnostic error FSC displays, press **Unload** to clear.
		5. When the tape ejects, press **Menu** to advance to the Exit Drive submenu; or, reinsert tape cartridge to repeat.
	"WrtRd Diag" displays during the approximately 5 minute routine.	
	If **CHK *xxxx*** displays, see FSC Dictionary for information.	

Note: The following Drive Diagnostics Submenu Item is not currently functional, although it appears as a menu option after firmware release level 1.30.109.

Not Available will display whenever you attempt to exercise this option until it is activated in a future firmware release.

Options	Notes	Procedure
Servo Head Diagnostic Submenu		
`SrvoHdDiag`	Servo Head Diagnostics test the drive servo head function.	1. Press **Menu** to bypass
	Not currently available.	

Table 6-3. Menu Table—Drive Operations (Continued)

Options	Notes	Procedure
Servo Load/ Unload Diagnostic Submenu		
SrvoLdUnld	Servo Load/ Unload Diagnostics test the drive servo load/unload function. A tape cartridge, if present, ejects when this option is selected. Make sure a scratch tape cartridge is available. Tape cartridge loading is required for the diagnostic, but the tape media is not used. **TestSrvLdU** displays during the approximately 1 minute routine (10 load/unload cycles). If **CHK xxxx** displays, see FSC Dictionary for information.	1. Press **Menu** to bypass, **or** 2. Press **Select** to activate. 3. When **LdScrtchTp** displays, insert known good scratch tape cartridge. 4. If a diagnostic error FSC displays, press **Unload** to clear. 5. When the tape ejects, press **Menu** to advance to the Exit Drive submenu; or, reinsert tape cartridge to repeat.
Exit Drive Submenu		
Exit Drv ?	This submenu allows you to exit Drive Operations, or to repeat the drive operations submenus.	1. Press **Select** (Yes) to exit Drive Operations, **or** 2. Press **Menu** (No) to loop back to the Code Update Submenu.

Error and Recovery

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This chapter provides 9840 Tape Drive error and recovery procedures.

Note: Refer to "Error and Recovery" in Chapter 5, "Cartridge Scratch Loader" for specific CSL error and recovery instructions.

■ Power and Service Error Indicators

Figure 7-1 provides the location of items on the standard and CSL operator panel. Table 7-1 on page 7-2 provides a description of the action recommended to clear the suspected malfunction.

Figure 7-1. Operator Panels
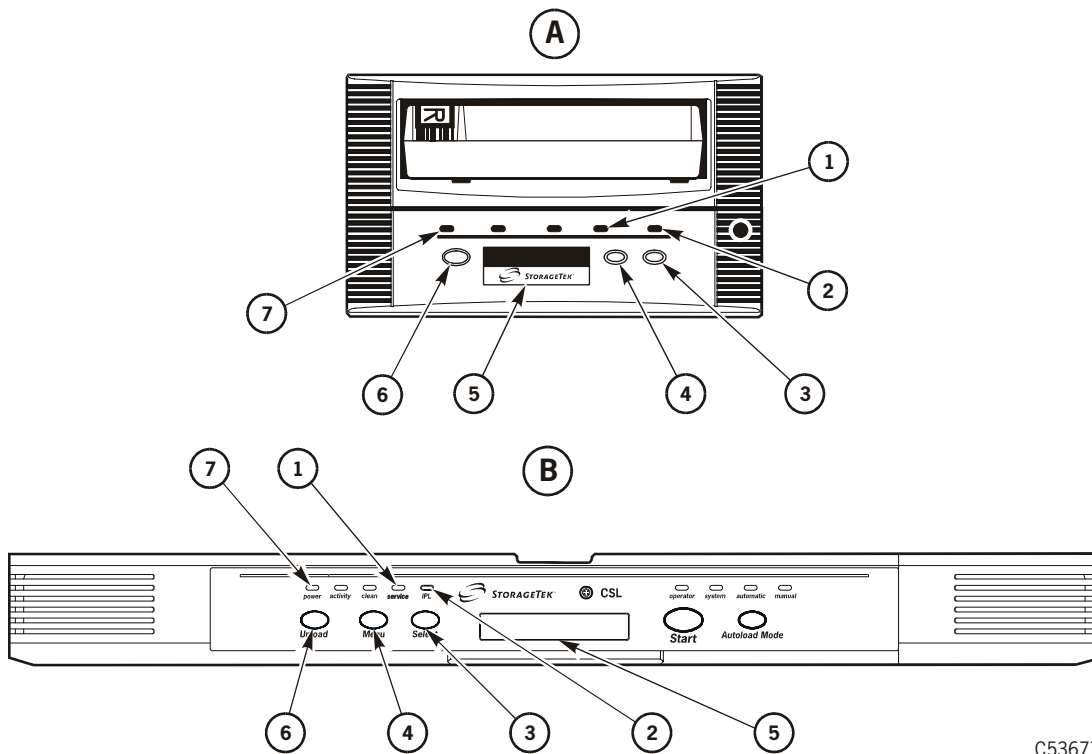
A is the standard operator panel.

1. *service* Indicator
2. IPL Switch
3. Select Switch
4. Menu Switch

B is the CSL operator panel.

5. Display
6. Unload Switch
7. *power* Indicator

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Table 7-1 explains error indications shown by the **power** and **service** indicators. These errors do not create an error message on the alphanumeric display. Refer to Table 7-2 on page 7-3 for error displays and recovery instructions.

Table 7-1. Power and Service Indicators

power (7, Figure 7-1)	**service** (1, Figure 7-1)	**Meaning**	**Action**
On	Off	Normal operation is occurring.	No action necessary.
On or flashing	Flashing after dump collection	A 9840 Tape Drive error is detected.	Perform an IPL. If the problem persists, contact authorized service personnel.
Flashing while action takes place	Flashing or off	A 9840 Tape Drive error occurred. Power-on and IPL sequences occur automatically.	No action necessary. If repeated power-on and IPL sequences do not make the drive or CSL operational, contact authorized service personnel.
Continuous flashing	Flashing or off	The 9840 Tape Drive failed the power on procedure; it cannot exit the IPL mode.	Retry the power on and IPL procedure. If the problem persists, contact authorized service personnel.
On	On	A 9840 Tape Drive failure occurred.	Perform an IPL. If the problem persists, contact authorized service personnel.

■ Dislodge a Stuck Tape

When you press the Unload switch (6, Figure 7-1 on page 7-1)or when the unload function is electronically triggered, and the cartridge fails to eject, it indicates that the tape cartridge is stuck or jammed within the carriage.

Note: See "Jammed Cartridge" in Chapter 8, "Servicing the Drive," for instructions to remove the cartridge from a drive.

See "Jammed Cartridge" in Chapter 5, "Cartridge Scratch Loader,"for instructions to remove the cartridge from a CSL.

Table 7-2 provides an alphabetical list of operator panel error displays and recommended actions. Refer to Figure 7-1 on page 7-1 for switch, indicator, and display locations on the standard and CSL operator panels.

The notation "*xxxx*" is a four-character hexadecimal fault symptom code (FSC).

Note: Refer to "Error and Recovery" in Chapter 5, "Cartridge Scratch Loader," for additional errors for the CSL.

Table 7-2. Error Displays and Instructions

Display	Probable Cause	Recommended Action
`*`	A steady asterisk (*) indicates that the drive completed IPL, and is online but not loaded.	Operator discretion.
`*` `Offline`	An asterisk (*) alternating with `Offline` indicates that drive or CSL is offline.	Operator discretion. Place drive `Online` for use by the host.
`ASIA DIAGS`	This is the normal display during IPL.	Wait for IPL to complete.
`Bank n Bad`	During a boot, a section of memory (*n*=1, 2, 3, or 4) is found bad.	If IPL does not correct the problem, replace the drive or CSL.
`Boot Fail`	The IPL failed.	Initiate IPL again. If IPL fails again, replace the drive or CSL.
`BT Monitor`	A sequence of switches took you to an Engineering zone.	IPL the drive or CSL to clear the error.
`BldMIRFail`	Rebuild of tape Media Information Region (MIR) unsuccessful.	
Note: In code level 1.30.109 and up, error message is replaced by `CHK xxxx`.		
`c`*n*`h`*n*`d`*n*`s`*n*	The hardware revision level supported by the firmware in this drive, where: *n*=any number 0–9, *c*=controller processor level *h*=host side formatter level *d*=device side formatter level *s*=servo level.	This message occurs when the firmware level is insufficient to control the hardware level in the drive. Install newer firmware level.
`CC DIAG`	This is the normal display during IPL.	Wait for the IPL to complete.

Table 7-2. Error Displays and Instructions (Continued)

CHK *xxxx*	An operational failure occurred. (*xxxx* = actual FSC that caused the failure.) Some failures will initiate a diagnostic dump and IPL.	If required, wait for the IPL to complete, then retry the operation. If the retry fails, replace drive or CSL.
Cleaning	The cleaning tape was inserted and the drive or CSL is now in process of cleaning.	No action necessary.
CodCrFail1	Unable to write to tape. Unable to position on tape.	Make sure the tape is write-enabled. Try another tape.
Note: In code level 1.30.109 and up, error message is replaced by CHK *xxxx*.		
CodCrFail2	Unreadable tape format.	Reclaim as a data tape. Retry the operation. Try another tape.
Note: In code level 1.30.109 and up, error message is replaced by CHK *xxxx*.		
CodCrFail3	Drive only has single code image in the EEPROM.	Make sure that the drive has all code images loaded in the EEPROM.
Note: In code level 1.30.109 and up, error message is replaced by CHK A738.		
CodeUpDate	The firmware in the drive or CSL is being updated from the host; the operator panel switches are locked.	No action necessary.
CodUpFail1	Unable to read the tape. Unable to position on tape. Unable to read image on tape.	Try another tape.
Note: In code level 1.30.109 and up, error message is replaced by CHK *xxxx*.		
CodUpFail2	The EEPROM is bad.	Before initiating IPL, try another tape. Initiate an IPL. If the problem persists, replace the drive or CSL.
Note: In code level 1.30.109 and up, error message is replaced by CHK *xxxx*.		

Table 7-2. Error Displays and Instructions (Continued)

`CodUpFail3`	The tape format is unreadable.	Reclaim as a data tape, recreate code tape.
		Retry the operation.
		Try another tape.
Note: In code level 1.30.109 and up, error message is replaced by `CHK` *xxxx*.		
`CodUpFail4`	This is not a code-update tape.	Retry with the correct tape.
Note: In code level 1.30.109 and up, error message is replaced by `CHK` *xxxx*.		
`DatCrFail1`	Unable to create (format) a data tape.	Make sure the tape is write-enabled.
		Try another drive or CSL.
Note: In code level 1.30.109 and up, error message is replaced by `CHK` *xxxx*.		
`DmpCrFail1`	Unable to create (format) a dump tape.	Make sure the tape is write-enabled.
		Try another tape.
		Try another drive or CSL.
Note: In code level 1.30.109 and up, error message is replaced by `CHK` *xxxx*.		
`DmpCrFail2`	The tape format is unreadable.	Reclaim as a data tape.
		Retry the operation.
		Try another tape.
Note: In code level 1.30.109 and up, error message is replaced by `CHK` *xxxx*.		
`DumpToHost`	The dump or event log is being transferred to host; the operator panel switches are locked	No action necessary.
`DmpWrFail1`	Unable to write a dump to tape.	Try another tape.
	Unable to position on tape.	Make sure the tape is formatted for a dump.
Note: In code level 1.30.109 and up, error message is replaced by `CHK` *xxxx*.		
`DmpWrFail2`	No dump to process.	Force a diagnostic dump.
Note: In code level 1.30.109 and up, error message is replaced by `CHK` *xxxx*.		
`DumpAgain?`	The drive or CSL detected the same "CHK (*xxxx*)" within one minute.	Go to "DumpAgain? Indication" on page 7-12.
`Exp ClCart`	The cleaning cartridge is used up.	Replace the cleaning cartridge.

Table 7-2. Error Displays and Instructions (Continued)

xxxx:Dmp*yy*	Alternates with an asterisk (*) after completion of an IPL, where: *xxxx* = FSC of the last dump data saved to the EEPROM *yy* = number of uncollected dumps in EEPROM	Optionally move the dump(s) to the host or tape See the dump instructions in Chapter 4, "Getting Started," or Chapter 7, "Error and Recovery."

Note: In code level 1.30.109 and up, error message is replaced by CHK *xxxx*.

Fix_CfgErr	Upon IPL, the configuration checksum does not match.	Go to "Save Fails or Fix_CfgErr Indication" on page 7-9.
INIT(*xxxx*)	An initialization error occurred.	Initiate IPL. If that fails, replace the drive or CSL.
IPL Pend	This is displayed for one second when the IPL switch is pressed.	Wait until the IPL completes automatically.
Load CC	The common controller code is loading.	No action necessary.
Loading	The tape cartridge is being loaded.	No action necessary.
Load FIBRE	This is the normal display during a boot.	Wait for the IPL to complete.
Load(*xxxx*)	The load or unload operation failed.	If another tape also fails to load, IPL the drive or CSL. If the failure persists, replace the drive or CSL. If another tape works, the tape is suspect.
Load SCSI	This is the normal display during a boot.	Wait for the IPL to complete.
Locating	The drive or CSL is performing a high-speed seek.	No action necessary.
Memory Err	The RAM failed during an IPL.	Initiate IPL again. If that fails, replace the drive or CSL.
NT Ready A	A VolSafe tape is in process of manual unload.	Wait until unload operation completes
NT Ready F	A write-protected tape is in process of manual unload.	Wait until unload operation completes

Table 7-2. Error Displays and Instructions (Continued)

`NT Ready U`	A non-write protected tape is in the process of a manual unload.	Wait until unload operation completes.
`Offline` `*`	`Offline` alternating with an asterisk (*) indicates that the drive or CSL is offline.	Operator discretion. **Note:** Place drive or CSL `Online` for use by the host.
`Online`	The drive or CSL is operational.	No action necessary.
`Power Fail`	The power supply failed.	Replace the power supply.
`Reading`	The drive or CSL is in read mode.	No action necessary.
`Ready A`	All of the following conditions must exist: • The loaded tape is a VolSafe tape. • The VolSafe tape is write-enabled (write-protect switch unlocked). • The drive or CSL has the VolSafe function enabled.	Operator discretion.
Note: Refer to "Cartridges" in Chapter 1, "Introduction," for more information on VolSafe cartridges.		
`Ready F`	The loaded tape is file-protected. A VolSafe tape is loaded into a drive or CSL which has VolSafe disabled.	Operator discretion. No action required to read the VolSafe tape. To append data to a VolSafe tape, enable drive or CSL and ensure the write-protect switch is unlocked.
Note: If the drive sensor is defective, all VolSafe cartridges will read `Ready F`. If a VolSafe cartridge is loaded in a drive or CSL that does not support VolSafe (downlevel code), FSC `4AF6` is displayed.		
`Ready U`	The loaded tape is not file-protected.	Operator discretion.
`Rewinding`	The drive or CSL is rewinding.	No action necessary.
`Save Fails`	The new configuration cannot be saved.	Replace the drive or CSL.

Table 7-2. Error Displays and Instructions (Continued)

SavingDump	This is displayed while saving the dump to EEPROM.	This is the normal display. Wait for the dump to complete.
Start Init	Initialization started.	No action necessary.
Trapped	The boot is trapped in a closed loop.	If the IPL does not clear the condition, replace the drive or CSL.
Unloading	The tape cartridge is being unloaded.	No action necessary.
UnWr(*xxxx*)	The **Unload** switch was pressed while a write was taking place.	Go to "UnWr xxxx Indication" on page 7-12.
Write Prot	The drive or CSL attempted to write to a write-protected tape. A VolSafe tape is loaded and the operator is trying to make a dump, code, or data tape, or build an MIR.	Change the switch on tape cartridge to write-enable. Remove VolSafe tape and insert a standard cartridge.
Writing	The drive or CSL is in write mode.	No action necessary.

■ Save Fails or Fix_CfgErr Indication

This section contains specific information to clear a Save Fails or Fix_CfgErr errors.

Explanation of Operations

Save New Configuration Change

When you make configuration changes, you save them to the RAM. The RAM copy is in turn stored in the EEPROM.

The ASIA (Application Specific Interface Adaptor) looks at the entire RAM contents, generates a checksum, and stores it in the EEPROM.

During normal operation, the drive uses the RAM content to determine drive configuration, and the EEPROM remains idle. Note that while drive power is on, the RAM periodically rewrites (refreshes) the EEPROM.

EEPROM versus RAM

The EEPROM is a non-volatile storage in which the drive configuration is saved through power on/off cycles.

The RAM is the volatile working memory used by the drive to hold the configuration data while it is powered on.

When powering off, the RAM content is lost, and the drive configuration is retained only in the EEPROM.

After Power On or IPL

When the drive is powered on or an IPL is manually initiated, the EEPROM contents are sent to the RAM. This data includes both the configuration data and the previously stored checksum.

The ASIA reads the RAM, generates a new checksum, and compares it to the previously stored checksum, looking for a match.

Fix_CfgErr" Error Indication

This error may occur during power on or IPL. The ASIA reads the RAM, generates a fresh checksum from the RAM contents it sees, and compares this checksum to the stored checksum. If there is no match, it shows up as a Fix_CfgErr display. This may indicate a defective EEPROM or RAM.

Save Fails Error Indication

This error may occur when you save a new configuration to the RAM after making configuration changes. It usually indicates a defective RAM.

Save Fails Error

This error can occur when saving a new configuration. It means that the RAM has failed the save operation. The drive cannot work properly with defective information in the RAM. Replace the drive.

Fix_CfgErr Error

This error can occur following power on or IPL: the drive configuration data was sent from the EEPROM to the RAM, and the RAM data failed the ASIA checksum test. When this error occurs, the drive completes the IPL but remains offline.

CAUTION:
This error check does not protect you from entering the wrong configuration in the first place. It only tells you that the RAM content had somehow changed since the configuration data was last entered. If you originally entered a wrong configuration and the circuits are in working order, it will not show up as an error.

This error check does not lock drive operations. You can place the drive online without changing the drive configuration. Do so only if you determine that an unused bit in the RAM or EEPROM is bad in accordance with the following procedure.

1. Check the drive configuration against the client records.

2. If the client records and the drive configurations match, there are two possibilities:

    -   An unused bit in the RAM or EEPROM has become bad.

    -   There may be a problem with the ASIA interface.

3. To isolate one of the two possibilities, do the following:

    a. Re-save the configuration.

        Because the configuration is already apparently correct, re-saving the configuration will generate and store a new checksum.

        If an unused bit of the RAM has become bad, it is now included in the ASIA checksum and will not show up again as an error.

    b. Initiate an IPL of the drive.

    c. If the error is not repeated, it is an indication that an unused bit in the RAM is bad. This problem can now be disregarded. Go to Step 5.

    d. If the problem is repeated and the configuration remains correct, there may be a problem with an unused bit in the EEPROM or with the ASIA checksum circuit.

> **Note:** When the configuration in the RAM is correct, the drive can usually operate normally while it remains powered on, even if the EEPROM or the checksum circuit in the ASIA are damaged. You can employ the drive that way if you have to wait for replacement.

4. If the client and drive configurations do not match, there are two possibilities:

   • A damaged used area of the RAM
   • A damaged used area of the EEPROM

   Reconfigure the drive and save the new configuration:

   a. If a used area of the RAM is bad, the save operation will fail, causing a `Save Fails` error. In that case the `Fix_CfgErr` was caused by a bad RAM and the drive must be replaced.

   b. If the save operation succeeds, the EEPROM is probably bad. The new configuration is properly saved only to the RAM: the EEPROM may have corrupt data.

      > **Note:** When the configuration in the RAM is correct, the drive can usually operate normally while it remains powered on, even if the EEPROM is damaged. You can employ the drive that way if you have to wait for replacement.

5. If applicable, return drive to the operator.

6. If the EEPROM is suspect, record the problem in the site's logbook.

7. If the configuration problem repeats on the next IPL, it means that the EEPROM is damaged and the drive should be replaced: you can, however, reconfigure the drive and use it until a new drive is available.

■ UnWr xxxx Indication

UnWr xxxx means Unwritten Data. This message will display if the **Unload** switch (6, Figure 7-1 on page 7-1) was pressed *during* a write operation. It indicates that the drive attempted to write the remaining data before it unloaded but the attempt failed and some data remains unwritten to tape.

CAUTION:
Pressing the Unload switch again will cause loss of this data.

The host may save the unwritten data by issuing the following command sequence before pressing the **Unload** switch a second time: "Recover Buffer Data."

■ DumpAgain? Indication

The "DumpAgain?" display alternates with a "CHK xxxx" fault symptom code indication while the *service* indicator (1, Figure 7-1 on page 7-1) flashes. This occurs when the identical "CHK xxxx" fault symptom code is detected within one minute. The drive then becomes non-operational and requires manual intervention.

With this condition, you may choose to initiate a dump but there is no requirement to do so. If you have reason to initiate the dump, press any control *except* the **IPL** switch (2, Figure 7-1 on page 7-1). This saves the dump data to the EEPROM.

While the dump is being saved to the EEPROM, the *service* indicator goes out and the display alternates between "SavingDmp" and the "CHK xxxx" display. After saving, the drive automatically performs an IPL.

Use the procedures in Chapter 4, "Getting Started," to copy the dump data from EEPROM to tape or a file.

If you do not want to initiate the dump, press the **IPL** switch. This initiates an IPL of the drive without copying the dump data to EEPROM.

If the IPL fails, as indicated by any error message, replace the drive.

If the IPL is successful, continue with normal operations.

Servicing the Drive

<div style="text-align: right">**8**</div>

This chapter provides servicing information for the 9840 Tape Drive. It contains:

■ Jammed Cartridge

Note: Refer to Chapter 5, "Cartridge Scratch Loader" to remove a jammed cartridge from a CSL.

A jammed cartridge in a 9840 Tape Drive is not a common malfunction. However, you must know how to remove jammed cartridges when the malfunction occurs.

Follow these instructions to remove a jammed cartridge from a drive.

1. Locate the MUD screw on the drive.

Note: The 9840 Tape Drive MUD screw is located on the right-front side of the drive (see the figure below).
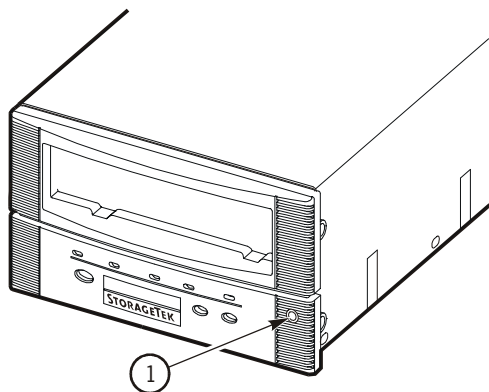
1. MUD screw

C53575

2. Obtain a common screwdriver and insert it into the MUD slot.

3. Press against the spring-loaded MUD screw until it stops.

    Note: Do not turn the screwdriver to the left or counter-clockwise (CCW) when removing a jammed cartridge.

4. Slowly turn the screwdriver to the right or clockwise (CW) to remove the jammed cartridge.

Note: When the MUD screw will not turn any further CW, the reel motors are lowered and the cartridge can be removed.
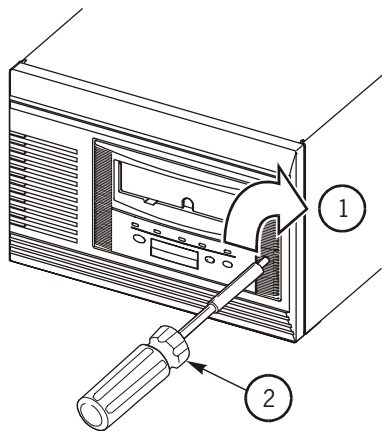
1. Turn MUD screw clockwise
2. Screwdriver

C53556

5. Remove the screwdriver.

6. Remove the cartridge from the 9840 Tape Drive.

Note: If cartridges continue to jam, the drive is defective and must be replaced.

■ Clean Tape Path

You clean the 9840 tape path with a cleaning cartridge. Clean the tape path when the amber *clean* indicator illuminates. This indicator lights when certain tape errors are detected or a certain length of tape moved through the tape path.

CAUTION:
Do not wet-clean the 9840 tape path: no chemical cleaning is allowed. Cleaning with chemicals or with tools other than the cleaning cartridge is not allowed.

Note: This procedure does not require you to take the drive offline.

1. If applicable, unload the drive

2. Insert a cleaning cartridge into the drive

Note: If the cleaning cartridge ejects immediately without performing a clean operation and the drive displays Exp CLcart, it means that the cleaning tape is used up; obtain a new cleaning cartridge.

3. Observe the indications:

   a. The green *activity* indicator flashes to indicate cleaning is taking place.

   b. The cartridge ejects and the *clean* indicator turns off when cleaning is complete.

   Note: A displayed CHK xxxx message means a cleaning cartridge failure, where *xxxx* is a fault symptom code; try a different cleaning cartridge.

4. Remove the cleaning cartridge when the drive ejects the cartridge.

■ Clean Fibre Channel Components

The following information describes a cleaning process for fibre channel components such as connectors, GBICs, and plugs.

Fibre Channel Transmission

The 9840 Tape Drive uses a laser multi-mode transmitter-receiver (transceiver) module. There are several warnings which everyone must know and understand for their personal safety.

Note: Ensure you follow the instructions on "Fiber Optic Safety" in Chapter 2, "Safety and Handling," and the warnings listed in this section.

Cleaning Materials

Use the following list of materials to clean fibre-optic components:

- Alcohol pads
- Cloth pads
- Texwipe microswab
- Texwipe foam swab

Fibre Channel Cable

To clean a fibre channel cable (such as the one in Figure 8-1):

1. Blow any dust from the ferrule and the end of the connector using compressed air by positioning the air nozzle approximately 50 mm (2 in.) away from the connector and blowing for 5 seconds.

Figure 8-1. Fibre Channel Connector
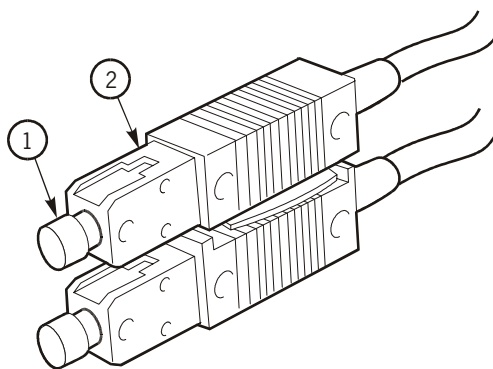
C53527

1. Fibre Channel Cable Dust Covers
2. Fibre Channel Cable Housing

2. Gently wipe the ferrule and the end surface of the connector with an alcohol pad. Ensure that the pad makes full contact with the end surface.

3. Wait 5 seconds for the surface to dry.

4. Repeat Step 1.

5. Wipe the ferrule and the end surface of the connector using a clean surface of the alcohol pad.

6. Wait 5 seconds for the surface to dry.

7. Repeat Step 1 for final cleaning.

9840 Fibre Channel Drive Ports

To clean the drive ports (such as the one in Figure 8-2):

1. Remove the Fibre Channel cables to gain access to Ports A and B.

2. Blow any dust from the ferrule and the end of the port using compressed air by positioning the air nozzle approximately 50 mm (2 in.) away from the connector and blowing for 5 seconds.

Figure 8-2. 9840 Fibre Channel Drive Ports

E53528
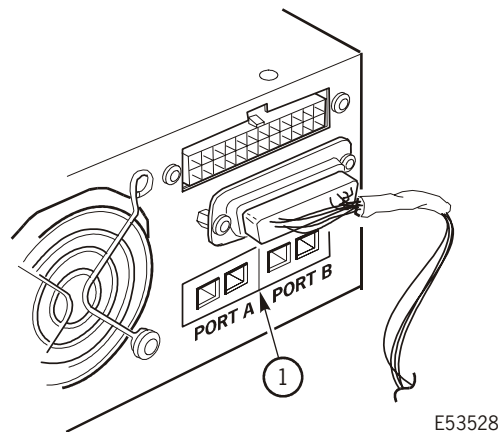
1. Fibre Channel Ports

3. Gently wipe the ferrule and the end surface of the port with an alcohol pad. Ensure that the pad makes full contact with the end surface.

4. Wait 5 seconds for the surface to dry.

5. Repeat Step 2.

6. Wipe the ferrule and the end surface of the port using a clean surface of the alcohol pad.

7. Wait 5 seconds for the surface to dry.

8. Repeat Step 2.

Fibre Channel GBIC

To clean a GBIC (giga-bit interface converter), refer to Figure 8-3).

Note: If GBICs are shipped or stored without a dust cover, clean the connectors before installing into a Fibre Channel environment.

1. Blow any dust from the ferrule and the ends of the GBIC using compressed air by positioning the air nozzle approximately 50 mm (2 in.) away from the connector and blowing for 5 seconds.

2. Clean inside the GBIC with a swab saturated with isopropyl alcohol if necessary.

3. Repeat Step 1.

Figure 8-3. Fibre Channel GBIC
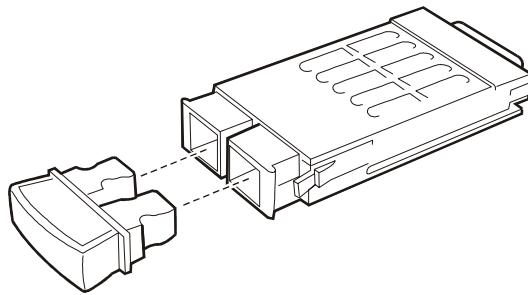
C53529

Fibre Channel Hub Slot

To clean a Fibre Channel hub slot, refer to Figure 8-4):

Before cleaning any Fibre Channel hub slot, notify the customer of the exact hub and slot(s) that require cleaning. Customers may have a maintenance contract with another vendor to maintain hubs and other devices on the network.

Note: Ensure no I/O is present at the applicable hub slot.

Figure 8-4. Fibre Channel Hub
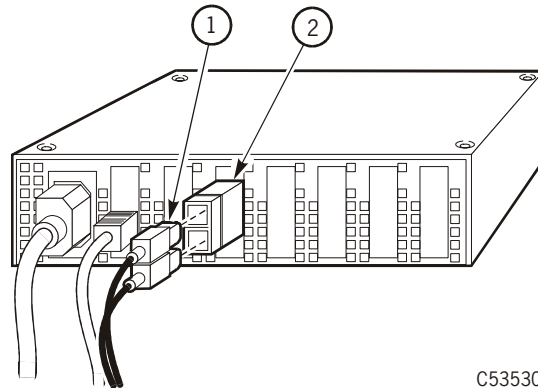
C53530

1. Fibre Channel Cable
2. Fibre Channel GBIC

1. Remove the applicable Fibre Channel cable and clean if necessary. Ensure you follow the specified cleaning procedures in this section.

2. Remove the GBIC from the applicable slot and clean if necessary. Ensure you follow the specified cleaning procedures in this section.

3. Blow any dust from the Fibre Channel cable ferrule using compressed air by positioning the air nozzle approximately 50 mm (2 in.) away from the connector and blowing for 5 seconds.

4. Clean inside the slot with a swab saturated with isopropyl alcohol if necessary.

5. Repeat Step 2.

■ Fibre Channel Loop Test

When you suspect Fibre Channel interface problems, you can conduct a fibre channel loop test to check the drive's optical ports as "alive or dead". This test will isolate the interface problem to the drive, or to the interface.

Tools Required for the Fibre Channel Loop Test

- Dual SC multi-mode fiber cable

Fibre Channel Loop Test Instructions

1. Take the drive offline to all hosts.

2. Disconnect the Fibre Channel interface cable at the drive end.

3. Connected a known good SC multi-mode fiber cable from Port A to Port B on the drive.

Note: The ports should see each other and then arbitrate a loop address for each port.

4. Place drive Online and navigate to the `View Cfg ?` menu.

5. Press **Select** to enter View submenus, then navigate to `View PrtA?` submenu.

6. Press **Select** to enter View submenus, then navigate to `A_I=`*xxyyzz* submenu.

Notes:

1. If the drive is operational, the current arbitrated loop address for Port A will be displayed.

2. If `Hard PA` was `Yes`, the loop address will equal the Hard PA.

3. If `Hard PA` was `No`, the loop address will vary, typically: `A_I=000001` for Port A and `A_I=000002` for Port B.

4. If `A_I=......` is displayed, the drive is defective.
   (Port A or Port B is not functioning properly; however, this test will not determine which port is defective.)

7. Disconnect the fiber cable loop from Port A and Port B.

8. If loop test failed, replace drive.

9. If loop test was good, replace interface fiber cable.

Note: If replacing interface fiber cable does not solve the interface problem, the fault is within the host system components.

Specifications

A

This appendix provides specifications for the 9840 Tape Drive. It contains:

■ Power Requirements

The specifications shown in Table A-1 reflect power requirements for each 9840 Tape Drive installed as a desktop and rack-mount drive tray.

Table A-1. Power Requirements

Characteristics	Value
Input voltage	100 to 240 VAC
Input frequency	50 to 60 Hz
Power consumption	101 VA
Power dissipation	345 Btu/hr
Power factor	0.95 minimum

■ Site Power Connector Requirements

The power drop connections are described here only for the stand-alone rack and the desktop drives. In all other cases the drives plug into power strips in the StorageTek equipment.

Table A-2. Site Power Drop Connectors

Where Used	STK Cable Part Number	STK Feature	Connector Description	Plug/Receptacle identification[1]
Desktop/Rack North America (Canada, U.S)	10083242	9930	Household type, 3-prong 120 VAC 10 A	NEMA-5-15P (M) NEMA-5-15R (F)
Desktop/Rack North America (Canada, U.S)	10083625	9930	Household type, 3-prong 120 VAC 15 A	NEMA-5-15P (M) NEMA-5-15R (F)
Rack Domestic	3127950-xx	9953	Hubbell type 250 VAC 15 A (IEC309)	Hubbell 320P6W (M)[2]
Rack Domestic	3127949-xx	9952	Russellstoll type 250 VAC 15 A	Russellstoll 3720DP (M)[3]
Desktop Export	10083241	9931	Continental[4] Europe standard 250 VAC 10 A	CEE7-7[5] (SCHUKO) plug or receptacle
Rack Export	10083302	9954	Comes without client-side connector 10 A cable	Connectors supplied by client

Notes:

1. The female (F) receptacle is identified for information only: it is supplied by the client.

2. This male (M) connector is compatible with inline female connector Hubbell 320C6W and wall receptacle Hubbell 320R6W or inline female connector RS320C6W and wall receptacle RS320R6W.

3. This male (M) connector is compatible with Russellstoll inline female connector RS3913 and wall receptacle RS3743.

4. Standardized in Belgium, Finland, France, Germany, Holland, Norway, and Sweden.

5. Order this cable for all desktop installations outside North America. If the attached client-side connector cannot be used, remove it and replace with client's choice.

■ Environmental Requirements

This section describes environmental requirements, including the drive, power supply, cartridge tapes, and media for the 9840 Tape Drive.

Drive and Power Supply

shows the environmental requirements for the drive and the power supply for the 9840 Tape Drive.

Table A-3. Drive and Power Supply Requirements

Temperature	
Operating	15º to 32ºC (59º to 90ºF)
Storage	10º to 40ºC (50º to 104ºF)
Shipping	-40º to 60ºC (-40º to 140ºF)
Relative Humidity Non-Condensing	
Operating	20% to 80%
Storage	10% to 95%
Shipping	10% to 95%
Wet Bulb Maximum	
Operating	26ºC (79ºF)
Storage	26ºC (79ºF)
Shipping	26ºC (79ºF)
Altitude	
Operating	Up to 3.05 km (up to 10,000 ft)
Storage	Up to 3.05 km (up to 10,000 ft)
Shipping	Up to 15.24 km (up to 50,000 ft)
Operating Heat Output/Air Flow Requirements	
Drive and power supply	61.7 kCal (241.3 Btu/hr)

Cartridge Tapes and Media

Table A-4 shows the environmental requirements for cartridge tapes and media for the 9840 Tape Drive.

Table A-4. Cartridge Tapes and Media Requirements

Temperature	
Operating (see note)	15º to 32ºC (59º to 90ºF)
Storage (up to four weeks)	5º to 32ºC (41º to 90ºF)
Storage (archive)	18º to 26ºC (65º to 79ºF)
Shipping	-23º to 49ºC (-10º to 120ºF)
Relative Humidity, Non-Condensing	
Operating (see note)	20% to 80%
Storage (up to four weeks)	5% to 80%
Storage (archive)	40% to 60%
Shipping	5% to 80%
Wet Bulb Maximum	
Operating (see note)	26ºC (79ºF)
Storage (up to four weeks)	26ºC (79ºF)
Storage (archive)	26ºC (79ºF)
Shipping	26ºC (79ºF)

Note: Allow a cartridge to acclimatize within the operating environment for at least 24 hours.

■ Cartridge Tape Specifications

Table A-5 shows the specifications for the cartridge tapes to be inserted into the 9840 Tape Drive.

CAUTION:
Do not degauss 9840 Tape Drive cartridges. Servo tracks are written on the tape at the factory. When these tracks are mistakenly erased, the cartridge tape must be discarded.

Table A-5. Cartridge Tape Specifications

Characteristics	Values
Type STK1R data cartridge, StorageTek PN 310319401	271 m (889 ft) physical length 251 m (823 ft) recordable length 9 µm tape thickness 288 tracks Advanced metal particle
Type STK1U cleaning cartridge, StorageTek PN 310324601	Good for about 100 cleanings. Estimated usage: 1 cleaning per drive every two days.
Dimensions	125 x 109 x 25.9 mm (4.92 x 4.29 x 1.00 in.)
Data Compression	LZ-1 Enhanced, 4:1 Ratio
Note: Individual results may vary depending on the characteristics of the data and other variables.	
Capacity	20 GB uncompressed
Archival Life	15 to 30 years
Media Durability Short length Long length	 80,000 write/read passes minimum 6,500 write/read passes minimum
Load/Unloads	10,000 minimum
Uncorrected bit error rate, including those caused by media defects	1 in 10^{18} bytes
Permanent Errors	Zero
Weight	0.26 kg (9.17 oz)

■ Drive Performance

Table A-6 shows performance characteristics of the 9840 Tape Drive.

Table A-6. Drive Performance

Characteristics	Values
Maximum block size	256 kB
Data rate, head-to-tape	10 MB/s (see note)
Data rate of host interface	**Fibre Channel**: burst transmission speed of 100 MB/s (256 kB) **Ultra SCSI**: 40 MB/s burst synchronous/ULTRA-1, differential, wide/fast, negotiable down to SCSI-1 narrow differential (see note)
Maximum rewind time: from end of any wrap to logical beginning of tape (BOT)	16 s
Reposition time	No penalty
Tape load and initialize to ready	4 s
Unload time	5 s excluding rewind
Access time (does not include library timing)	8 s for first search 11 s average for subsequent search
Data buffer size	8 MB
Read/write speed	2m/s (79 ips)
Search/rewind speed	8 m/s (315 ips)

Note: Individual results may vary depending on the characteristics of the data and other variables.

■ Host Interfaces

Table A-7 provides the 9840 Tape Drive host interfaces. The 9840 Tape Drive is used in Fibre Channel and SCSI environments.

Table A-7. Host Interfaces

Interface Type	Interface Characteristics
Fibre Channel	Transmission speed of 100 MB/s (burst) Interface options: • Bridge: Connects SCSI devices to an FC network • Hub: Connects FC devices in a logical loop • Switch: Connects FC devices in a fabric
SCSI	Synchronous, differential (burst): • Narrow/slow at 5 MB/s • Narrow/fast at 10 MB/s • Narrow/ultra at 20 MB/s • Wide/slow at 10 MB/s • Wide/fast at 20 MB/s • Wide/ultra at 40 MB/s

■ Library Attachments

Table A-8 provides the library attachment.

Table A-8. Library Attachments

Library Type	Description
9738	A StorageTek TimberWolf family library. It holds 30 cartridges and up to 3 drives. Fibre Channel and SCSI interfaces are supported.

■ Non-Library Drive Installations

Table A-9 provides a list of non-library drive installations. The 9840 Tape Drive ships as a desktop or rack unit within this environment.

Table A-9. Non-Library Drive Installations

Installation Type	Description
Desktop, manual-load	This installation consists of a 9840 Tape Drive and a power supply. The desktop has the smallest footprint of any version of the 9840. Fibre Channel and SCSI interfaces are available for the 9840.
Desktop, CSL	This installation consists of a 9840 Tape Drive, a CSL mechanism, and a power supply. Fibre Channel and SCSI interfaces are available for the 9840.
Rack-mountable, manual-load	This installation consists of a rack-mount tray with either one drive and power supply, or two drives side-by-side and two power supplies. The StorageTek rack holds up to six trays. Fibre Channel and SCSI interfaces are available for the 9840.
Rack-mountable, CSL	This installation consists of a rack-mount tray with one 9840 Tape Drive, a CSL mechanism, and a power supply. The StorageTek rack holds up to six trays. Fibre Channel and SCSI interfaces are available for the 9840.

■ Supported Device Modes

Table A-10 provides the supported device modes.

Table A-10. Supported Device Modes

Interface Type	9840 Native	3490E Emulation (AS400 only)	3590B Emulation (AS400 only)
Fibre Channel	Yes	No	Yes
SCSI	Yes	Yes	Yes

■ Host Hardware and Software Attachments

The 9840 Tape Drive compatibilities expand frequently. Ask your local StorageTek sales representative for the latest information.

Glossary

This glossary defines abbreviations and new or special terms used in this publication.

Some of the definitions are taken from the *IBM Dictionary of Computing*. The letters in parentheses that follow some definitions indicate the source of the definition:

(A) *The American National Standard Dictionary for Information Systems*, ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI).

(E) The ANSI/Electronic Industries Association (EIA) Standard-440-A, *Fiber Optic Terminology*.

(I) The *Information Technology Vocabulary*, developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and International Electrotechnical Commission (ISO/IEC/JTC1/SC1).

(IBM) *The IBM Dictionary of Computing*, copyright 1994 by IBM.

(T) Draft international standards committee drafts, and working papers being developed by the ISO/IEC/JTC1/SC1.

A

access time The time interval between the instant at which a call for data is initialized and the instant at which the delivery of data is completed. (T)

adapter Hardware used to join different optical fiber connector types. (IBM)

address A character or group of characters that identifies a register, a particular part of storage, or some other data source or destination. (A)

AL_PA *See* Arbitrated Loop Physical Address.

alphanumeric Pertaining to data that consist of letters, digits, and usually other characters, such as punctuation marks. (T) (A)

Arbitrated Loop A topology in Fibre Channel that provides multiple connections for devices that share a single loop, over which only two devices can communicate at once. Similar to the SCSI protocol of the same name, it provides an "arbitrate and win" scenario among more than two devices when those devices want to communicate on the bus. The sending device must arbitrate and win the connection with the receiving device before communication can begin.

Arbitrated Loop Physical Address A one-byte value that identifies a port in an arbitrated loop topology.

ASIA Application specific interface adapter. The interface card in the 9840 Tape Drive.

B

beginning-of-tape A point on the tape where written data begins.

bin See Cartridge Scratch Loader (CSL)

block A string of data elements recorded or transmitted as a unit. The elements may be characters, words, or physical records. (T)

British thermal unit (Btu) A standard measure of a device's heat output. The amount of heat required to raise one pound of water one degree Fahrenheit.

Btu *See* British thermal unit.

buffer A routine or storage used to compensate for a difference in rate of flow of data, or time of occurrence of events, when transferring data from one device to another. (A)

burst In data communication, a sequence of signals counted as one unit in accordance with some specific criterion or measure. (A)

C

cartridge A storage device that consists of magnetic tape on supply and takeup reels, in a protective housing. (IBM)

Cartridge Scratch Loader (CSL) In the 9840 Tape Drive, a device attached to the 9840 drive which automatically feeds cartridges to the drive. Cartridges are manually placed in an input bin, and after use, are deposited automatically in an output bin.

channel A functional unit, controlled by the processor (or host), that handles the transfer of data between processor storage and local peripheral equipment. (IBM)

check A detection of an error condition or test for correct condition.

CHK Check.

checksum In error detection, a function of all bits in a block. If the written and calculated sums do not agree, an error is indicated. (IBM)

cleaning cartridge A cartridge tape containing special material used to clean the tape path in a transport.

compress To save storage space by eliminating gaps, empty fields, redundancy, or unnecessary data to shorten the length of records or files. (IBM)

configuration The manner in which the hardware and software of an information processing system are organized and interconnected. (T)

configuration error An error that results from incorrect configuration values.

connector An electrical part used to join two or more other electrical parts. (IBM)

CSL See Cartridge Scratch Loader.

CSL operator panel A combination of the 9840 Tape Drive operator panel controls with additional switches and indicators for the Cartridge Scratch Loader.

D

data rate The speed of a data transfer process, normally expressed in bits per second or bytes per second. (IBM)

Data Security Erase (DSE) . A random binary pattern, over-writing existing data, from the point of an "Erase" command, to the End of Tape point.

data tape A tape cartridge formatted for use as a regular data tape for the system in which it is used.

diagnostic Pertaining to the detection and isolation of errors in programs and faults in equipment. (IBM)

differential A SCSI bus alternative that provides better signal quality with less crosstalk and noise but requires more power to drive the signal. The maximum cable length is 25 m (82 ft).

drive A device for moving magnetic tape and controlling its movement. (IBM)

DSE See data security erase.

dump To copy the contents of all or part of virtual storage for the purpose of collecting error information. (IBM)

dump-formatted cartridge A cartridge on which the tape has been specially formatted to store diagnostic dump data.

E

emulation The use of programming techniques and special machine features to permit a computing system to execute programs written for another system. (IBM)

enterprise A representation of the goals, organizational structure, business processes, and information resources and requirements of an enterprise. (IBM)

environmental requirement Any of the physical conditions required for the protection and proper operation of a functional unit; the requirement is usually specified as a nominal value and a tolerance range. For a device, there may be more than one set of environmental requirements; for example, one set for transport, another for storage, and another for operation. (T) (A)

error A discrepancy between a computed, observed, or measured value or condition and the true, specified, or theoretically correct value or condition. (I) (A)

F

F_Port A Port within the Fabric which attaches to an N_Port through a link.

fabric The FC topology that is similar to a telephone switch in that the initiator of a "call" to the receiving port simply provides the receiver with the port address, and the fabric routes the transmission to the proper port. A fabric differs from a point-to-point or arbitrated loop topology in that it provides for interconnections between ports without having a point-to-point connection. The fabric also serves as a media type converter.

fault symptom code (FSC) A hexadecimal code generated by the drive for controller microcode in response to a detected subsystem error.

FC *See* Fibre Channel.

fibre channel (FC) The ANSI standard that defines an ultra high-speed, content independent, multi-level data transmission interface that can support multiple protocols simultaneously, support connectivity to millions of devices over copper and/or fiber optic physical media, and provides the best

characteristics of both networks and channels, over diverse topologies.

field replaceable unit (FRU) An assembly that is replaced in its entirety when any one of its components fails. (IBM)

file-protect To prevent the destruction or overwriting of data stored on cartridge tape. See also write-protect switch.

firmware An ordered set of instructions and data stored in a way that is functionally independent of main storage; for example, microprograms stored in a ROM. (T)

FL_Port An F_Port within the Fabric which also contains the Loop Port State Machine as defined in FC-AL-2. The FL_Port attaches to an NL_Port through a link.

FRU *See* field replaceable unit.

FSC *See* Fault Symptom Code.

G

GB *See* Gigabyte.

Gb Gigabit, equal to 10^9 bits.

GBIC *See* Gigabit Interface Converter

gigabit (Gb) One billion (10^9) bits.

Gigabit Interface Converter (GBIC) An adapter that connects a fiber-optic or copper-wire cable to a Fibre Channel hub or switch.

gigabyte (GB) One billion (10^9) bytes. When referring to memory capacity, 1,073,741,824 in decimal notation. (IBM)

H

hardware All or part of the physical components of an information processing system, such as computers or peripheral devices. (T) (A)

HBA *See* host bus adaptor

host The primary computer on a network, with which other computers interact.

host bus adapter (HBA) A circuit installed in a multi-platform host or device that interfaces between the device and the bus.

host interface Interface between a network and host computer. (T)

hub A piece of hardware, separate from the actual FC interface accessible on the backplane of a device, which houses the port bypass circuitry for configurations of 8 to 16 ports per hub. Hubs may be cascaded to support larger configurations, and can usually support a mix of both electrical and optical media ports in the same hub.

I

indicator A device that gives a visual or other indication of the existence of a defined state. (T)

initialization The operations required for setting a device to a starting state, before the use of a data medium, or before implementation of a process. (T)

Initial Program Load (IPL) The initialization procedure that causes an operating system to commence operation.

input/output (I/O) Pertaining to a device, process, or channel involved in data input, data output, or both. (IBM)

interface Hardware, software, or both, that links systems, programs, or devices. (IBM)

I/O See input /output.

IPL *See* Initial Program Load.

L

laser A term meaning Light Amplification by Stimulated Emission of Radiation. Laser devices generate coherent radiation in the visible, ultraviolet, and infrared portions of the electromagnetic spectrum. Regarding FC, lasers can be transmitting either short waves or long waves, depending on the composition of the arbitrated loop or fabric.

library installation The process of installing the 9840 Tape Drive in a library environment.

link A two-fiber connection made between two FC ports in which one fiber is transmitting, the other receiving, information.

logical device address A number used to represent a terminal or terminal component within a workstation. (IBM)

M

magnetic tape A tape with a magnetizable layer on which data can be stored. (T)

manual operation Processing of data in a system by direct manual techniques. (IBM)

MB Megabytes, or 1,048,576 bytes.

media defects Physical impurities or other problems that cause the medium to function improperly.

medium A physical material in or on which data may be represented. (IBM)

menu A list of options displayed to the user by a data processing system, from which the user can select an action to be initiated. (T)

microcode A code, representing the instructions of an instruction set, that is implemented in a part of storage that is not program-addressable. (IBM)

N

N_Port A Port within the Node that attaches to a link.

network An arrangement of nodes and branches, connecting data processing devices

to one another via software and hardware links, to facilitate information interchange.

NL_Port An N_Port within the Node which also contains the Loop Port State Machine as defined in FC-AL-2. The NL_Port attaches to either an FL_Port or an NL_Port through a link.

node A device that contains a minimum of one N_Port and/or NL_Port.

O

offline Neither controlled by, nor communicating with, a computer. (IBM)

online Pertaining to the operation of a functional unit when under the direct control of the computer. (T)

operating system Software that controls program execution.

operator control panel A functional unit that contains switches used to control all or part of a computer and possibly the indicators giving information about its functioning. (T)

P

performance One of two major factors, together with facility, on which the total productivity of a system depends. Performance is largely determined by a combination of throughput, response time, and availability. (IBM)

point-to-point A topology in which exactly two ports communicate. In FC, the two ports are N_Ports.

port A specific communications end point within a host. A port is identified by a port number. (IBM) In FC, it is an access point in a device where a link attaches. Examples of this port are N_Port, NL_Port, F_Port, and FL_Port.

private loop An Arbitrated Loop that does not contain a participating FL_Port but does contain two or more NL_Ports.

Private NL_Port An NL_Port that does not attempt a Fabric Login.

protocol A set of semantic and syntactic rules that determines the behavior of functional units in achieving communication. (I).

public loop An Arbitrated Loop that includes a participating FL_Port and at least one NL_Port.

Public NL_Port An NL_Port that attempts a Fabric Login.

R

random access memory (RAM) A storage device in which data can be written and read. (IBM).

read/write head The data sensing and recording unit of a diskette magazine drive or tape drive. (IBM)

reclaim The process of reformatting a tape as a data tape.

release A distribution of a new product or new function and fixes for an existing product. (IBM)

restore To return a backup copy to the active storage location for use. (IBM)

rewind To move tape from the take-up hub to the supply hub. (IBM)

S

SCSI *See* small computer system interface.

small computer system interface (SCSI) An input and output bus that provides a standard interface between the OS/2 multimedia system and peripheral devices. (IBM)

software All or part of the programs, procedures, rules, and associated documentation of a data processing system. Software is an intellectual creation that is independent of the medium on which it is recorded. (T)

state The condition of a device, such as online or offline.

sub-menu A menu related to and reached from a main menu. (IBM)

switch A device or programming technique for making a selection; for example, a toggle, a conditional jump. (A)

T

tape See magnetic tape.

tape drive A device for moving magnetic tape and controlling its movement. (T)

target A SCSI device performing an I/O operation requested by the initiator.

topology A method or scheme for connecting ports for communicating in FC. FC topologies include Point-to-Point, Arbitrated Loop, and Fabric.

V

VolSafe A mode of operation and special data cartridge tape that allows data *only* to be appended to the cartridge tape; no data is overwritten.

VOLSER A six-character alphanumeric label used to identify a volume.

W

write operation An output operation that sends a processed record to an output device or output file. (IBM)

write protection Restriction of writing into a data set, file or storage area of a user or program not authorized to do so. (IBM)

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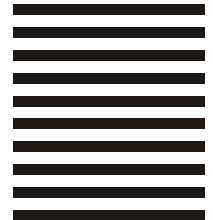
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