

# 9710 Library Storage Module

Hardware Operator's Guide







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# Summary of Changes

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EC released document table

<b>EC Number</b>	<b>Date</b>	<b>Type</b>	<b>Change</b>
111322	December 1995	Initial Release	See this publication for specific information.
111301	December 1999	Fifteenth Edition	See this publication for specific information.
111689	December 2001	Sixteenth Edition	Updated template. Added SDLT 220 and T9840B Drive information.

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# Preface

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This guide describes how to operate the 9710 library storage module (LSM). Most of the information pertains to hardware.

For specific drive information and for customer server software commands and console messages, refer to your drive publications or software publications.

This guide is intended primarily for data center operators who operate the LSM. System programmers and computer system administrators might also find the information in this guide useful.

## ■ Organization

This book contains the following information:

- Chapter 1** “General Information” describes the LSM hardware.
- Chapter 2** “Controls and Indicators” shows the locations of the power switch and operator panel and describes the functions of the softkeys, indicators, and display. This chapter also shows how to set two configuration options: the DMS (AS/400) host number and maximum usage count for the cleaning cartridge.
- Chapter 3** “Operating the LSM” contains the procedures to operate the LSM. The procedures include how to display the LSM status, power on and power off the units, perform automated operations (enter and remove cartridges through the cartridge access port), and perform manual operations (load and unload cartridges).
- Chapter 4** “StorageTek Maintenance Support” describes how to contact the Call Center or Remote Center for assistance if the LSM has a hardware or software problem.
- Appendix A** “Cartridge Tape Information” describes how to prepare, inspect, store, clean, and repair cartridges. It also lists the criteria that colored cartridges must meet to be used in the LSM.
- Glossary** The glossary defines new or special terms and abbreviations used in this guide.
- Index** The Index assists in locating information in this guide.

## ■ Trademarks

StorageTek is a trademark of Storage Technology Corporation. Other features and terms used in this publication are for informational purposes only and might be trademarks of Storage Technology Corporation or other companies.

## ■ Alert Messages

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.**

## ■ Conventions

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

Item	Example	Description of Convention
Acronyms	CSA	All uppercase
Buttons	MENU	Sans serif font; capitalization follows label on product (usually all uppercase)
Commands	Mode Select	Initial cap
Document titles	<i>System Assurance Guide</i>	Italic font
Emphasis	<i>not</i> or <i>must</i>	Italic font
File names	fsc.txt	Monospace font
Hypertext links	<a href="#">Figure 2-1 on page 2-5</a>	Blue (prints black in hardcopy publications)

<b>Item</b>	<b>Example</b>	<b>Description of Convention</b>
Indicators	<i>Open</i>	Italic font; capitalization follows label on product (usually initial caps)
Jumper names	TERMPWR	All uppercase
Keyboard keys	<Y> <Enter> or <Ctrl+Alt+Delete>	Sans serif font; capitalization follows label on product (usually initial caps); enclosed within angle brackets
Menu names	Configuration Menu	Capitalization follows label on product; usually title caps
Parameters and variables	Device = <i>xx</i>	Italic font
Path names	c : /mydirectory	Monospace font
Port or connector names	SER1	Capitalization follows label on product; otherwise, all uppercase
Positions for circuit breakers, jumpers, and switches	ON	Default font; capitalization follows label on product; otherwise, all uppercase
Screen text (including screen captures, screen messages, and user input)	downloading	Monospace font
Switch names	Power	Sans serif font; capitalization follows label on product
URLs	<a href="http://www.storagetek.com">http://www.storagetek.com</a>	Blue (prints black in hardcopy publications)

## ■ Related Publications

Additional information is contained in the following publications, some of which are delivered with this product.

<b>DLT Publications</b>	<b>Part Number</b>
<i>Quantum DLT4000 Cartridge Subsystem Product Manual</i>	313127601 (StorageTek) 81-60043-0x (Quantum)
<i>Quantum DLT7000 Tape Drive Product Manual</i>	313134501 (StorageTek) 81-60000-0x (Quantum)

<b>DLT Publications (Continued)</b>	<b>Part Number</b>
<i>Quantum DLT8000 Tape Drive Product Manual</i>	81-60118-0x (Quantum)
<b>SDLT Publications</b>	<b>Part Number</b>
<i>Quantum SuperDLTape System SDLT 220 Product Manual</i>	81-00000-0x (Quantum)
<b>9840 Publications</b>	<b>Part Number</b>
<i>9840/T9840 Tape Drive User's Reference Manual</i>	95739
<b>4890 Publications</b>	<b>Part Number</b>
<i>4890 Maintenance Manual</i>	9512952900
<i>4890 Product Manual</i>	9512941000
<b>IBM Publications</b>	<b>Part Number</b>
<i>Care and Handling of the IBM Magnetic Tape Cartridge</i>	GA32-0047
<i>Tape and Cartridge Requirements for the IBM 3480 Tape Drive</i>	GA32-0048
<b>ANSI Publications</b>	<b>Part Number</b>
<i>American National Standard Magnetic Tape and Cartridge for Information Interchange</i>	ACS X3B5

## ■ Additional Information

StorageTek offers several methods for you to obtain additional information. Please use one of these methods when you want to obtain the latest edition of this or any other StorageTek customer publication.

### StorageTek's External Web Site

StorageTek's external Web site provides marketing, product, event, corporate, and service information. In addition, the external Web site serves as an entry point to the Customer Resource Center (CRC) and to the e-Partners site. The external Web site is accessible to anyone with a Web browser and an Internet connection.

The URL for the StorageTek external Web site is <http://www.storagetek.com>

## Customer Resource Center

StorageTek's Customer Resource Center (CRC) is a Web site that enables members to resolve technical issues by searching code fixes and technical documentation. CRC membership entitles you to other proactive services, such as HIPER subscriptions, technical tips, answers to frequently asked questions, and online product support contact information. Customers who have a current warranty or a current maintenance service agreement may apply for membership by clicking on the **Request Password** button on the CRC home page.

The URL for the CRC is <http://www.support.storagetek.com>.

## e-Partners Site

StorageTek's e-Partners site, formerly known as the Partners Page or the Channels Site, is a Web site that provides information about products, services, customer support, upcoming events, training programs, and sales tools to support StorageTek's e-Partners. Access to this site, beyond the e-Partners Login page, is restricted. On the e-Partners Login page, current partners who do not have access can request a login ID and password and prospective partners can apply to become StorageTek resellers.

The URL for the e-Partners site is <http://channels.storagetek.com>.

## Hardcopy Publications

Contact a StorageTek sales or marketing representative to order additional paper copies of this publication or to order other StorageTek customer publications in paper format.

## ■ 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.

# Safety, Fiber Optic, and ESD

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The following pages describe common practices concerning electrical safety, ergonomics, fiber optics, and electrostatic discharge.

## ■ Safety Precautions

### **CAUTION:**

***Potential injury:* On-the-job safety is 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 fire and accidents.

**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 installed 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 up something or to 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 your 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 the 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.

## ■ Fiber Optic Safety

### **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.**

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  $\mu\text{W}$  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 for users in 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.

## ■ 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 the Field Service Grounding Kit (PN 4711) and always follow these ESD precautions and procedures when you are servicing StorageTek 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 StorageTek 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 66°C (150°F) or below 4.5°C (40°F), 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.

**Note:** 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 M $\Omega$ , and the coil cord should measure between 0.8 and 1.2 M $\Omega$ . 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.

## ■ 9710 Interlocks

Two safety interlocks are provided on the LSM. These interlocks disable drive current to the LSM motors when either of the two front doors is opened.

1. The door interlock (also referred to as an SPI switch), at the center right of the LSM frame, generates a *software* request to turn off drive current to all LSM motors when the *right*, front door is opened.

Actuating this switch generates a nonmaskable interrupt (NMI) to the LSM processor. The processor will allow completion of the current robotic command before current is disconnected from all LSM motors.

2. The servo power interrupt (SPI) interlock, at the center left of the LSM frame, generates an immediate *hardware* disconnection of drive current to all LSM motors when the *left*, front door is opened.

Actuating this switch removes all drive current to LSM motors. All robotic activity comes to an immediate halt.

# Notices

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Please read the following compliance and warning statements for this product.

**CAUTION:**

***Potential equipment damage:* Cables that connect peripherals must be shielded and grounded; refer to cable descriptions in the instruction manuals. Operation of this equipment with cables that are not shielded and not correctly grounded might result in interference to radio and TV reception.**

**Changes or modifications to this equipment that are not expressly approved in advance by StorageTek will void the warranty. In addition, changes or modifications to this equipment might cause it to create harmful interference.**

## ■ FCC Compliance Statement

The following compliance statement pertains to Federal Communications Commission Rules 47 CFR 15.105:

**Note:** This equipment has been tested and found to comply to the limits for Class A digital devices pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his or her own expense.

## ■ CISPR 22 and EN55022 Warning

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take adequate measures.

## ■ Japanese Compliance Statement

The following compliance statement in Japanese pertains to VCCI EMI regulations:

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラス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。

**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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**English translation:** This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take adequate measures.

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This chapter describes the hardware components of the 9710 library storage module (LSM). For software information and drive information, refer to the publications that pertain to these specific topics.

The LSM is the hardware component in an automated tape cartridge system. An automated cartridge system is a removable media, robotic system that loads cartridges into a storage cell, into a cartridge access port (CAP), or into a drive for read/write operations. [Figure 1-1 on page 1-2](#) and [Figure 1-2 on page 1-3](#) show the major components of an LSM, described in the following pages.

## ■ Library Storage Module Components

The LSM has four major, internal components:

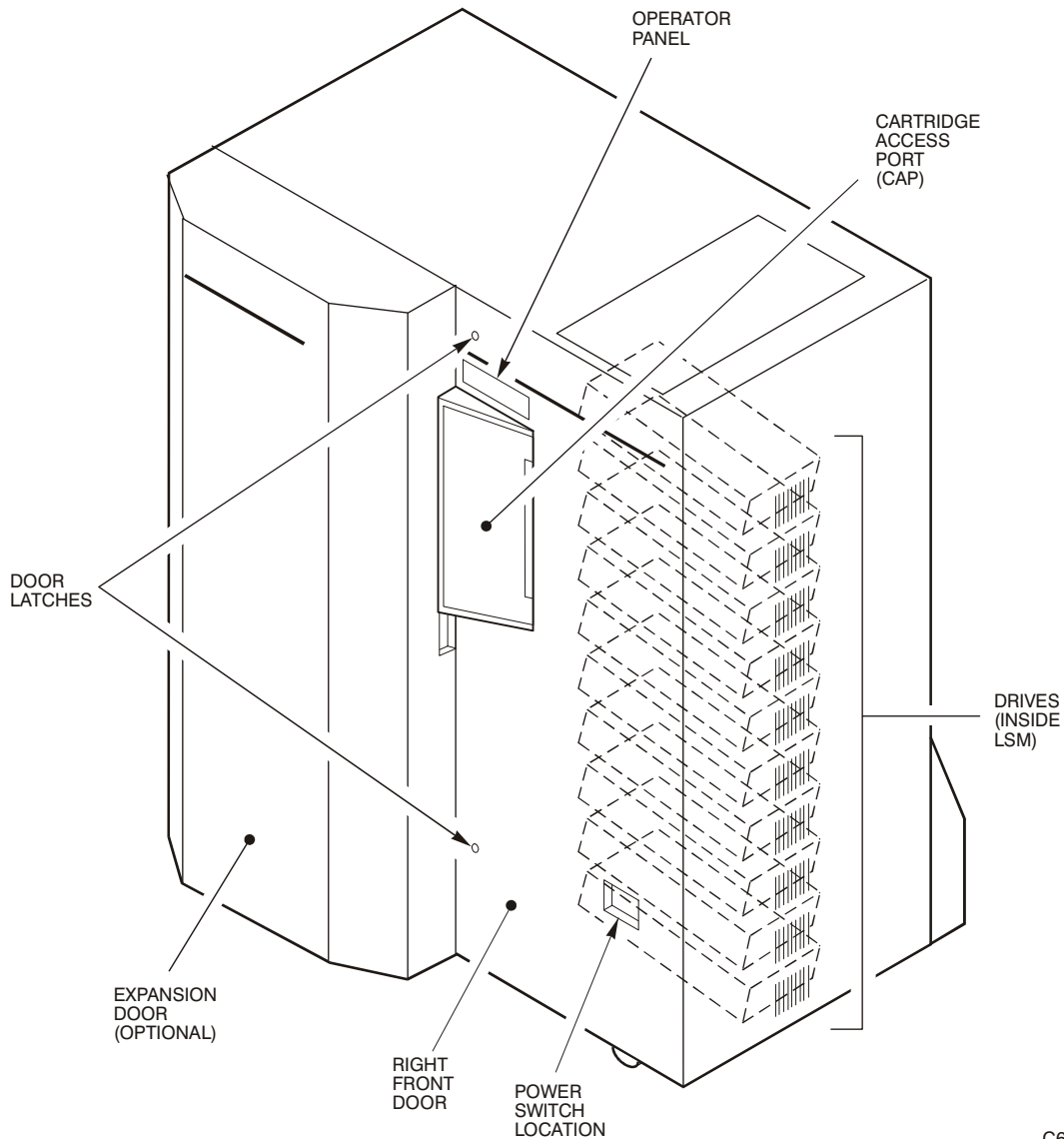
- A robot
- Storage cells for 224 to 588 cartridges
- A cartridge access port (CAP) that holds up to 14 cartridges
- Drives (ordered separately)

### Robot

The robot moves cartridges to storage cells, to a drive, or to the CAP. The robot consists mainly of the Z column assembly and the hand assembly. [Figure 1-2 on page 1-3](#) shows the robot components.

The Z column assembly contains a Z column and Z carriage. The Z column attaches to the floor and ceiling of the LSM. The Z column can rotate almost 360 degrees to allow access to all the cells in the LSM.

The hand assembly mounts to the Z carriage. The Z carriage moves the hand vertically up and down the Z column to storage cells, drives, or the CAP.

**Figure 1-1. LSM Major External Components**

C60022

The hand assembly contains the hand (or “gripper”) and a bar code scanner, referred to as “the camera.” The camera reads the cartridges’ volume serial (VOLSER) labels during audits and transmits the VOLSER and location of each cartridge to the LSM’s memory. The camera is not used to locate cartridges during normal load and unload operations.

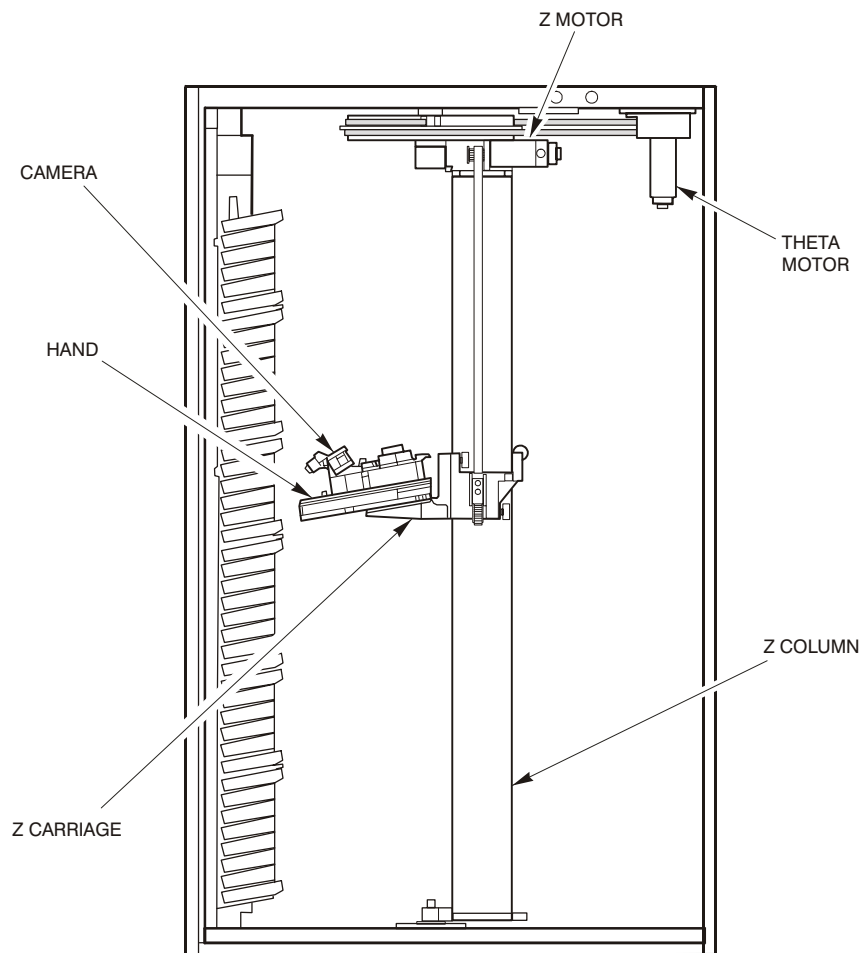
An audit occurs when:

- You power on the LSM.
- You open and close the left front LSM door.
- You press the IPL button on the operator panel.
- You make a request at the system server console to audit the LSM.

The camera's functional parameters have two implications for operation:

- Each time an audit occurs, you must request a host system update from the system server console. This will add the LSM's audit data to host memory.
- If you manually exchange a cartridge from a drive for one in storage, you must re-IPL (initial program load) the library. Otherwise, host memory will continue to apply the VOLSER and location information from the first cartridge to the second cartridge. This might cause an error.

**Figure 1-2. Robot Components**



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## Storage Cells

The LSM is configured by panel, column, row and cell so that the customer server software can locate a cartridge. The LSM contains storage cells for 224 to 588 cartridges, excluding the CAP cells. The number of cells is determined by how many drives are installed and whether the LSM has the standard left front door or the expansion door. The expansion frame provides additional storage

space for 168 cartridges. Arrays can be installed above the drives if fewer than seven drives are installed.

Cartridges are stored in cell arrays that hold 20 cartridges. The cell arrays are stacked in columns and the columns are arranged in a circle around the robot assembly. Each column can hold 42 cartridges.

Table 1-1 on page 1-4 lists LSM storage cell capacities. Figure 1-3 on page 1-5, and Figure 1-4 on page 1-6 show cell locations for an LSM with the base unit, expansion door, and maximum number of drives installed.

**Note:** The two cells located next to Drive 4 are designated cleaning cartridge cells. If you have the AUTO CLEAN feature enabled, you must store cleaning cartridges in these cells. If you do not, you must leave these cells empty.

The array targets are used for robotic calibration during IPL.

The CAP and drives are not used to store cartridges.

The empty/drop-off cell is used by the robot to deposit a cartridge that remains in the hand when a power failure occurs.

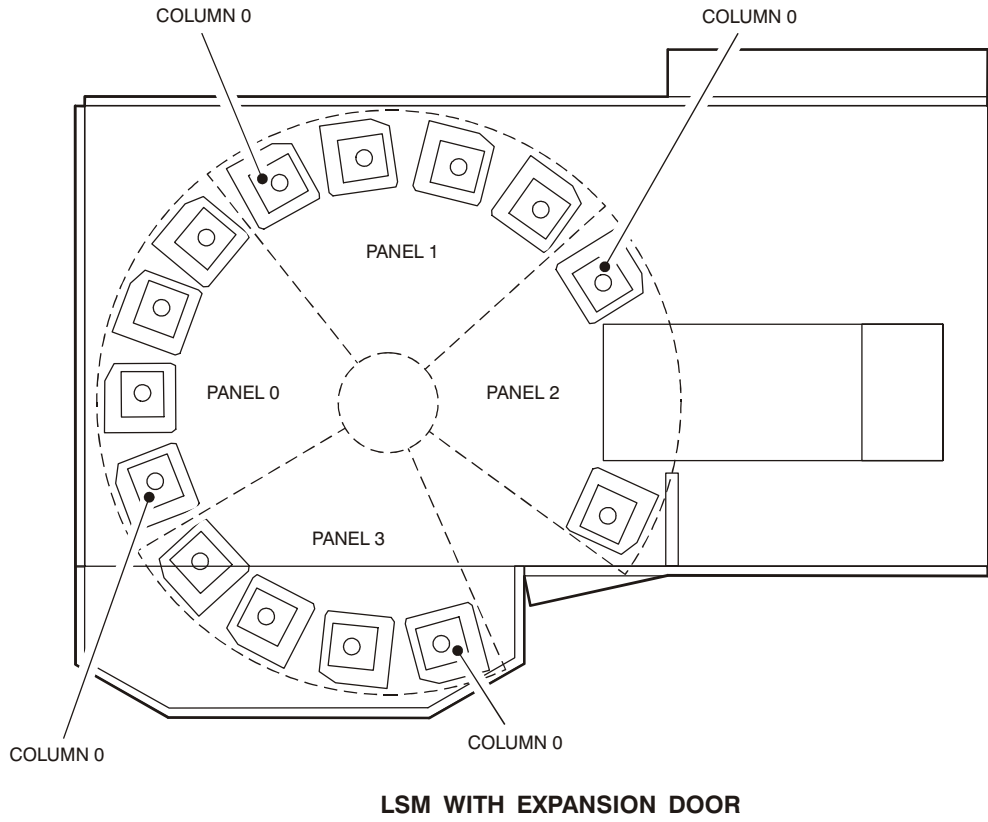
**CAUTION:**

**3480-compatible cartridges (for 4890 drives only) must be inserted into the storage cells with the customer label on top and the VOLSER label facing the person doing the inserting. If the cartridges are inserted into the cells upside down, the LSM will stop operating during initialization (IPL).**

**Table 1-1. LSM Capacity**

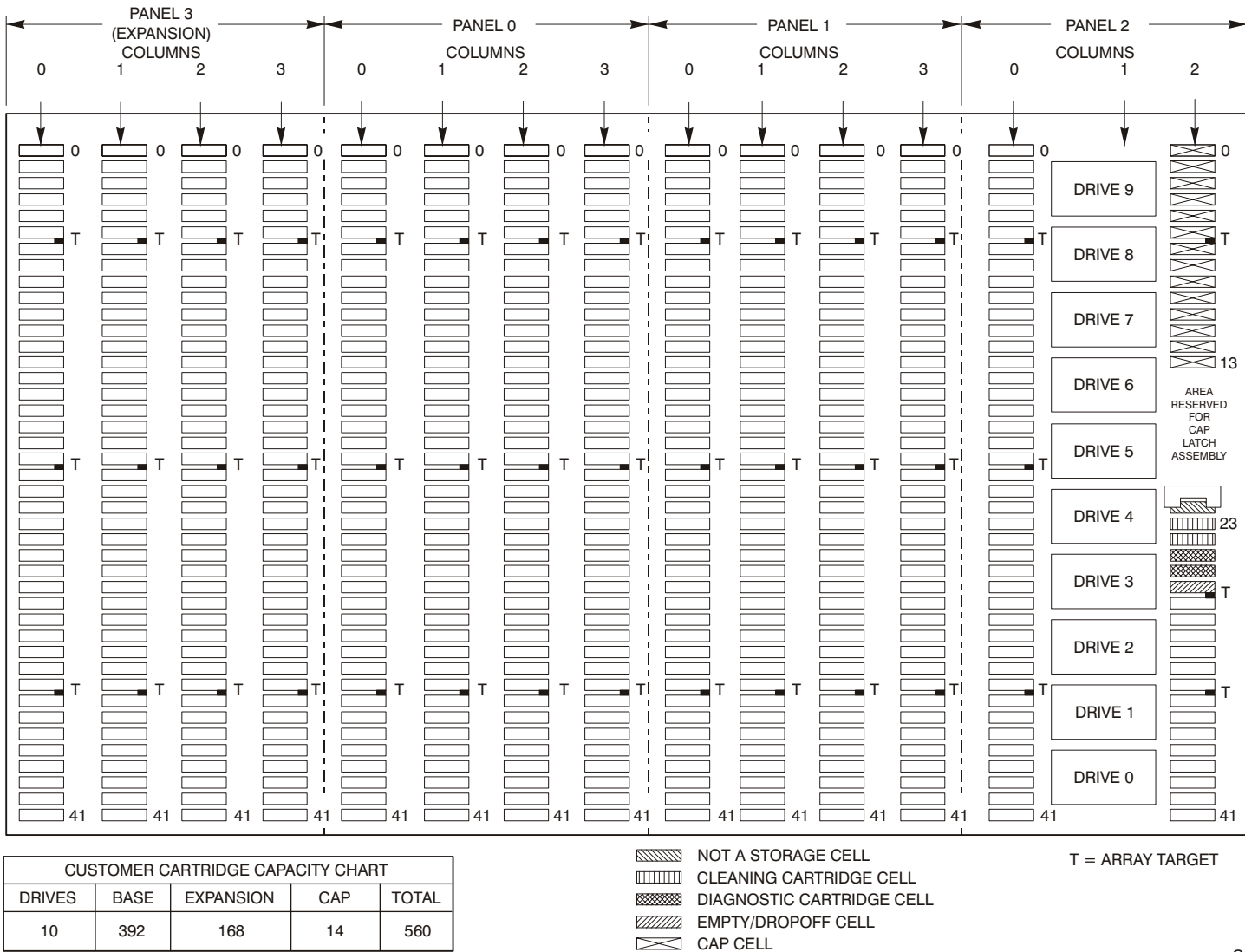
Expansion Frame, Panel 3	Panels Available	Drives Installed	14-Cartridge Arrays Above Drives	Total Cartridges
Yes	0, 1, 2, 3	1 to 3	2	588
		4 to 6	1	574
		7 to 10	0	560
No	0, 1, 2	1 to 3	2	420
		4 to 6	1	406
		7 to 10	0	392
	1, 2	1 to 3	2	252
		4 to 6	1	238
		7 to 10	0	224

**Figure 1-3. Locating Cartridges—Top View**



C60035

Figure 1-4. Locating Cartridges—Panels, Cells, Rows



C60148

## Cartridge Access Port

The CAP is the location where you add cartridges to or remove cartridges from an LSM without interrupting normal cartridge mounts and dismounts. The CAP is located on the right front door.

If your LSM contains the 14-cartridge CAP array, it must remain in place. You can insert cartridges into or remove cartridges from the individual cells. If your LSM contains the 10-cartridge CAP array, you can remove the top screw from the array, lift out the array, load all the cells, and slide the array back into the CAP.

**Note:** The 10-cartridge, removable array is available only for 4890 applications.

You might use the CAP to load and unload cleaning cartridges. Refer to [“Replacing the Cleaning Cartridge” in Chapter 3, “Operating the LSM.”](#) You also might use the CAP to load and unload data cartridges. For detailed procedures, refer to, [“Entering Cartridges through the CAP”](#) and [“Removing Cartridges through the CAP” in Chapter 3, “Operating the LSM.”](#)

## Drives

The robot loads a cartridge into a drive for data read or write operations. The 9710 LSM can contain three types of drives:

- One to six 4890
- One to ten Digital Linear Type (DLT) 4000, 7000 or 8000
- One to ten SDLT BRC (Backward-Read Compatible)
- One to ten 9840/T9840B

The drives are numbered 0 to 9, with 0 at the bottom.

**Note:** Some software might number the drives from 1 to 10.

An individual LSM *may not contain* both 9840/T9840B drives and 4890 drives.

During LSM automated mode (see definition at the end of this chapter), the robotic hand places the cartridge into the drive when a command is sent from the system server software. During LSM manual mode, you might need to insert a cartridge into the drive yourself. Refer to [“Locating a Cartridge in the Storage Cells” in Chapter 3, “Operating the LSM,”](#) for the procedure.

For specific drive information, refer to your drive publications.

## ■ LSM Safety Features

Safety features are incorporated into the LSM. If the front doors to the LSM are opened, electrical interlocks remove power from the robot assembly.

Behind the right front door, covers are placed over the logic card, the AC/DC power supply, and the power distribution unit (PDU) to prevent you from coming into contact with hazardous voltages and sensitive electronics.

## ■ Controlling Software

Controlling software, within the customer server, requests tape read/write operations to the drives and robotic move operations for the LSM robotic components. The software determines where the cartridge is located by tracking the VOLSER and cell location during audits, then allocates which drive receives the cartridge. For specific information, refer to your software publications.

When the control path is a direct attachment, the software resides within the host central processing unit (CPU). When the control path is an indirect attachment, the software is divided between the server and the host CPUs. For specific information, refer to your software publications.

## ■ Library Operating Modes

An operating mode is the manner in which an LSM and the controlling software (also referred to as the customer server software) interact. An LSM can operate in either automated mode or manual mode, as described in the subsections below.

### Automated Mode

Automated mode is the normal operating mode of the LSM. The controlling software instructs the robot to move the cartridge among the storage cells, drives, and CAP without operator intervention. The operator tasks include:

- Monitoring the LSM operator display for messages
- Entering a cartridge into the CAP
- Removing a cartridge through the CAP
- Replacing a cleaning cartridge

Refer to [Chapter 3, “Operating the LSM,”](#) for the procedures.

## Manual Mode

Manual mode occurs when the LSM is taken offline or loses power. The operator tasks might include:

- Opening the LSM front door
- Moving the robot
- Locating a cartridge
- Removing a cartridge from the hand
- Loading a cartridge into a drive
- Unloading a cartridge from a drive
- Returning the LSM to online status

Refer to [Chapter 3, “Operating the LSM,”](#) for the procedures.

## ■ AUTO CLEAN Feature

Drives occasionally need to be cleaned to prevent read/write errors.

When your solutions delivery engineer (SDE) configures your LSM during installation, he/she can enable the AUTO CLEAN feature. If the feature is enabled and a drive requires cleaning, the robot will receive a software message telling it to retrieve the cleaning cartridge from the cleaning cell in the LSM and place it into the drive.

Refer to [“Setting Cleaning Cartridge Count”](#) in [Chapter 2, “Controls and Indicators,”](#) and [“Replacing the Cleaning Cartridge”](#) in [Chapter 3, “Operating the LSM,”](#) for more information and procedures.

If AUTO CLEAN is not enabled, you must periodically look at the LEDs (lights) on the drive. When the *Use Cleaning Cartridge* LED is on, you must place a cleaning cartridge into the drive. (You might also receive a message at the system/server console that indicates a drive requires cleaning.)

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This chapter shows the locations and describes the functions of the library storage module (LSM) operator panel and the power switch. It also shows how to set two configuration options: the DMS host number and the maximum usage count of the cleaning cartridges. Refer to the drive publications for information about operating the drives.

## ■ Using the Operator Panel

The operator panel is behind the right front door of the LSM. The panel contains softkeys and indicators, plus a two-line display. The LSM operator panel shows LSM status, configuration options, diagnostic sequences, and error information. [Figure 2-1 on page 2-2](#) shows the panel and describes each item.

You use this panel to:

- Resolve machine problems

If an error occurs, the display shows a fault symptom code (FSC) that you can give to the solutions delivery engineer (SDE) or to your local service representative to help resolve problems. Write down the FSC as soon as it is displayed.
- Receive the instruction to close the door or cartridge access port (CAP)
- Set configuration options, such library's DMS host number and the cleaning cartridge count

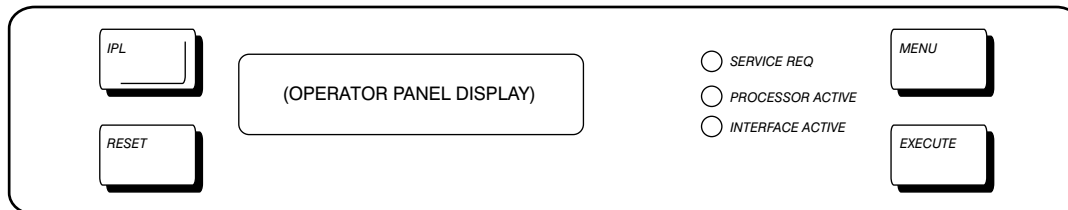
**Note:** Your SDE configured the library's SCSI address and entered each drive's SCSI address into the operator panel during installation. These addresses reside in non-volatile memory and are thus protected during power failures. You should not have to re-enter these addresses yourself. Contact your SDE if you have concerns about a SCSI address or if you decide to add more drives to your LSM.
- View configuration data
- Run diagnostic tests

## ■ Viewing and Setting Configuration Data

Figure 2-3 on page 2-4 shows how to view the LSM's configuration. The following sections explain how to set two configuration options: the number of DMS (AS/400) hosts and the maximum usage count for a cleaning cartridge.

Refer to Figure 2-2 on page 2-3 to make sure that you understand how to read the block diagrams. Usually, pressing **EXECUTE** means "yes," that you want to perform the activity in the block, and pressing **MENU** means "no," that you want to continue through the choices until your activity appears in the block. Usually, when you are at the end of an activity, you press **EXECUTE**. Press **MENU** if you make a mistake and need to go through the choices again.

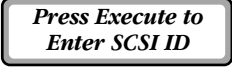
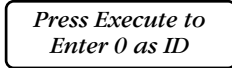



**Figure 2-1. Operator Panel Softkeys, Indicators, and Display**

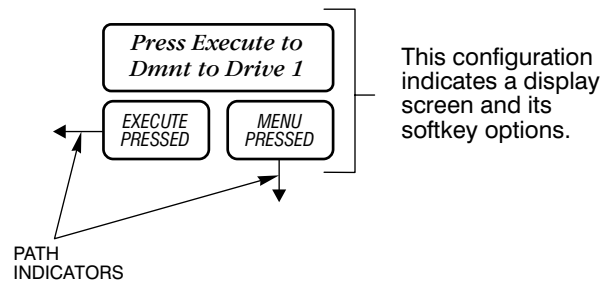


<b>IPL</b>	Initiates the download from the diskette. The IPL sequence consists of PROM tests, boot tests, and machine initialization.
<b>RESET</b>	<b>DESIGNED FOR CSE USE ONLY! NOT an operator activity.</b> Initiates a dump.
<b>OPERATOR PANEL DISPLAY</b>	Displays machine status and menu information. It also prompts the operator to perform certain functions.
<b>SERVICE REQ</b>	Lights when the LSM requires service. The display indicates
<b>PROCESSOR ACTIVE</b>	Lights solidly until the functional code is active, then flashes on
<b>INTERFACE ACTIVE</b>	Flashes whenever I/O is performed across a host interface or Customer Engineer port.
<b>MENU</b>	Accesses SCSI address and cleaning cartridge usage menus and options.
<b>EXECUTE</b>	Unlocks the CAP and sets SCSI addresses, DMS host number, and cleaning cartridge usage.

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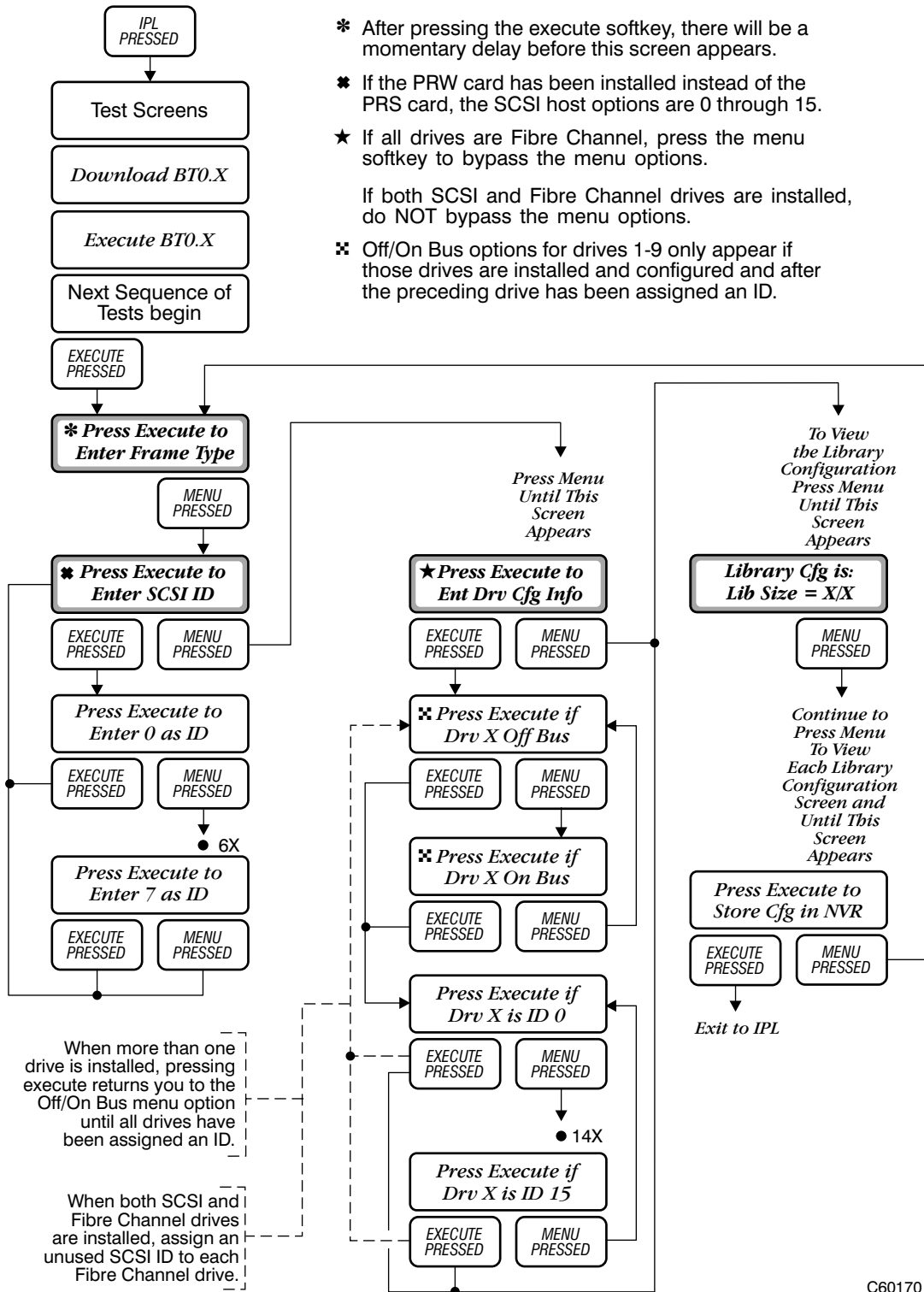
**Figure 2-2. Symbol Definitions for Menu Block Diagram****Symbol Definitions for Menu Block Diagrams**

	= display screen with actual display screen text from a top level menu
	= display screen with actual display screen text
	= display screen and type of information screen is displaying
 	= operator panel softkey operations used in menu sequences
bullet (●)	= repeat previous menu action
a bullet (●) plus a number and a multiplication symbol (Example: ● 3X)	= the number of times a previous menu action is repeated between the first and last option in a sequential menu set

**How Used....**

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Figure 2-3. Viewing the Configuration Data



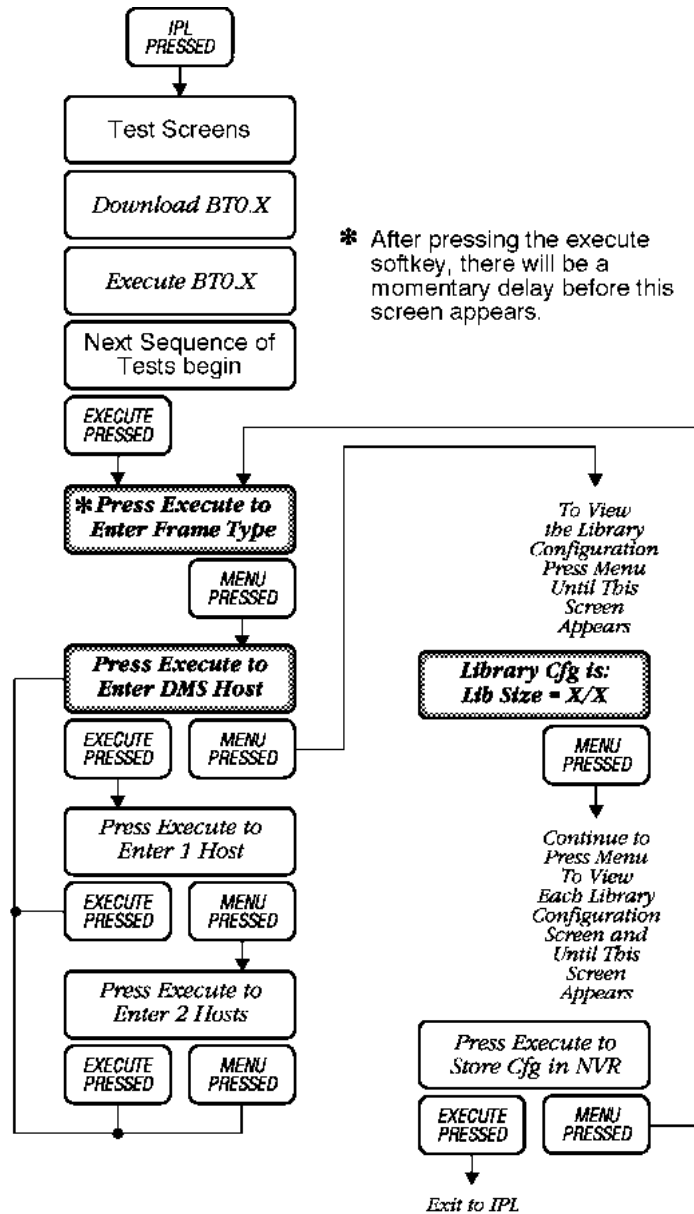
## Setting the DMS Host Number

You set the number of DMS (AS/400) hosts from the LSM operator panel. Refer to [Figure 2-2 on page 2-3](#) and [Figure 2-4 on page 2-6](#) for the menu block diagrams that describe how to set the DMS host number to one or two hosts.

**CAUTION:**

**During this procedure, the panel displays `Press Execute to Enter Lib Size`. This is not normally an operator function. Altering the library size can cause initialization errors or damage the hard.**

Figure 2-4. Setting the DMS Host Number



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## Setting Cleaning Cartridge Count

Drives might occasionally need to be cleaned to prevent read/write errors. The drives are cleaned with a special cleaning cartridge. After a predetermined number of uses, the cartridge must be thrown away.

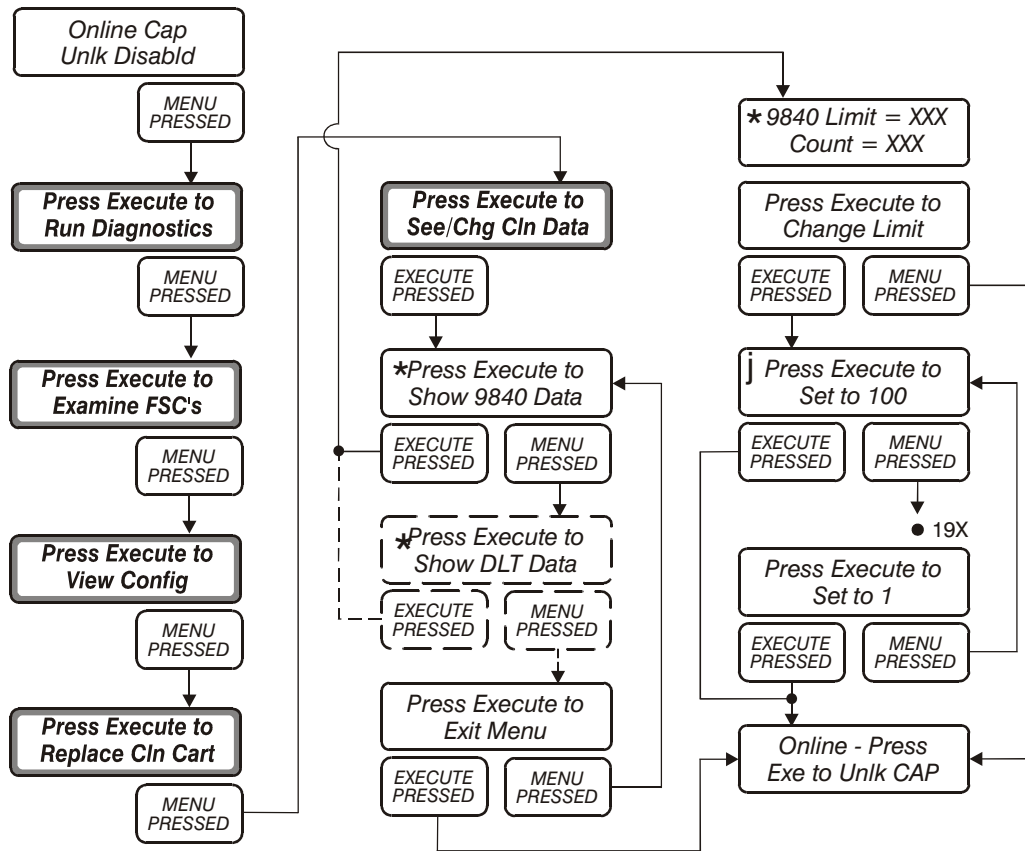
If your LSM was configured during installation to have the AUTO CLEAN feature enabled, you can use the LSM operator panel to set the maximum number of times a cartridge can be used. The *DLT Tape Drive Product Manual* suggests that you use a DLT cleaning cartridge about 20 times. For 4890 cartridges (3840 compatible), refer to the manufacturer's label to determine the number of times the cartridge should be used. For 9840/T9840B linear serpentine cartridges, refer to the *9840/T9840B Tape Drive User's Reference Manual*, PN 95739.

**Note:** Quantum states that there is not an extensive need for the SDLT cleaning cartridge due to improved head characteristics of the SDLT 220 over previous generations of DLTtape drives. However, in some highly stressed environments the cleaning cartridge can be useful. Although this type of highly stressed environment is not typical, Quantum believes the differences in customer environments could lead to situations where cleaning would be beneficial.

The SDLT cleaning tape is in stock and available for order.

Refer to [Figure 2-2 on page 2-3](#) to make sure that you understand how to read the block diagrams. Refer to [Figure 2-5 on page 2-8](#) for the menu block diagrams that describe how to set the count.

**Note:** Use only 3480 compatible cartridges for 4890 drives. Use only DLT cartridges for DLT drives. Use only SDLT cartridges for SDLT drives. Use only 9840/T9840B cartridges for 9840/T9840B drives

**Figure 2-5. Setting the Maximum Usage Count of the Cleaning Cartridge**

- \* If the LSM is configured for DLTs or 4890s only, the DLT or 3480 screen option will appear instead of 9840.
- \* If the LSM is configured for a mixed environment, both the 9840 (or 3480) and DLT menu options are available. Use the menu button to access the other option.
- j 9840 limits decrease from 100 to 1 in decrements of 5; DLT from 20 to 1 in

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## ■ Locating the LSM's Power Switches

The power switch is a circuit breaker located in the lower right corner of the right front door of the LSM.

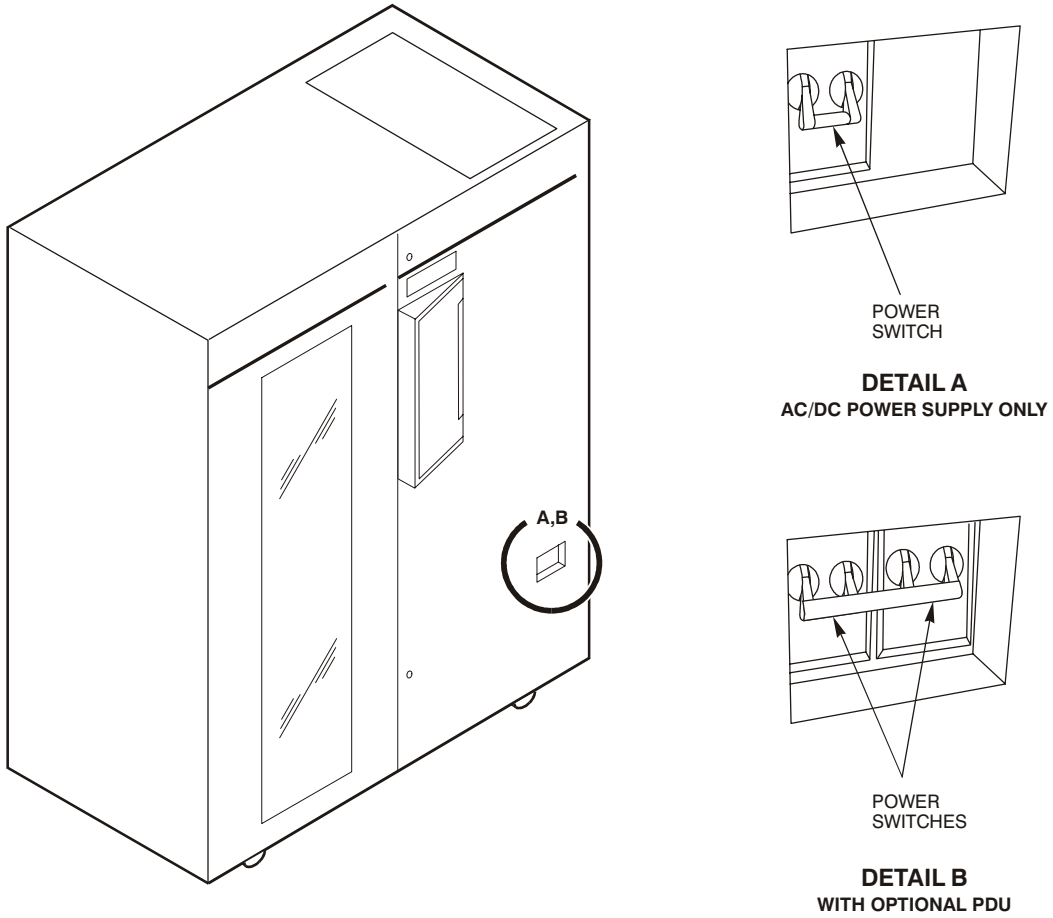
Two configurations of power switches exist:

- A single switch located on the AC power supply controls the LSM and up to six drives.
- An additional switch located on the optional power distribution unit (PDU) controls up to four additional drives. For this configuration, the two switches are connected by a gang bracket.

To supply power to the LSM and/or optional PDU, lift the switches or switch.

To remove power from the LSM and drives, make sure that all jobs being performed are complete. Then Push down the single switch or gang bracket. The robot and all drives power-off completely. [Figure 2-6 on page 2-10](#) shows the power switch location.

**Figure 2-6. Power Switch Location**



C60155

This chapter contains the procedures for:

- Powering on the LSM
- Powering off the LSM
- IPLing the LSM
- Operating in automated mode
- Operating in manual mode

**Note:** When the machine is controlled by the host, refer to your software publications and enter the command at the system/server console to perform the desired activity. For some activities, you might have to ask your systems administrator for the required information.

## ■ Powering on or IPLing the LSM

To power on the LSM, lift the single power switch or gang bracket located on the bottom right corner of the right front door of the LSM. The LSM will automatically begin an initial program load (IPL) sequence.

**Note:** If the LSM does not power on, contact StorageTek's Call Center and report the problem.

To re-IPL the LSM after it is already powered-on, press the IPL soft key located on the operator panel.

## ■ Powering off the LSM

To power off the LSM:

1. Enter the command at the system/server console to remove the LSM and drives from online status.
2. Push down the single power switch or gang bracket located on the bottom right corner of the right front door of the LSM.

## ■ Operating in Automated Mode

Automated mode is the normal operating mode of the LSM. When the LSM is online and the robot is loading and unloading cartridges, monitor your system/server console and the LSM operator panel for messages and respond appropriately.

When an LSM is online, you might need to:

- Enter cartridges into the LSM through the cartridge access port (CAP)
- Remove cartridges from the LSM through the CAP
- Replace a cleaning cartridge

The following text describes how to perform these activities.

## Entering Cartridges through the CAP

If the operator panel displays `ONLINE CAP UNLK DISABLD`, the CAP is locked by the host.

Issue the command at the customer server console to allow the CAP to be unlocked. Then perform the steps below.

If the operator panel displays `ONLINE - PRESS EXE TO UNLK CAP`, go directly to the steps below.

To unlock the CAP so that you can open the CAP and enter cartridges into it, examine [Figure 3-1 on page 3-3](#) and [Figure 3-2 on page 3-4](#) and follow these steps:

1. Press `EXECUTE` on the operator panel.
  - a. The operator panel displays `ONLINE CAP UNLK PENDING`.
  - b. The robot hand unlocks the CAP.
  - c. The operator panel displays `ONLINE CAP UNLOCKED`.

### **CAUTION:**

**You must enter the cartridges properly or you might damage the robot or the drive, or cause the LSM to stop operating. Use only 3480-compatible cartridges for the 4890 drives. Use only DLT cartridges for the DLT drives. Use only SDLT media for SDLT drives. Use only 9840/T9840B linear serpentine cartridges for 9840/T9840B drives.**

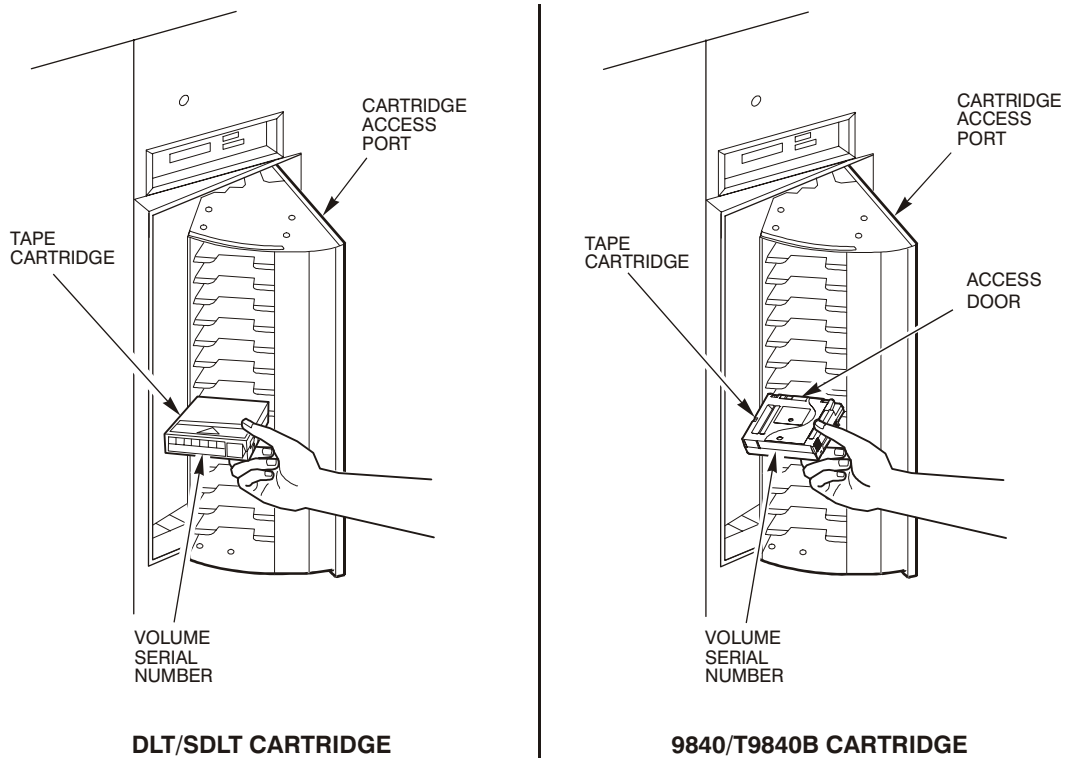
2. Open the CAP to gain access to the cells.
3. Enter the cartridges:
  - a. Place the cartridges in the 14-cartridge fixed array so that they lie flat, with the customer label on top and the tape leader block cutout on the right-hand side, or
  - b. Insert the cartridges into the removable CAP array and insert the array into the CAP. Make sure that the cartridges are properly oriented and properly seated.

**CAUTION:**  
Do not slam the CAP. Cartridges could become unseated and be extended out into the path of the robotics, causing severe damage to the robot hand.

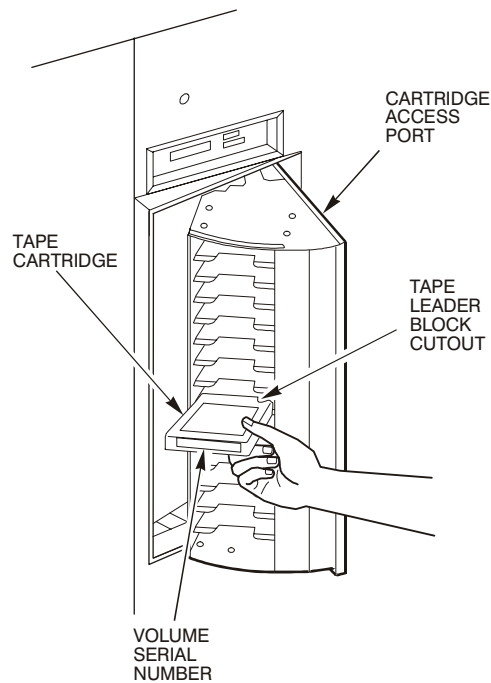
4. Close the CAP. The lock automatically engages.

**Note:** The host software determines what happens when you enter a cartridge upside down or with an unreadable label. Under normal conditions, the camera on the hand audits the CAP and recognizes that a cartridge is present, but the hand does not move it. You must remove the cartridge from the CAP. With some host software, the LSM might stop operating. With other host software, you are prompted to type in a label number when no VOLSER is read. If you do type in a label number, this might cause a problem later during an audit, because the camera still will not be able to read an unreadable VOLSER on the cartridge.

**Figure 3-1. Entering DLT, SDLT or 9840/T9840B Cartridges into the Cartridge Access Port**



C60031

**Figure 3-2. Entering 3480 Cartridges into the Cartridge Access Port****3480 CARTRIDGE**

C60549

## Removing Cartridges through the CAP

When you want the robot to remove cartridges from the LSM through the CAP, use the system/server console to enter the VOLSERS of the cartridges you require. The robot will retrieve them and insert them into the CAP.

If the operator panel displays `ONLINE CAP UNLK DISABLD`, the CAP is locked by the host. Issue the command at the system/server console that puts the LSM in the `ONLINE - PRESS EXE TO UNLK CAP` mode. Then perform the steps below.

If the operator panel displays `ONLINE - PRESS EXE TO UNLK CAP`, go directly to the steps below.

To unlock the CAP so that you can open the CAP and remove cartridges from it:

1. Press **EXECUTE** on the operator panel.
  - a. The operator panel displays `ONLINE CAP UNLK PENDING`.
  - b. The hand unlocks the CAP.
  - c. The operator panel displays `ONLINE CAP UNLOCKED`.
2. Open the CAP to gain access to the cells.

3. Remove the cartridges and store them *outside* the LSM (refer to “[Storing Cartridges](#)” in [Appendix A, “Cartridge Tape Information](#)”) or
4. Remove the array from the CAP, remove the cartridges from the array, and store the cartridges *outside* the LSM (refer to “[Storing Cartridges](#)” in [Appendix A, “Cartridge Tape Information](#)”).

**CAUTION:**

**Do not slam the CAP. Cartridges could become unseated and be extended out into the path of the robotics, causing severe damage to the robot hand.**

5. Close the CAP. The lock automatically engages.
6. Repeat these steps until all the desired cartridges have been removed.

## Replacing the Cleaning Cartridge

Cleaning cartridges clean the drive and thus prevent read and write errors. The following paragraphs pertain to you if your LSM has the AUTO CLEAN feature enabled. You can use the View Configuration section of [Figure 2-3 on page 2-4](#) to determine whether the feature is enabled.

If the feature is not enabled, you will need to keep track of how many times a cleaning cartridge has been used, and throw it away when necessary.

When a cleaning cartridge has been used a number of times, as defined in “[Setting Cleaning Cartridge Count](#)” in [Chapter 2, “Controls and Indicators,”](#) the LSM operator panel displays (3480, DLT, or 9840) CLEANING CARTRIDGE USED UP. You must remove the expired cartridge and place a new cartridge into the CAP. If your machine has AUTO CLEAN enabled, use the procedures in the following sections to replace the cartridge.

**Note:** The *DLT Tape Drive Product Manual* recommends using a cleaning cartridge about 20 times. For the 3480-compatible cartridge, refer to the manufacturer’s label on the cartridge to determine the number of uses. For the 9840/T9840B cartridge, refer to the *9840/T9840B User’s Reference Manual*, PN 95739.

Quantum states that there is not an extensive need for the SDLT cleaning cartridge due to improved head characteristics of the SDLT 220 over previous generations of DLTtape drives. However, in some highly stressed environments the cleaning cartridge can be useful. Although this type of highly stressed environment is not typical, Quantum believes the differences in customer environments could lead to situations where cleaning would be beneficial.

The SDLT cleaning tape is in stock and available for order.

Cleaning cartridges have a VOLSER prefix of DG CLN or CLNxxx. These cartridges cannot be used as scratch cartridges or initialized by software utilities.

Use the LSM operator panel and the CAP to remove the expired cleaning cartridge from the LSM and replace it with a new cleaning cartridge.

**CAUTION:**

**Do not re-enter a cleaning cartridge that has been ejected from an LSM. When you enter a cleaning cartridge, the software considers it to be new and sets the usage counter to zero.**

To replace the expired cleaning cartridge:

1. Press **MENU** until the LSM operator panel displays **PRESS EXECUTE TO REPLACE CLN CART.**
2. Press **EXECUTE**. The panel displays **PRESS EXECUTE TO REPLACE 3480 CART.**
3. To replace the *3480-compatible* cleaning cartridge, press **EXECUTE** and wait until the CAP unlocks. Go to Step 6.
4. To replace the *DLT or SDLT* cleaning cartridge, press **MENU**.

The LSM operator panel displays **PRESS EXECUTE TO REPLACE DLT CART.**

Press **EXECUTE** and wait until the CAP unlocks.

- a. The hand takes the expired cleaning cartridge from its cell inside the LSM and inserts it into the CAP.
  - b. The hand unlocks the CAP.
  - c. Go to Step 6.
5. To replace the *9840/T9840B* cleaning cartridge, press **MENU**.  
The LSM operator panel displays **PRESS EXECUTE TO REPLACE 9840 CART.**  
Press **EXECUTE** and wait until the CAP unlocks.
    - a. The hand takes the expired cleaning cartridge from its cell inside the LSM and inserts it into the CAP.
    - b. The hand unlocks the CAP.
    - c. Go to Step 6.
  6. Open the CAP and remove the expired cartridge.
  7. Throw away the expired cartridge.

8. Insert *one* new cleaning cartridge into a CAP cell.

**CAUTION:**

**Do not slam the CAP. Cartridges could become unseated and be extended out into the path of the robotics, causing severe damage to the robot hand.**

9. Close the CAP. The lock automatically engages.
  - a. The robot performs a brief audit of the CAP.
  - b. The operator panel displays MOVING CLEANING CART TO CELL.
  - c. The hand inserts the cartridge into its cell.
  - d. The operator panel displays ONLINE CAP UNLK DISABLD or ONLINE – PRESS EXE TO UNLK CAP.

## ■ Operating in Manual Mode

The following sections describe operations you can perform when the LSM is in manual mode. Manual mode occurs when the LSM is either offline or loses power.

**CAUTION:**

**Components are sensitive to static electricity. Even a small electrostatic discharge could damage an electrical component inside the LSM. A damaged component might not fail immediately, but over time, it will become worse, possibly causing an “intermittent” problem. Be sure to touch gray, unpainted metal before you reach inside the LSM.**

**After you open one of the LSM’s doors:**

1. With your finger, touch a gray, unpainted metal surface, such as the LSM’s frame.
2. Keep your body movement to a minimum as you touch the drives or LSM components

**Antistatic wrist straps with clip-on ends are commercially available.**

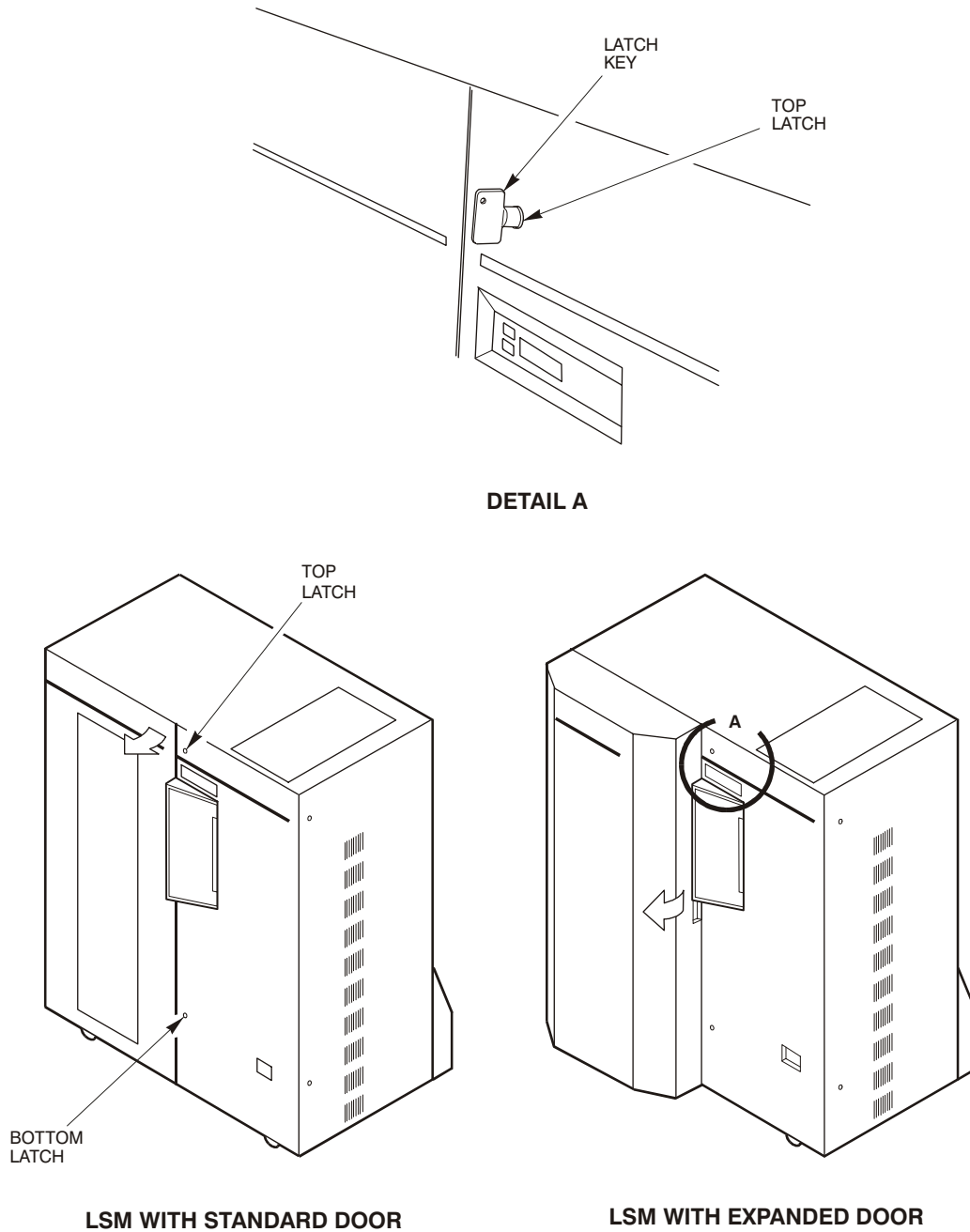
## Opening the LSM Front Doors

You must open the right front door, then the left front door to perform manual operations. Refer to [Figure 3-3 on page 3-8](#).

1. Make sure that all jobs have ended and vary the LSM from the system/server console.
2. Open the LSM right front door by using a latch key to unlock the top and bottom latches. Turn the key counterclockwise.

3. Open the LSM left front door. For the standard door, pull gently from the top right corner. For the expansion door, pull from the recessed area on the right side.

**Figure 3-3. Opening Access Doors**



C60032

## Moving the Robot

After you open the LSM doors, you might need to move the robot to make it easier to access the stored cartridges or the drives.

Read and observe the following caution before you attempt to move any portion of the robot.

**CAUTION:**

To prevent damaging the hand or Z carriage, make sure that the reach mechanism on the hand is fully retracted before moving any part of the robot. Turn the hand pulley to retract the reach mechanism (refer to [Figure 3-9 on page 3-14](#)). If you fail to retract the hand before the robot is rotated, the hand will be damaged.

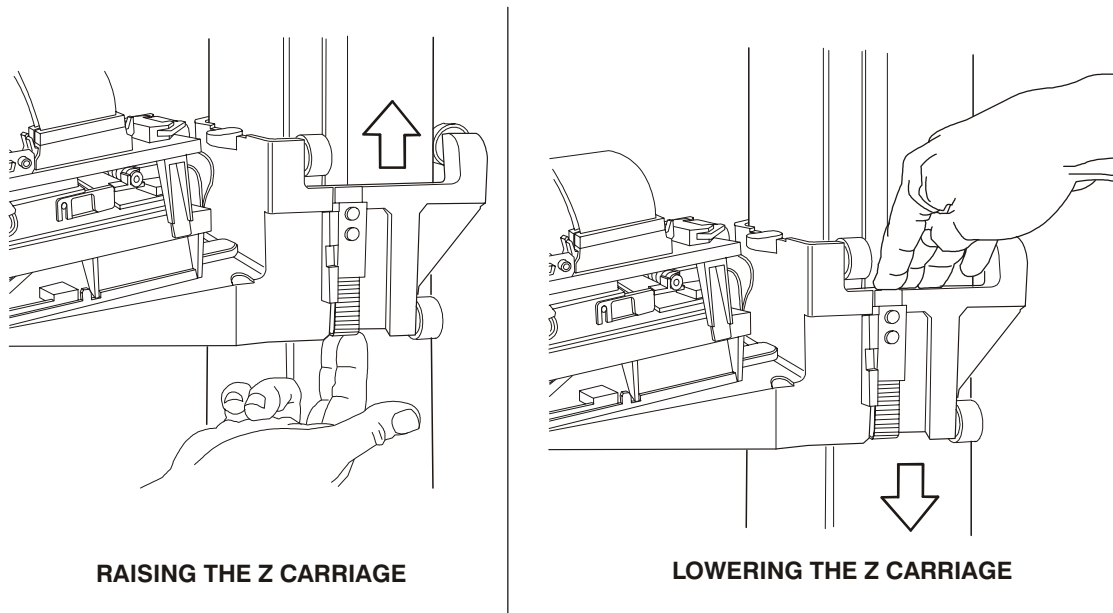
Move the Z column and Z carriage only as shown in [Figure 3-4 on page 3-9](#) and [Figure 3-5 on page 3-10](#).

Do not touch exposed electrical parts when moving any part of the robot.

### Raising and Lowering the Z Carriage

If you need to raise or lower the hand, *slowly and carefully* move it by placing your fingers on the Z carriage as shown in [Figure 3-4](#).

**Figure 3-4. Raising and Lowering the Z Carriage**



E60033

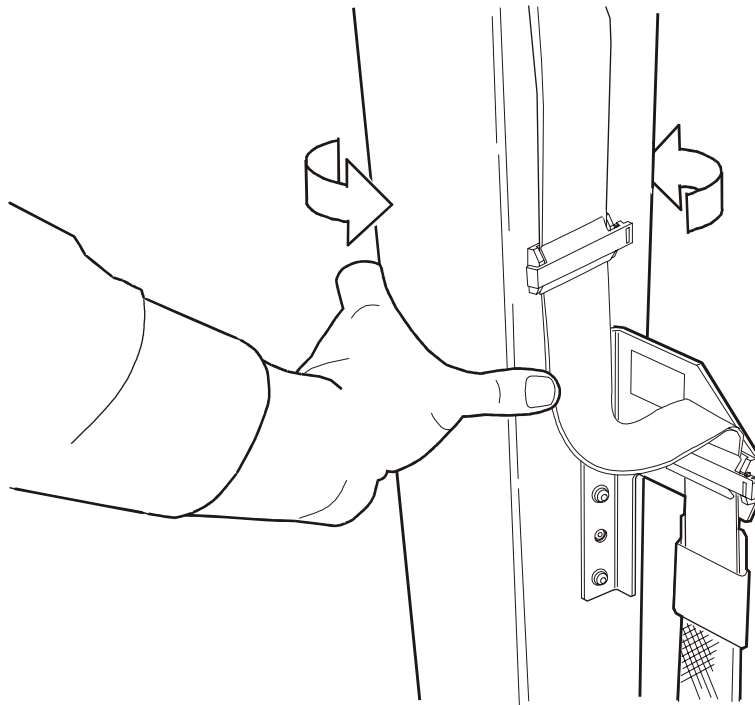
## Rotating the Z Column

If you need to rotate the Z column, grasp it and *carefully* rotate it, as shown in Figure 3-5.

The Z column does not rotate a full 360 degrees. If the column meets resistance and stops before the desired position is reached, it has contacted a stopping mechanism mounted on the floor of the LSM. Do not force it. Rotate the column in the opposite direction.

**Figure 3-5. Rotating the Z Column**

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E60034

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## Locating a Cartridge in the Storage Cells

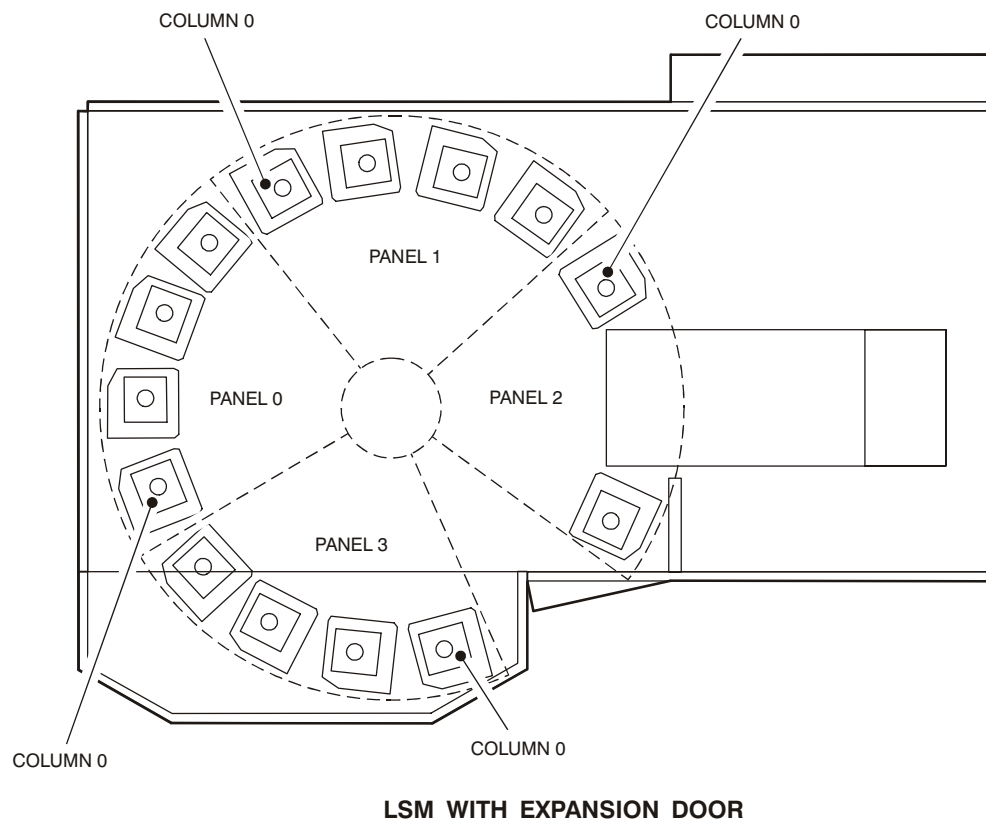
Figure 3-6 and Figure 3-7 on page 3-12 show the locations of the panels, rows, and columns of the cartridge storage cells when the expansion door and 10 drives are installed. The decal at the top of each column also provides location information.

Figure 3-8 on page 3-13 shows the locations of reserved storage cells. These cells store diagnostic and cleaning cartridges and provide an empty/drop-off cell, where the robot inserts a cartridge when the LSM loses power while a cartridge is in the hand.

### CAUTION:

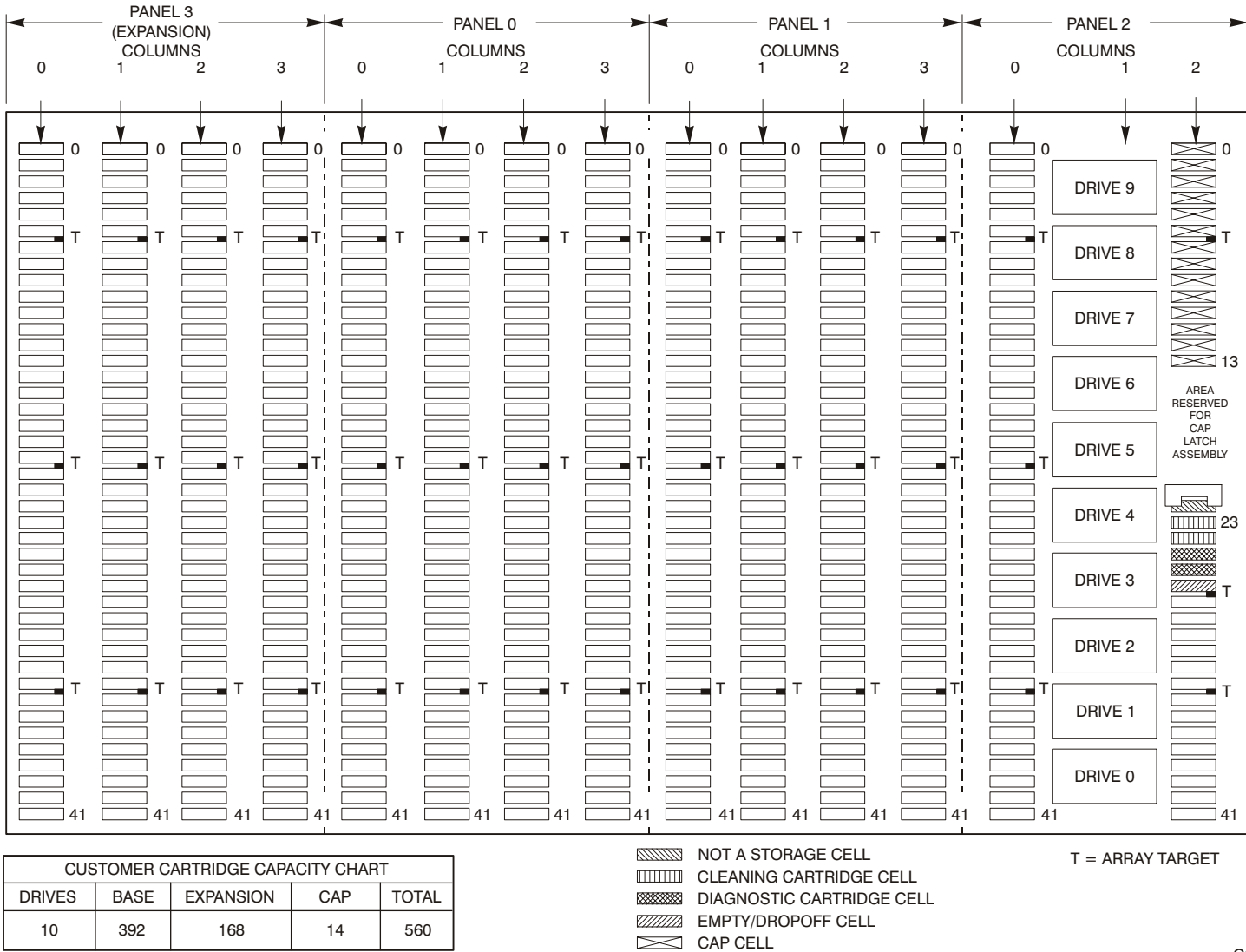
**Do not insert data cartridges into these reserved cells, or the LSM will issue an error message when it tries to access these cells.**

**Figure 3-6. Locating Cartridges—Top View**

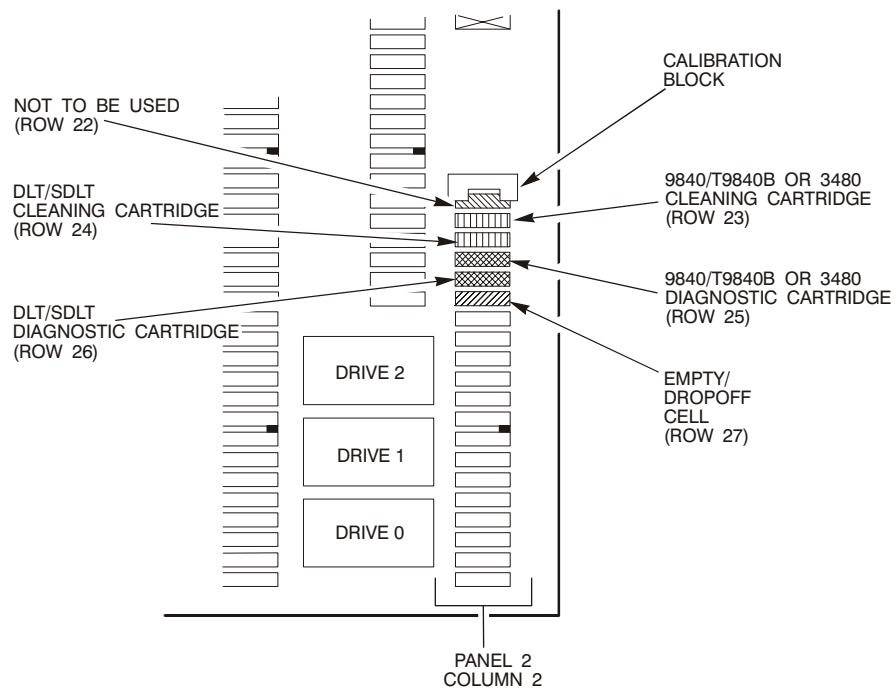


C60035

Figure 3-7. Locating Cartridges—Panels, Cells, Rows



C60148

**Figure 3-8. Diagnostic and Cleaning Cartridge Cell Locations**

C60186

## Removing a Cartridge from the Hand

If the LSM goes offline due to a power failure, a cartridge might be left in the hand. You can remove it from the hand and manually mount it into a drive for a read/write operation.

### CAUTION:

Follow the procedures described in [“Moving the Robot” on page 3-9](#). Failing to do so could damage the hand.

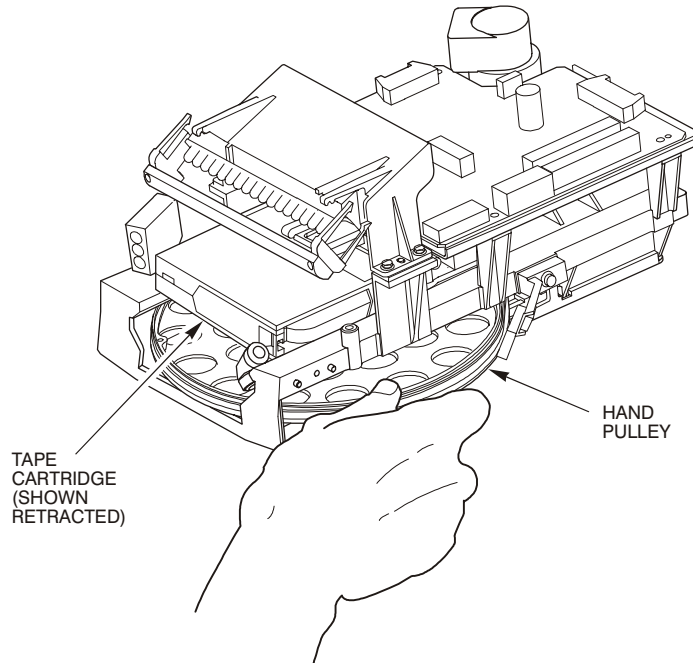
**Make sure that you do not touch the TWH card on the hand assembly. It contains ESD-sensitive components and could be damaged.**

To remove a cartridge from the hand:

1. Rotate the Z column:
  - If the LSM has an expansion door, move the hand until it is facing the expansion door location.
  - If the LSM has a standard door, move the hand until it is facing the door.

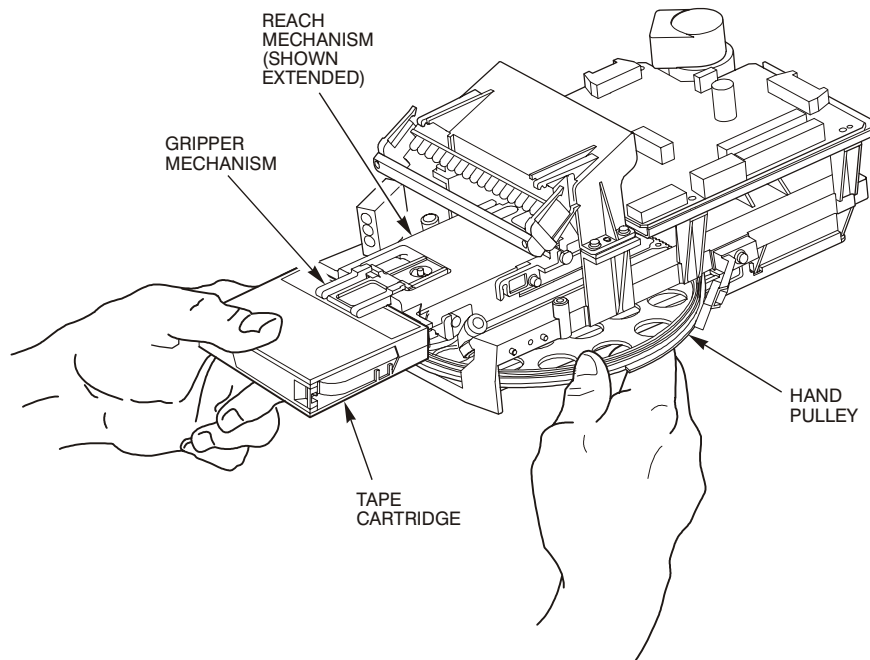
2. Rotate the hand pulley (as shown in [Figure 3-9 on page 3-14](#)) until the gripper is extended to its full position, as shown in [Figure 3-10 on page 3-14](#).

**Figure 3-9. Extending the Gripper**



C60037

**Figure 3-10. Removing a Cartridge from the Hand**



C60036

3. Hold the hand pulley with one hand and grasp the cartridge with the other. Pull gently on the cartridge until it is released from the gripper, as shown in [Figure 3-10](#).

**CAUTION:**

**Make sure that the gripper mechanism is fully retracted. If it is left extended and you turn the robot, the gripper mechanism will strike a storage cell. If it is left extended and the hand is facing the LSM door when it is closed, the door will strike the gripper mechanism.**

4. Turn the hand pulley until the gripper mechanism is fully retracted.

## Loading a Cartridge into a 4890 Drive

To load a cartridge into a 4890 drive:

1. Obtain the cartridge VOLSER, location, and drive number from the system/server console.
2. Open the LSM right front door by using a latch key to unlock the top and bottom latches. Refer to [Figure 3-3 on page 3-8](#).
3. Open the LSM left front door. For the standard door, pull gently from the top right corner. For the expansion door, pull from the recessed area on the right side. Take ESD precautions.
4. Locate the cartridge.

**WARNING:**

**Keep your fingers out of the drive when loading a cartridge; the drive elevator lowers automatically.**

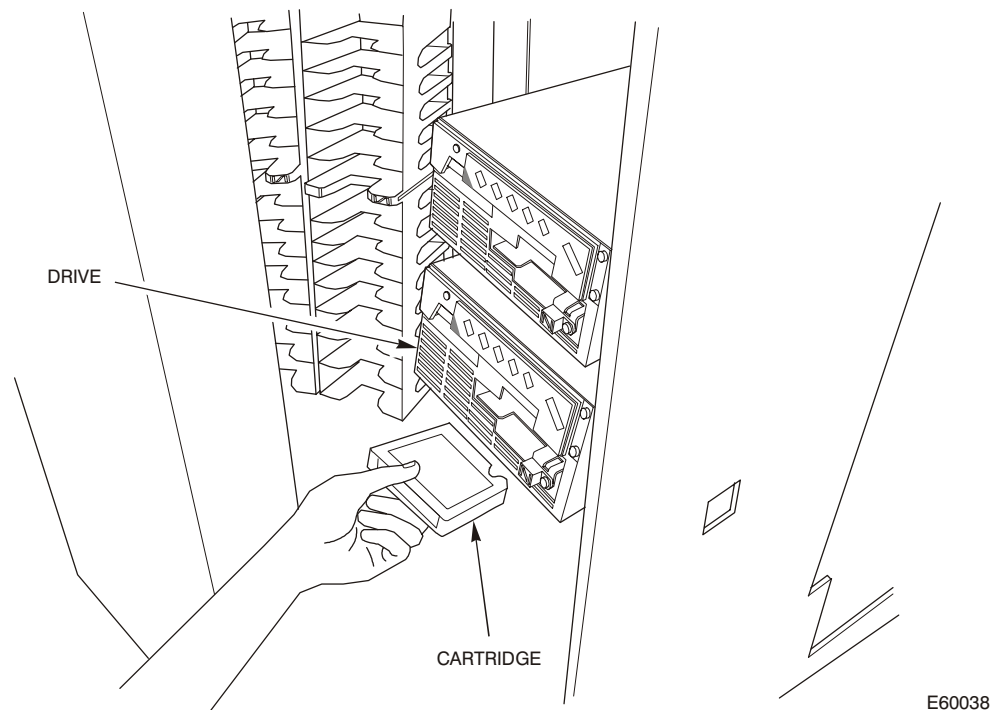
5. If necessary, remove the cartridge from a previous job and place it *outside* the LSM.

**CAUTION:**

**You must insert the cartridge properly or you will damage the drive. Use only 3480-compatible cartridges for the 4890 drives. Use only DLT cartridges for the DLT drives. Use only SDLT media for the SDLT drives. Use only linear serpentine cartridges for 9840/T9840B drives. Make sure that the cartridge has a readable VOLSER label.**

6. Insert the cartridge as shown in [Figure 3-11](#).

**Note:** If a 4890 drive has been running, it might not accept the tape unless you place the drive into manual mode. Press the **READY** button on the drive panel to turn the *Ready* light off. Press the **UNLOAD** button to reset the carriage on the drive to allow the drive to be loaded in manual mode.

**Figure 3-11. Loading a Cartridge into the 4890 Drive**

### Unloading a Cartridge from a 4890 Drive

To dismount a cartridge from a 4890 drive:

1. Obtain the drive number from the system/server console.
2. Open the LSM right front door by using a latch key to unlock the top and bottom latches. Refer to [Figure 3-3 on page 3-8](#).
3. Open the LSM left front door. For the standard door, pull gently from the top right corner. For the expansion door, pull from the recessed area on the right side. Take ESD precautions.
4. Locate the desired drive.
5. Press the **READY** toggle button on the drive to make it not ready.
6. Press the **UNLOAD** button on the drive.
7. Remove the cartridge from the raised elevator.
8. Properly store the cartridge *outside* the LSM (refer to [“Storing Cartridges” in Appendix A, “Cartridge Tape Information”](#)).

## Loading a Cartridge into a DLT Drive

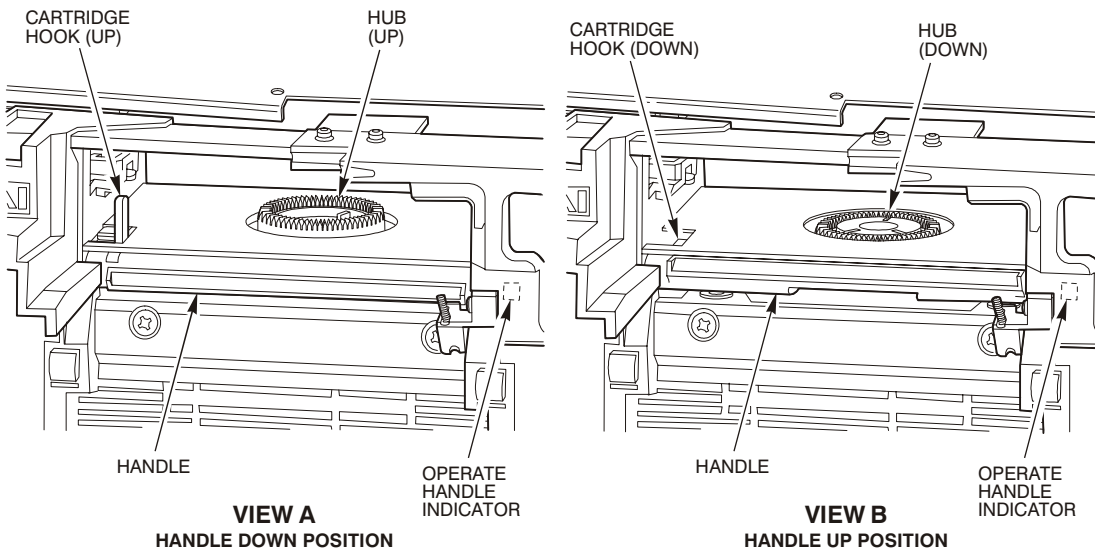
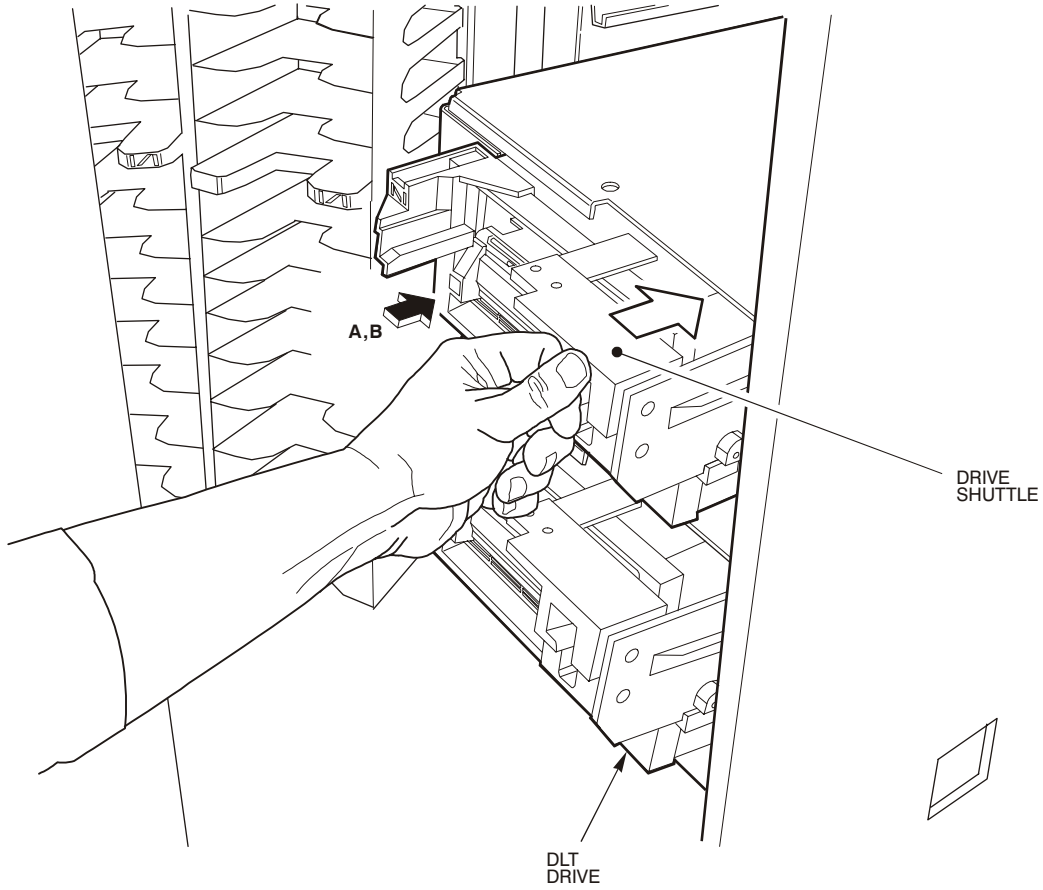
**CAUTION:**

**Do not attempt to operate a DLT drive's shuttle mechanism until you see the *Operate Handle* indicator light. The indicator will not light until the drive has completed initialization (about 10 seconds).**

To load a cartridge into a DLT drive:

1. Obtain the cartridge VOLSER, location and drive number from the system/server console.
2. Open the LSM right front door by using a latch key to unlock the top and bottom latches. Refer to [Figure 3-3 on page 3-8](#).
3. Open the LSM left front door. For the standard door, pull gently from the top right corner. For the expansion door, pull from the recessed area on the right side. Take ESD precautions.
4. Locate the cartridge.
5. Make sure that the DLT handle is up and the cartridge hook and hub are down. [Figure 3-12 on page 3-18](#) shows these positions.

**Figure 3-12. DLT Shuttle, Handle, Hook, and Hub**



E60438

6. If the DLT handle is down, raise it by operating the shuttle:

**CAUTION:**

**Potential damage to the cartridge: The DLT7000 drive does not release a cartridge's tape leader immediately. So when attempting to raise the handle (and eject a cartridge), you must hold the shuttle in for three seconds before releasing it. Failure to hold in the shuttle could result in damage the tape leader.**

- a. Push the shuttle back (see the direction of the arrow in the top half of [Figure 3-12 on page 3-18](#)). If you are operating a DLT7000, hold the shuttle in the pushed back position for three seconds.
- b. Release the shuttle, allowing it to return to its normal position.

**Note:** If you use this procedure to raise the handle when the *Operate Handle* indicator is not lit, a safety mechanism will prevent damage to the drive. To reset the mechanism, wait for the *Operator Handle* indicator to light. Push the shuttle in completely; then pull firmly on the shuttle. If the handle does not raise, repeat these actions.

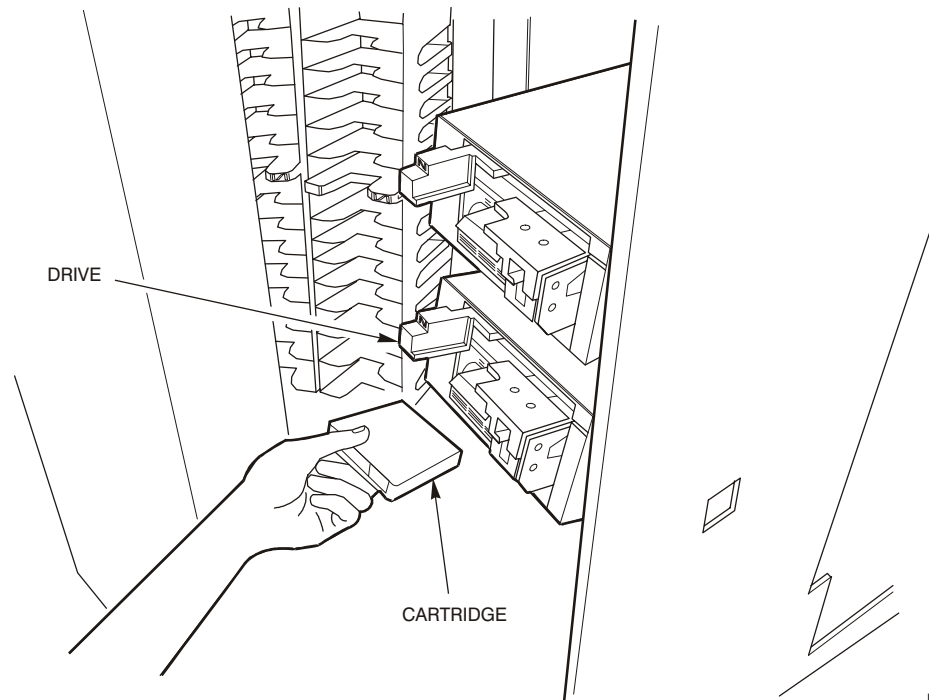
**CAUTION:**

**You must insert the cartridge properly or you will damage the drive. Use only 3480-compatible cartridges for the 4890 drives. Use only DLT cartridges for DLT drives. Use only SDLT media for SDLT drives. Make sure that the cartridge has a readable VOLSER label.**

7. Hold the cartridge so that the VOLSER label is facing you and the write protect switch is on the right side of the cartridge, as shown in [Figure 3-13 on page 3-20](#).
8. Insert the cartridge into the shuttle and push the cartridge into the back of the drive until it is firmly seated.
9. Push the shuttle all the way back, pause for three seconds, then release the shuttle.

**CAUTION:**

**If the cartridge has been ejected from the drive, you must remove it from the shuttle before you can reload it into the drive. Otherwise, the shuttle will become jammed by simultaneously holding onto the cartridge and lowering the handle. If this happens, release the cartridge from the shuttle latch under the right side of the cartridge. Then push the cartridge into the drive and lower the handle.**

**Figure 3-13. Loading a Cartridge into the DLT Drive**

E60374

### Unloading a Cartridge from a DLT Drive

To unload a cartridge from a DLT drive:

1. Obtain the drive number from the system/server console and place the drive offline.
2. Open the LSM right front door by using a latch key to unlock the top and bottom latches. Refer to [Figure 3-3 on page 3-8](#).
3. Open the LSM left front door. For the standard door, pull gently from the top right corner. For the expansion door, pull from the recessed area on the right side. Take ESD precautions.
4. Locate the desired drive.
5. Make sure that the *Operate Handle* indicator is on.
6. Push the shuttle all the way back, pause for three seconds, then release the shuttle.

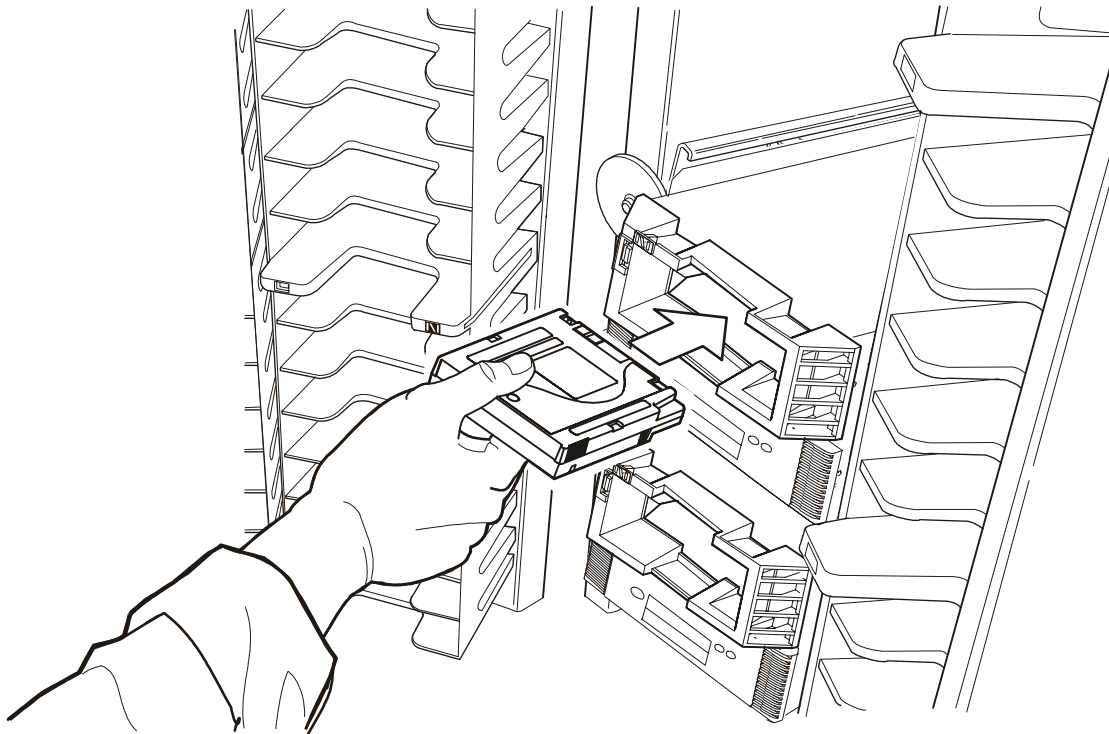
**Note:** If the cartridge does not come out of the drive, remount the cartridge by releasing it from the shuttle latch under the right side of the cartridge. Then push the cartridge into the drive and lower the handle. If this fails, the tape leader might be dislodged and require rethreading.

7. Remove the cartridge from drive.
8. Store the cartridge *outside* the LSM (refer to “Storing Cartridges” in [Appendix A, “Cartridge Tape Information”](#)).

## Loading a Cartridge into a 9840/T9840B Drive

To load the cartridge in a 9840/T9840 drive:

1. Insert the cartridge into the 9840/T9840 drive using the direction shown in [Figure 3-14 on page 3-22](#).
2. Wait for one of the following messages to display and take the appropriate action, if necessary:
  - The Ready F (File Protected) message displays when a write-protected cartridge loads successfully.
  - The Ready U (File Unprotected) message displays when a cartridge that is not write-protected loads successfully.
  - The NTReady message displays when the tape in the cartridge has lost tension. Follow the instructions outlined in the *9840/T9840 Tape Drive User's Reference Manual*, PN 95739 to correct this condition.
  - The LOADxxxx message displays when the cartridge unsuccessfully loads, where the xxxx is a fault symptom code. Follow the instructions outlined in PN 95739 to correct this condition.

**Figure 3-14. Loading a Cartridge into the 9840/T9840B Drive**

C60489

### Unloading a Cartridge from a 9840/T9840B Drive

To unload the cartridge from a 9840/T9840 drive:

1. Ensure that the 9840/T9840 drive is not selected from the host.
2. Press the **UNLOAD** switch.

One of the following conditions can occur:

- After the tape rewinds, the cartridge ejects from the 9840/T9840 drive. Remove the cartridge from the 9840/T9840 drive.
- The cartridge fails to eject after the tape rewinds. Refer to the *9840/T9840 Tape Drive User's Reference Manual*, PN 95739 to correct this condition.
- If the **UNLOAD** switch is pressed during a write operation, the 9840/T9840 drive tries write the remaining data before the cartridge unloads. If the `UnWrxxxx` (Unwritten Data) message displays, where `xxxx` is the fault symptom code, the attempt failed and some data remains

unwritten to the tape. For more information about recovering from an Unwritten Data condition, refer to PN 95739.

## Returning the LSM to Online Status

To place the LSM online for automated operations:

1. Refer to your specific drive publications for instructions on making the drives ready. For DLT or SDLT, make sure that the *Operate Handle* light is on and the handle is up.
2. Close and lock the LSM doors. The robot will perform an LSM audit of the cells.
3. Place the LSM online by entering the command at the system/server operator console.
4. Refer to your specific software publications for instructions on placing the cartridges you removed into the CAP and having the robot insert the cartridges into the LSM cells.

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This chapter describes what to do if problems occur with the LSM. In some cases, you might be able to correct the problem. In other cases, you must contact your service representative, as described in this chapter.

When the problem is caused by cartridge tapes, refer to [Appendix A, “Cartridge Tape Information.”](#) When the problem is caused by cartridge tape units, refer to your drive unit operator’s guide.

Most of the time, a fault symptom code (FSC) will appear on the LSM operator panel display. Write down the information on the display as soon as it appears, and give the information to your customer representative or to the staff at the StorageTek Call Center.

## ■ StorageTek Call Center

The StorageTek Call Center is available 24 hours a day, seven days a week, to customers with StorageTek maintenance contracts and to StorageTek solutions delivery engineers (SDEs).


## ■ Customer Initiated Maintenance (CIM)

Customer Initiated Maintenance begins with a telephone call from a customer to the StorageTek Call Center. You receive immediate attention from StorageTek personnel, who record problem information and respond in one of two ways:

- Route your call to the Remote Center. Trained hardware support personnel will then help you resolve the problem over the phone.
- Dispatch a local SDE to your site.

To contact the Call Center about a problem:

1. Use the telephone to call the StorageTek central dispatcher at

 **1-800-525-0369.**

2. Tell the central dispatcher why you are calling. The central dispatcher will ask several questions and take the appropriate response. If you have answers to the following questions ready when placing a service call, the process is much smoother and faster:

Site location number \_\_\_\_\_

Account name \_\_\_\_\_

Equipment model number \_\_\_\_\_

Contact name \_\_\_\_\_

Telephone number \_\_\_\_\_

Problem description \_\_\_\_\_

Urgency of problem \_\_\_\_\_

# Cartridge Tape Information

# A

This appendix describes how to prepare, inspect, store, clean, and repair cartridges. It also lists cartridge specifications.

## ■ Basic Requirements for Cartridges

LSM cartridges must meet specifications defined in, *American National Standard Magnetic Tape & Cartridge for Information Interchange, ACS X3B5*. Cartridges must meet the following requirements:

- Cartridges
  - 105.6 mm x 105.3 mm x 25.4 mm (4.16 in. x 4.15 in. x 1 in.)
  - Integrated thumbwheel
- Media
  - Chromium dioxide
  - 12.7 mm (0.5 in.) wide
  - 165 m (541 ft) long minimum
  - No beginning of tape/end of tape reflective markers
- Volume serial number (VOLSER) label
  - Valid characters are A–Z, 0–9, # (crosshatch), or trailing blanks. Leading blanks are not allowed.

## ■ Colored Cartridge Specifications

Colored cartridges are approved only if the measured reflection density is greater than 1.20 for DLT cartridges and 1.50 for 9840/T9840B cartridges, as measured by an X-Rite 404G color reflection densitometer.

<b>Bandwidth</b>	ANSI Status T Wideband (380–780 nanometers)
<b>Measuring range</b>	Density (0.00–2.50) D
<b>Accuracy</b>	± 0.02 D
<b>Repeatability</b>	± 0.01 D
<b>Aperture diameter</b>	3.4 mm (0.13 in)

## ■ Preparing Cartridges

The following pages describe how to prepare a cartridge for use in the LSM.

### Handling a Cartridge

Improper handling of cartridges can result in a loss of data or damage to a machine component.

To handle a cartridge correctly:

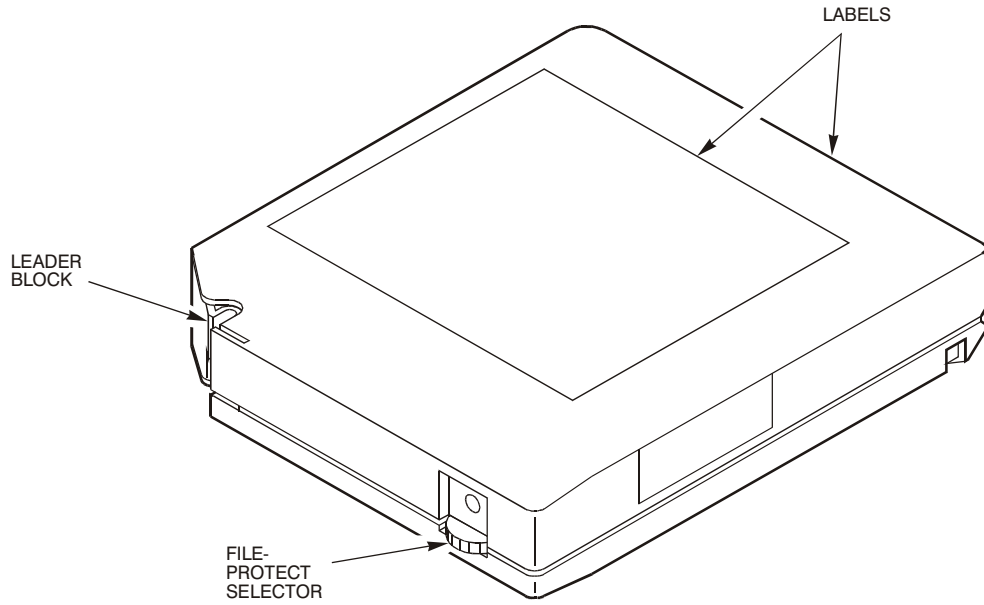
- Make sure that the leader block is latched every time you pick up a cartridge.
- Keep cartridges *clean*.
- Inspect a cartridge before each use, and *never* put a damaged cartridge into a drive or LSM. Never release a leader block and pull tape from a cartridge.
- Never release a leader block and pull tape from a cartridge.
- Never open a cartridge.
- Do not handle tape that is outside the cartridge; the tape edge might be damaged.
- Do not expose the tape or cartridge to direct sunlight or moisture.
- Do not expose a recorded cartridge to magnetic fields; this might destroy data on the tape.

### Inspecting a Cartridge

A defective or dirty cartridge can damage a drive. Always inspect a cartridge before inserting it into a drive or entering it into an LSM. Refer to [Figure A-1 on page A-3](#), [Figure A-2 on page A-3](#) or [Figure A-7 on page A-11](#). Look for:

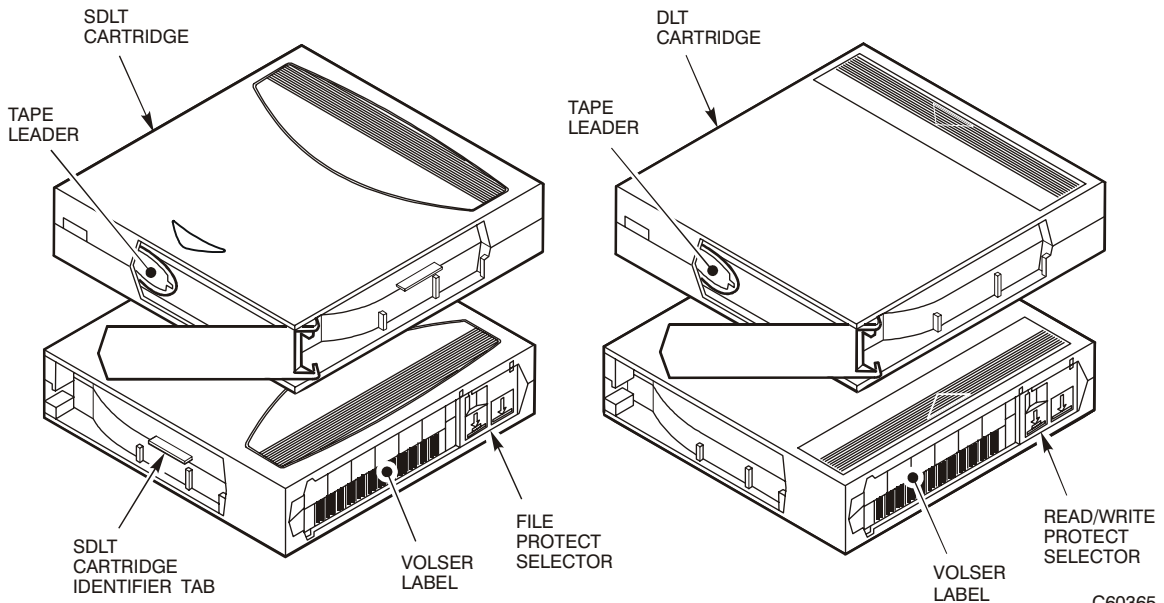
- Cracked or broken cartridge
- Broken leader block
- Broken leader block latch
- Damaged file-protect selector or write-protect switch
- Liquid in the cartridge
- Labels not firmly attached or extending over the cartridge edge
- Any other obvious damage

**Figure A-1. Inspecting a 3480-Compatible Cartridge**



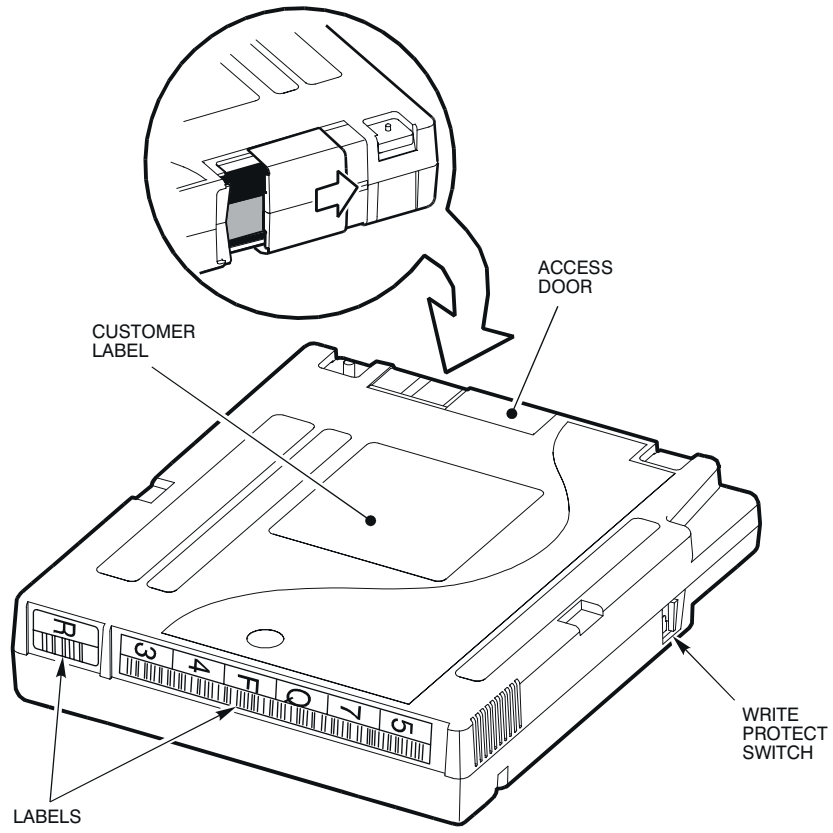
C60086

**Figure A-2. Inspecting DLT and SDLT Cartridges**

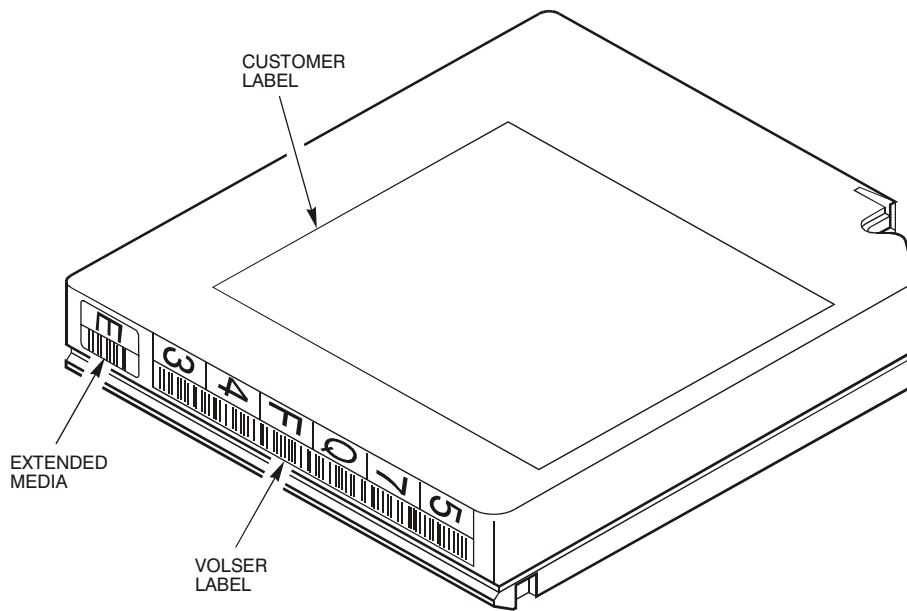


C60365

**Figure A-3. Inspecting a 9840/T9840B Cartridge**



C60490

**Figure A-4. Applying Cartridge Labels on 3480-Compatible Cartridges**

C60087

## Applying Cartridge Labels on 3480-Compatible Cartridges

Cartridge labels reflect the cartridge media and usage. Cleaning cartridges have CLN in the VOLSER, diagnostic cartridges have DG in the VOLSER. Extended media cartridges have a label with an “E” that you will place next to the VOLSER label, as described below.

The kinds of cartridge labels you might need to apply are:

- Customer
- VOLSER
- Extended media (enhanced capacity tape)

Refer to [Figure A-4](#) and place the labels on the recessed areas provided on each cartridge:

1. Make sure that the cartridge has been at room temperature for at least 24 hours.
2. Clean the surface where the labels will be placed using a cleaning solution made for this purpose. Refer to [“Cleaning the Cartridge Exterior” on page A-17](#).
3. Peel the backing from the VOLSER label.

4. Hold the cartridge so that the leader block is above the file protect selector and is facing away from you.
5. Position the label with the VOLSER characters to the left, so you can read them from top to bottom. Press into place.
6. If you are using an extended media (enhanced tape) cartridge, peel the backing from the “E” label and place the label in the recessed area to the left of the VOLSER, as shown in [Figure A-4 on page A-5](#). Press into place.
7. If your cartridge has no customer label, place the label in the area shown in [Figure A-4](#) and press into place.

The labels must be within the indented area of the cartridge so that the edges of the label are parallel to the edges of the cartridge. The label should be close to the inside edge of the indented area but must *never* overlap the edge of this area.

**Note:** Make sure that the labels are not placed elsewhere on the cartridge surface.

Make sure that the edges of the labels do not curl up; curling causes the cartridge to stick in the drive loader.

Use labels that do not leave a residue when removed.

Make sure that the label contains a VOLSER.

## Ordering DLT, SDLT and 9840/T9840B/T9940 Cartridges/ Labels

The Media Service Center in Atlanta handles orders for cartridge tapes and labels. To obtain additional information about cartridge tapes and labels call the Media Service Center at 1-800-905-8502, or fax 1-877-888-0609; from 8 a.m. to 8 p.m. United States Eastern Standard Time, Monday Through Friday. You may also find information on cartridges and labels at the following Web site:

<http://storagetek.com/products/tape/services/>

Order cartridge tapes and labels by including the order on the sales entry form, if used; the media portion of the order will be routed to the appropriate department.

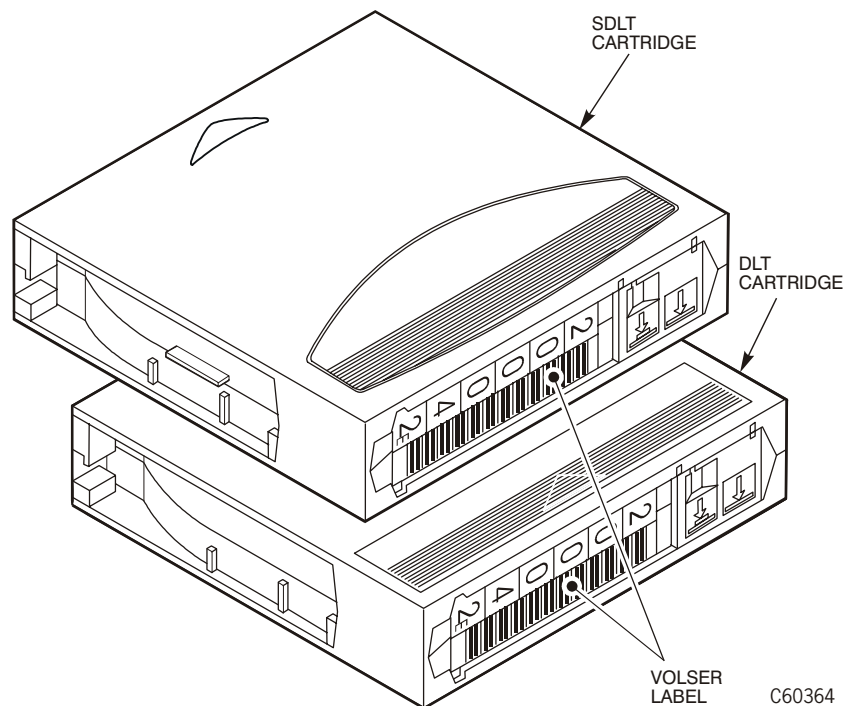
### **Orders for domestic customers, value-added distributors (VADs), and value-added resellers (VARs):**

5390 Triangle Parkway, Suite 300  
Norcross, GA 30092  
Voice: 1-800-905-8502  
Media Service Center  
Fax: 1-877-888-0609

**Orders from distributors, original equipment manufacturers (OEMs), and Canada, Japan, Australia, South Asia, or Mexico subsidiaries:**

Orders Management  
 Fax: 303-673-2640 for distributors or subsidiaries  
 Fax: 303-673-7654 for OEM  
 One StorageTek Drive  
 Louisville, CO 80028-4350  
 Voice: 303-673-5513:

**Figure A-5. Applying Cartridge Labels on DLT and SDLT Cartridges**



## Cartridge Labeling

Cartridge labels include a volume label (serial number) and a code that indicates the type of cartridge. If your cartridges were not ordered with labels already applied, you must apply them yourself. You must correctly label all cartridges for library use.

Data cartridges have a small letter that indicates the cartridge type next to the last number in the volume label; cleaning and diagnostic cartridges have a two- or three-letter prefix in the volume label, as shown in [Table A-1 on page A-8](#).

## Applying Cartridge Labels on DLT/SDLT Cartridges

Cartridge labels reflect the cartridge media and usage. The CompacTape VOLSER letter located next to the last number in the VOLSER reflects the media. Cleaning cartridges have CLN in the VOLSER, diagnostic cartridges have DG in the VOLSER.

**Table A-1. DLT/SDLT Volume Labels**

Label	Type of Cartridge
D	DLTtape IV data cartridges
C	DLTtape III data cartridges
E	DLTtape IIIXT data cartridges
S	Super DLTtape I data cartridge
CLN	Cleaning cartridges*
DG	Diagnostic characters (apply a DG label to a blank data cartridge to be used for diagnostic tests)

\*For information regarding the SDLT cleaning cartridge, please refer to [page 2-7](#)

Refer to [Figure A-5](#) and insert the label into the recessed area provided on each cartridge:

1. Make sure that the cartridge has been at room temperature for at least 24 hours.
2. Clean the surface where the labels will be placed using a cleaning solution made for this purpose. Refer to “[Cleaning the Cartridge Exterior](#)” on [page A-17](#).
3. Locate the type of label that you require (see [Table A-1 on page A-8](#) ).
4. Hold the cartridge so that the write protect switch is toward you.
5. Refer to [Figure A-5 on page A-7](#) and slide the label under the slots in the recessed area. If you want, peel the backing from the label and then slide it under the slots, pressing it into place.

**Note:** Make sure that the labels are not placed elsewhere on the cartridge surface.

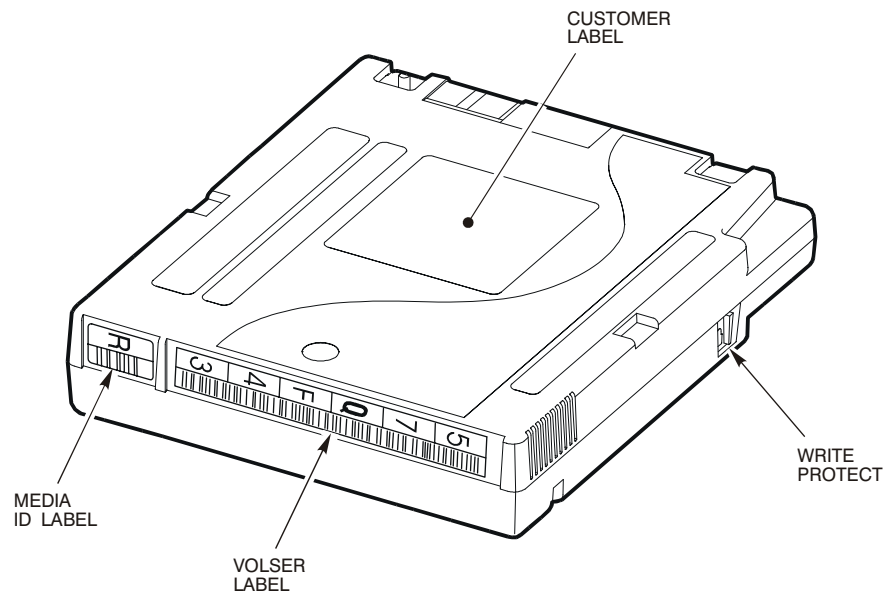
Make sure that the edges of the labels do not curl up; curling causes the cartridge to stick in the drive loader and the robot will misread the VOLSER.

Use labels that do not leave a residue when removed.

Make sure that the label contains a VOLSER and media letter.

## Applying Cartridge Labels to 9840/T9840B Cartridges

**Figure A-6. Applying Cartridge Labels to 9840/T9840B Cartridges**



C60491

Cartridge labels reflect the cartridge media and usage. Cleaning cartridges have DG CLN in the VOLSER and a “U” beneath the VOLSER. Diagnostic cartridges have DG 000 in the VOLSER and an “R” beneath the VOLSER.

Refer to [Figure A-6](#) and insert the label into the recessed area provided on each cartridge.

1. Make sure that the cartridge has been at room temperature for at least 24 hours.
2. Clean the surface where the labels will be placed using a cleaning solution made for this purpose. Refer to [“Cleaning the Cartridge Exterior” on page A-17](#) for additional information.
3. Locate the label that you require and refer to [Figure A-6](#).

Refer to [Figure A-6](#) and slide the label under the slots in the recessed area. If you want, peel the backing from the label and then slide it under the slots, pressing it into place.

**Note:** Make sure that the labels are not placed elsewhere on the cartridge surface.

Make sure that the edges of the labels do not curl up; curling causes the cartridge to stick in the drive loader.

Use labels that do not leave a residue when removed.

Make sure that the label contains a VOLSER.

## Setting 3480-Compatible Cartridge File-Protect Selector

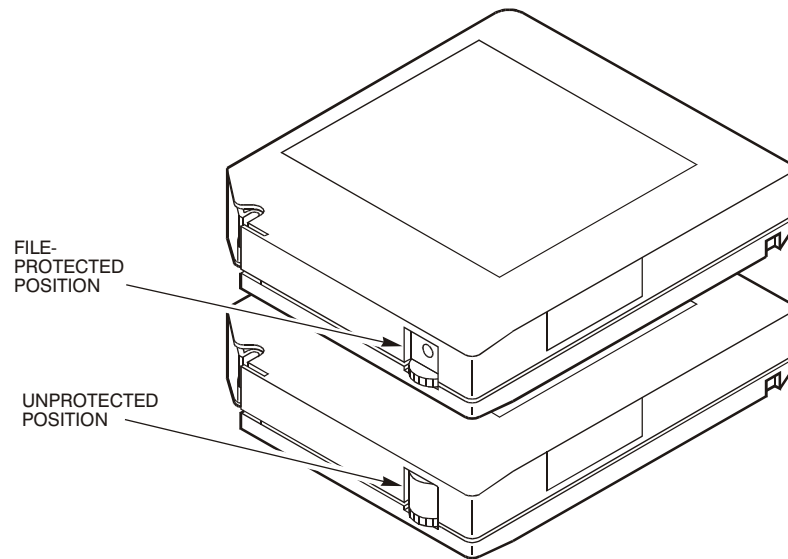
You can set the file-protect selector so that the cartridge is *write-enabled*. Turn the thumbwheel on the side of the cartridge until the white dot or white padlock icon above the wheel disappears. In this position, the drive can write as well as read data. This setting is recommended when entering cartridges into the LSM.

**Note:** Some software has a feature called virtual thumbwheel, allowing read-only access to a cartridge that is not physically write-protected.

You can set the file protect selector so that the cartridge is read-only (nothing can be written on the tape). Turn the thumbwheel on the side of the cartridge until the white dot or white padlock icon in a dark background appears on the wheel ([Figure A-7 on page A-11](#)). In this position, the drive can only read data from the tape and cannot write data.

**Figure A-7. Setting the 3480-Compatible File Protect Selector**

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C60088

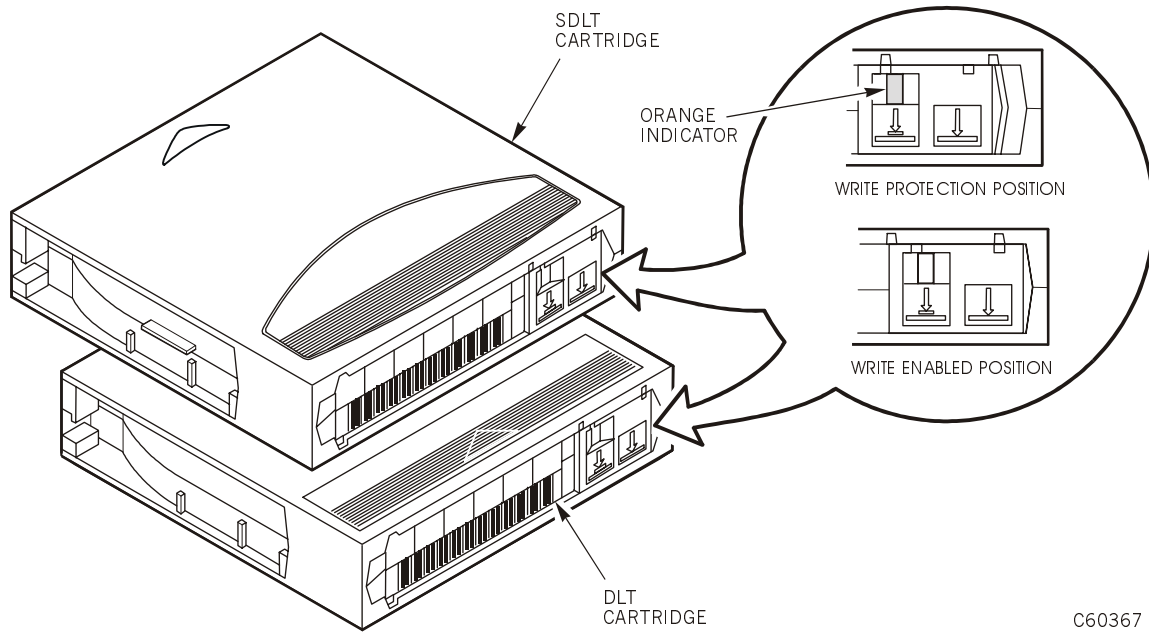
---

## Setting DLT and SDLT Write-protect Switch

You can set the write-protect switch so that the cartridge is *write-enabled*. Slide the switch to the right so that the orange indicator is not visible. In this position, the drive can write as well as read data. This setting is recommended when entering cartridges into the LSM. Refer to [Figure A-8 on page A-12](#).

You can set the write-protect switch so that the cartridge is *read-only* (nothing can be written on the tape). Slide the switch to the left so that the orange indicator is visible. In this position, the drive can only read data from the tape and cannot write data.

**Figure A-8. Setting the DLT and SDLT Write-Protect Switch**



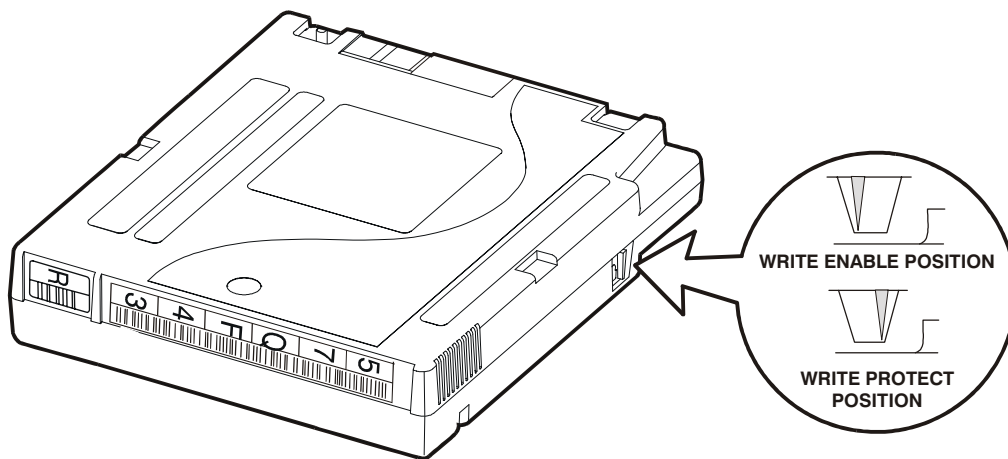
C60367

## Setting the 9840/T9840B Write-Protect Switch

To write-protect a cartridge:

1. Hold the cartridge with the customer label side up and the rear VOLSER label toward you. (Refer to [Figure A-9 on page A-13.](#))
2. Locate the write-protect switch on the right side of the cartridge.
3. Move the write-protect switch to the front of the cartridge (away from you) to the write-protect position.

**Figure A-9. Setting the 9840/T9840B Write-Protect Switch**



C60492

## ■ Maintaining Cartridges

The following pages list cartridge environmental specifications, describe how to store and clean cartridges, use cleaning cartridges, and repair a detached leader block.

### DLT Cartridge Environmental Specifications

The following specifications refer to the operating and storage environments for SDLT cartridges.

**Table A-2. DLT Cartridge Environmental Specifications**

<i>Operating environment</i>	
Temperature	10° to 40°C (50° to 104°)
<b>Relative humidity</b>	20% to 80% noncondensing
Wet bulb temperature	25°C (77°F) maximum
<b>CAUTION:</b>	
<b>Cartridge temperatures above 49°C (120°F) might damage the tapes. If during storage or transportation a cartridge has been exposed to conditions outside the above values, before using the cartridge, keep the cartridge within those operating environment specifications for at least as long as the time period that the cartridge was not within the specifications, up to two hours. Make sure that the cartridge has no moisture on it.</b>	
<b>CAUTION:</b>	
<b>When storing DLT cartridges, the stray magnetic field at any point on the tape shall not exceed 4000A/m. Make sure that the cartridge has no moisture on it</b>	
<i>Cartridge storage environment</i>	
Temperature	16° to 32°C (61° to 90°F)
<b>Relative humidity</b>	20% to 80% noncondensing
Wet bulb temperature	26°C (79°F) maximum
<i>Cartridge storage environment for cartridges intended for archiving data for one year or more</i>	
Temperature	18° to 26°C (64° to 79°F)
<b>Relative humidity</b>	20% to 60%

## SDLT Cartridge Environmental Specifications

The following specifications refer to the operating and storage environments for SDLT cartridges.

**Table A-3. SDLT Cartridge Environmental Specifications**

<i>Operating environment</i>	
Temperature	10°–40°C (50°–104°F)
<b>Relative humidity</b>	20%–80%
Wet bulb temperature	26°C (79°F) maximum
<b>CAUTION:</b>	
<b>Tape temperatures above 49°C (120°F) might damage the tapes. If during storage or transportation a cartridge has been exposed to conditions outside the above values, before using the cartridge, keep the cartridge within those operating environment specifications for at least as long as the time period that the cartridge was not within the specifications, up to two hours. Make sure that the cartridge has no moisture on it.</b>	
<b>CAUTION:</b>	
<b>When storing SDLT cartridges, the stray magnetic field at any point on the tape shall not exceed 4000A/m. Make sure that the cartridge has no moisture on it.</b>	
<i>Cartridge storage environment</i>	
Temperature	16°–32°C (60°–90°F)
<b>Relative humidity</b>	20%–80%
Wet bulb temperature	26°C (79°F) maximum
<i>Cartridge storage environment for cartridges intended for archiving data for one year or more</i>	
Temperature	18°–28°C (64°–82°F)
<b>Relative humidity</b>	40%–60%

## 3480 Cartridge Environmental Specifications

The following specifications refer to the operating and storage environments for 3480-compatible cartridges.

**Table A-4. 3480 Cartridge Environmental Specifications**

<i>Operating environment</i>	
Temperature	15.6° to 32.2°C (60° to 90°F)
<b>Relative humidity</b>	20% to 80%
Wet bulb temperature	25.6°C (78°F) maximum
<i>Cartridge storage environment</i>	
Temperature	4.4° to 32.2°C (40° to 90°F)
<b>Relative humidity</b>	5% to 89%
Wet bulb temperature	26.7°C (80°F) maximum

## 9840/T9840B Cartridge Environmental Specifications

The following specifications refer to the operating and storage environments for 9840/T9840B cartridges.

**Table A-5. 9840/T9840B Cartridge Environmental Specifications**

<i>Operating environment *</i>	
Temperature	15.6° to 32.2°C (60° to 90°F)
<b>Relative humidity</b>	20% to 80%
Wet bulb temperature	26°C (78.8°F) maximum
<i>Cartridge storage environment (non-archive)</i>	
Temperature	5° to 32.2°C (41° to 90°F)
<b>Relative humidity</b>	5% to 80%
Wet bulb temperature	26°C (78.8°F) maximum
<i>Cartridge storage environment (archive)</i>	
Temperature	5° to 25.5°C (41° to 78°F)
<b>Relative humidity</b>	40% to 60%
Wet bulb temperature	26°C (78.8°F) maximum
<i>Cartridge shipping environment (unrecorded) *</i>	
Temperature	-23° to 49°C (-10° to 120°F)
<b>Relative humidity</b>	5% to 80%
Wet bulb temperature	26°C (78.8°F) maximum

**Table A-5. 9840/T9840B Cartridge Environmental Specifications***Cartridge shipping environment  
(recorded) \**

Temperature	4° to 40°C (40° to 104°F)
<b>Relative humidity</b>	5% to 80%
Wet bulb temperature	26°C (78.8°F) maximum

**Notes:**

\* The conditioning time before use is 24 hours.

\*\* The shipping environment must not exceed the limit of the storage environment, archive or non-archive, for longer than 10 days.

## Storing Cartridges

When you store a cartridge:

- Do not take a cartridge out of its protective wrapping until you are ready to use it.
- Store cartridges in a clean environment that duplicates the conditions of the room in which they are used.
- Before using a cartridge, make sure that it has been in its operating environment for at least 24 hours.

## Cleaning the Cartridge Exterior

**CAUTION:**

**Do not use certain solvents to remove labels or to clean cartridges because they can damage the cartridges. Do not use acetone, trichloroethane, toluene, xylene, benzene, ketone, methylethyl ketone, methylene chloride, ethyldichloride, esters, ethyl acetate, or similar chemicals.**

Wipe all dust, dirt, and moisture from the cartridge with a lint-free cloth.

Use StorageTek Tape Cleaner Wipes, PN 4046289-01 to clean the cartridges. These wipes are saturated with isopropyl alcohol. Do not let any solution touch the tape or get inside the cartridge.

## **Repairing a Detached Leader Block**

When a tape is damaged, use a backup tape. If a leader block is detached, there is no obvious damage to the cartridge or tape, and you have no backup tape, you may repair the leader block using a repair kit provided by your supplier. You can use the tape one time to copy the data onto another tape.

# Glossary

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This glossary defines new or special terms and abbreviations used in this guide.

Some of the definitions are taken from the *IBM Dictionary of Computing*. The letters in the parentheses that follow some definitions indicate the source of the definition:

**(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.

## Numeric

**4890** A device that reads from or writes to a magnetic tape.

**9840** A device that reads from or writes to a magnetic tape.

## A

**audit** An operation to catalog or record the physical location of a cartridge tape in an automated library.

**automated mode** A relationship between a library and all attached hosts. A library operating in automatic mode handles cartridges without operator intervention. This is the normal operating mode of a library that has been placed online to all host central processing units.

## C

**CAP** *See* cartridge access port.

**cartridge** A storage device that consists of magnetic tape on supply and take-up reels, in a protective housing. (IBM)

**cartridge access port (CAP)** In a StorageTek library, a mail slot through which an operator feeds tape cartridges into and retrieves tape cartridges from a library.

**cartridge tape** Magnetic tape enclosed in a plastic housing.

**catalog** The inventory of all cartridge storage locations in an LSM; this inventory is by LSM number, panel, row, column.

**cell** A slot in the library in which a cartridge is stored.

**Central Support Remote Center (CSRC)**  
*See* Hardware Support Services (HSS).

**CIM** *See* customer-initiated maintenance.

**customer-initiated maintenance (CIM)**  
A StorageTek maintenance agreement for maintenance support when the customer initiates a maintenance request.

**configuration** The manner in which the hardware and software of an information processing system is organized and interconnected. (T)

**CSE** Customer service engineer. *See* solutions delivery engineer.

**CSRC** Central Support Remote Center. *See* Hardware Support Services.

**customer services engineer (CSE)**  
Customer service engineer. *See* solutions delivery engineer.

## D

**Digital Linear Tape (DLT)** A trademarked name for Quantum cartridge tapes and tape drives.

**DLT** *See* Digital Linear Tape.

**F**

**fault symptom code (FSC)** A four-character hexadecimal code generated in response to a subsystem error to help isolate failures within the device.

**Federal Information Processing Standard (FIPS)**

An industry channel for parallel channels. A channel protocol that uses Bus and Tag (copper wire) channel cables to interface between the host operating system and a device or control unit.

**field replaceable unit (FRU)** An assembly that is replaced in its entirety when any one of its components fails. (IBM)

**FIPS** *See* Federal Information Processing Standard.

**FRU** *See* field replaceable unit.

**FSC** *See* fault symptom code.

**H**

**Hardware Support Services (HSS)** The remote diagnostic center at StorageTek. Hardware support services engineers (HSSEs) can access and test StorageTek equipment and software, through telecommunications lines, from certain remote customer installations. Previously referred to as the remote diagnostic center (RDC) or the Customer Support Remote Center (CSRC).

**I**

**ID** Identifier or identification.

**initial program load (IPL)** A process that activates a machine reset and loads system programs to prepare a computer system for operation. Processors having diagnostic programs activate these programs at initial program load execution. Devices running firmware usually reload the functional

firmware from a diskette or disk drive at initial program load execution.

**in-transit cartridges** Cartridges left in the robot hand. The Data Management Software must recover these cartridges to a known location to clear out the software in-transit record.

**IPL** *See* initial program load.

**L**

**library storage module (LSM)** A housing that contains cartridge tapes and a robot that moves the tapes between storage cells and the attached transports. *Synonymous with* tape library.

**LSM** *See* library storage module.

**M**

**manual mode** A relationship between a library and all attached hosts. Libraries operating in manual mode are placed offline to and do not communicate with all host central processing units and require human assistance to perform cartridge operations.

**P**

**PRC card** The central processing unit card for the library storage module.

**PRS card** The card that interfaces the library storage module control side with a SCSI host; it attaches to the PRC card. The PRS card supports single-ended and differential operation, up to eight addresses.

**PRW card** The card that interfaces the library storage module control side with a SCSI host; it attaches to the PRC card. The PRW card supports differential operation, up to 16 addresses.

**PRZ card** The card that contains the power-supply components.

**R**

**Remote Center** *See* Hardware Support Services.

**robot** An electromechanical device that moves cartridge tapes between storage cells and tape drives.

**S**

**SCSI** *See* small computer systems interface.

**SDE** *See* solutions delivery engineer.

**servo** A device that uses closed-loop feedback to govern physical positioning.

**Small Computer Systems Interface (SCSI)** A local interface operating over a wide range of transfer rates using a common command set for all devices attached to the interface. It connects host computer systems to a variety of peripheral devices.

**solutions delivery engineer (SDE)** The StorageTek field representative who installs StorageTek products and maintains product performance in a customer's account.

**V**

**VOLSER** *See* volume serial label.

**volume** A data carrier that mounts and dismounts as a unit; for example, a reel of magnetic tape or a disk pack.

**volume serial label (VOLSER)** An alphanumeric label that the host software uses to identify a volume. It attaches to the spine of a cartridge and is both human- and machine-readable.

**Z**

**Z carriage** The assembly that moves the hand vertically up and down the Z-column to the storage cells, the drives, and the cartridge access port in a library storage module or library.

**Z column assembly** The assembly that enables the hand mechanism in the library storage module or library to move vertically. The up position is considered positive.

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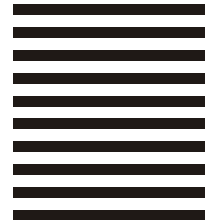


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