



EXB-10h 8mm Library

Maintenance

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Revision History

Revision	Date
000	December 1995 (initial release)

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311192-000

Product Warranty Caution

The EXABYTE® EXB-10h 8mm Library is warranted to be free from defects in materials, parts, and workmanship and will conform to the current product specification upon delivery. For the specific details of your warranty, refer to the warranty card included in the library kit. If no warranty card was included, refer to your sales contract (or contact the company from which the library was purchased).

The warranty for the library shall not apply when:

- The library is repaired by anyone other than the Manufacturer's personnel or approved agent; or is repaired by anyone (including an approved agent) in a manner that is contrary to the maintenance or installation instructions supplied by the Manufacturer.
- The library is damaged or fails because of physical abuse, mishandling, accident, negligence, alteration, misapplication, faulty installation, or failure to follow operating instructions.
- The Manufacturer's serial number tag is removed.
- The library is damaged because of improper packaging on return.

CAUTION

Returning the library in unauthorized packaging may damage the unit and void the warranty.

If problems with the library occur, contact your maintenance organization; do not void the product warranty by allowing untrained or unauthorized personnel to attempt repairs.

Patents

The EXB-10h 8mm Library and related Exabyte products are covered by one or more of the following patents (other patents pending):

4,835,628	4,972,277	5,059,772	5,142,422	5,243,473
4,843,495	4,984,106	5,065,261	5,173,817	5,287,233
4,845,577	5,025,333	5,068,757	5,177,417	5,287,478
4,845,713	5,034,833	5,103,986	5,191,491	5,309,300
4,845,714	5,050,018	5,111,463	5,237,467	

FCC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, 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 and used 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 own expense.

Shielded cables are required for this device to comply with FCC. **Use shielded cables when connecting this device to others.**

CSA Notice

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de Classe A prescrites dans le reglement sur le brouillage radioelectrique edicte par le Ministere des Communications du Canada.

English translation:

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

Contents

About This Manual	xii
1 Overview	1-1
Locator maps	1-1
2 Maintenance Preparation	2-1
Maintenance tools	2-2
Electrostatic protection requirements	2-2
Moving the CHM	2-3
Replacing a data cartridge magazine	2-5
Shutting down the library	2-7
Removing the library cover	2-9
3 Replacing Front Panel Components	3-1
Maintenance preparation	3-1
Replacing the front panel assembly and operator panel	3-2
Replacing the door	3-10
4 Replacing CHM Components	4-1
Maintenance preparation	4-1
Removing the CHM shield	4-2
Replacing the CHM	4-4
Replacing the ECHM card	4-11
Replacing the horizontal drive belt	4-16
Replacing the horizontal drive motor	4-18
Replacing the vertical drive belt	4-24
Replacing the vertical drive motor	4-27
5 Replacing Tape Drive and Cartridge Components	5-1
Maintenance preparation	5-1
Replacing the tape drive	5-2
Replacing the magazine mounting plate	5-11

6	Replacing Internal Electronic Components	6-1
	Maintenance preparation	6-1
	Replacing the SCSI card	6-2
	Replacing the motor control card	6-7
	Replacing the power supply	6-12
7	Replacing Rear Panel Components	7-1
	Maintenance preparation	7-1
	Replacing the fan	7-2
	Replacing the power entry module	7-4
	Replacing the fuse	7-7
8	Replacing Cables	8-1
	Maintenance preparation	8-1
	Replacing the operator panel cable	8-2
	Replacing the interface cable	8-5
	Replacing the SCSI cable	8-7
	Replacing the drive sensor cable	8-10
	Replacing the CHS Monitor port	8-13
	Replacing the CTS Monitor port	8-16
	Replacing the SCSI ID select cable	8-20
	Replacing the DC harness cable	8-23
	Replacing the vertical flex cable	8-27
A	LCD Menu Quick Reference	A-1
	Main Menu overview	A-1
	Viewing system sensors	A-4
	Using the library diagnostic commands	A-6
	Resuming normal operation	A-9
B	Calibration Procedures	B-1
	Calibrating the cartridge sensor position	B-1
	Calibrating the eject position	B-4

C	Diagnostics	C-1
	Required hardware and software	C-2
	Prepare the library	C-3
	Set up and start diagnostics	C-4
	Diagnostic Main Menu overview	C-5
	Upgrading to new firmware	C-8
	Obtaining a diagnostic dump	C-11
	Displaying system statistics	C-12
	Setting the system time and baud rate	C-16
	Displaying the command history	C-19
	Displaying the retry/recovery history	C-20
	Displaying the pick history	C-21
	Displaying the cartridge inventory	C-22
	Performing calibration and set-up functions	C-24
	Using diagnostic functions	C-26
	Using the SCSI functions submenu	C-29
D	Hardware Errors by Error Code	D-1
	Index	I-1

Figures

Overview

Figure 1-1	Front panel components and cover assembly	1-2
Figure 1-2	Front internal components	1-3
Figure 1-3	CHM components	1-4
Figure 1-4	Rear internal components	1-5
Figure 1-5	Rear panel components	1-6

Maintenance Preparation

Figure 2-1	Moving the CHM manually	2-4
Figure 2-2	Removing a data cartridge magazine	2-5
Figure 2-3	Installing a data cartridge magazine	2-6
Figure 2-4	Ejecting a data cartridge from the tape drive	2-7
Figure 2-5	Shutting down the library	2-8
Figure 2-6	Removing the upper rear panel	2-10
Figure 2-7	Disconnecting the operator panel cable	2-11
Figure 2-8	Removing screws from the lower back panel	2-12
Figure 2-9	Lifting the cover off the chassis	2-13
Figure 2-10	Replacing the cover assembly	2-14
Figure 2-11	Connecting the operator panel cable	2-15

Replacing Front Panel Components

Figure 3-1	Removing the cover from the front panel	3-2
Figure 3-2	Removing the cover from the front panel	3-3
Figure 3-3	Disconnecting the optical switch assembly	3-4
Figure 3-4	Removing the operator panel	3-5
Figure 3-5	Replacing the LCD window	3-6
Figure 3-6	Installing the operator panel	3-7
Figure 3-7	Installing the optical switch assembly	3-8
Figure 3-8	Attaching the cover to the front panel	3-9
Figure 3-9	Removing the front door	3-11
Figure 3-10	Inserting the latch into the door	3-12

Replacing CHM Components

Figure 4-1	Removing the CHM shield (parts of CHM removed for clarity)	4-3
Figure 4-2	Disconnecting the grounding cable from the CHM shield (early models only)	4-4
Figure 4-3	Disconnecting CHM cables from the motor control card	4-5
Figure 4-4	Disconnecting the vertical flex cable	4-6
Figure 4-5	Removing the CHM from the library	4-7
Figure 4-6	Connecting the vertical flex cable	4-8
Figure 4-7	Disconnecting CHM cables from the motor control card	4-9
Figure 4-9	Removing the ECHM card	4-12
Figure 4-10	Connecting the vertical flex cable	4-13
Figure 4-11	Removing the horizontal drive belt	4-16
Figure 4-12	Disconnecting the vertical flex cable	4-19
Figure 4-13	Replacing the horizontal motor	4-20
Figure 4-14	Connecting the vertical flex cable	4-22
Figure 4-15	Replacing the vertical drive belt	4-24
Figure 4-16	Replacing the vertical drive motor	4-28
Figure 4-17	Installing the vertical drive belt	4-29

Replacing Tape Drive and Cartridge Components

Figure 5-1	Disconnecting the drive sensor cable	5-2
Figure 5-2	Removing the tape drive screws	5-3
Figure 5-3	Installing the tape drive faceplate	5-4
Figure 5-4	Removing the terminators and SCSI ID jumpers	5-5
Figure 5-5	Attaching the mounting bracket to the tape drive	5-5
Figure 5-6	Sliding the tape drive into the chassis	5-6
Figure 5-7	Cable connections to the tape drive	5-7
Figure 5-8	Connecting the drive sensor cable	5-8
Figure 5-9	Connecting the tape drive SCSI cable to the SCSI card	5-8
Figure 5-10	Attaching the tape drive to the chassis	5-9
Figure 5-11	Removing the magazine mounting plate (library shown without cover for clarity)	5-12

Replacing Internal Electronic Components

Figure 6-1	Disconnecting the SCSI card	6-3
Figure 6-2	Replacing the SCSI card	6-4
Figure 6-3	Disconnecting the SCSI card	6-5
Figure 6-4	Cable connections to the motor control card	6-8
Figure 6-5	Replacing the motor control card	6-9
Figure 6-6	Cable connections to the motor control card	6-10
Figure 6-7	Disconnecting the DC harness cable from the power supply	6-13
Figure 6-8	Replacing the power supply	6-14
Figure 6-9	Connecting the DC harness cable to the power supply	6-15

Replacing Rear Panel Components

Figure 7-1	Replacing the fan	7-2
Figure 7-2	Removing the power entry module	7-4
Figure 7-3	Removing the power entry module	7-5
Figure 7-4	Replacing the fuse	7-7

Replacing Cables

Figure 8-1	Operator panel cable and connections	8-2
Figure 8-2	Positioning the operator panel cable	8-3
Figure 8-3	Interface cable and connections	8-5
Figure 8-4	Removing the SCSI cable	8-7
Figure 8-5	Installing the SCSI cable	8-8
Figure 8-6	Disconnecting the drive sensor cable	8-10
Figure 8-7	Drive sensor cable connection to the motor control card	8-11
Figure 8-8	CHS Monitor port connections	8-13
Figure 8-9	CHS Monitor port connections	8-14
Figure 8-10	Removing the CTS Monitor port	8-17
Figure 8-11	Installing the CTS Monitor port	8-18
Figure 8-12	SCSI ID select cable and connections	8-21
Figure 8-13	Detaching the DC harness cable from the SCSI ID select cable	8-23
Figure 8-14	DC harness cable and connections	8-24
Figure 8-15	Attaching the DC harness cable to the SCSI ID select cable	8-25
Figure 8-16	Disconnecting the vertical flex cable from the motor control card	8-27
Figure 8-17	Replacing the vertical flex cable	8-28
Figure 8-18	Connecting the vertical flex cable to the motor control card	8-29

Calibration Procedures

Figure B-1	Placing the calibration block in the gripper	B-3
-------------------	--	-----

Diagnostics

Figure C-1	CHS Monitor port (rear view of the EXB-10h)	C-3
Figure C-2	Diagnostic Main Menu	C-5
Figure C-3	ROM Console Menu	C-9
Figure C-4	System Statistics screen	C-12
Figure C-5	Time/Baud Rate Menu	C-16
Figure C-6	History of Events screen	C-19
Figure C-7	Retry History of Events screen	C-20
Figure C-8	Pick History screen	C-21
Figure C-9	Cartridge Inventory screen	C-23
Figure C-10	Calibration/Set-up Functions screen	C-24
Figure C-11	Diagnostic Functions Menu	C-27
Figure C-12	SCSI Functions Submenu	C-29
Figure C-13	Element Reserved Status	C-31
Figure C-14	SCSI Mode Parameters screen	C-32
Figure C-15	LCD Main Screen Mode Select Parameters	C-34
Figure C-16	SCSI Sense Data screen	C-35

About This Manual

This manual provides detailed instructions for performing maintenance and repair on the EXABYTE® EXB-10h 8mm Library.

This manual contains the following information:

- **Chapter 1** provides an overview of general information about the library and illustrations of major library components.
- **Chapter 2** describes electrostatic protection requirements, lists required tools for removing and replacing library parts, and describes how to access the internal components.
- **Chapters 3 through 8** describe how to remove and replace all replaceable parts in the library.
- **Appendixes A through D** provide a quick reference to the LCD operator panel, calibration procedures, instructions for using the built-in Diagnostics firmware to test library operations and troubleshoot problems, and descriptions of library error codes.

Intended audience

This manual is provided for Exabyte customers and third party maintainers who have signed self-maintenance contracts and who need to maintain and diagnose problems with the EXB-10h.

How to use this manual

Before performing maintenance on the EXB-10h, read the maintenance preparation instructions in Chapter 2. These instructions describe the tools you need for maintenance, guidelines for providing ESD protection for the library, and procedures for accessing the internal components.

Troubleshoot the problem using the error codes and diagnostics instructions in Appendixes C and D. This information should help you determine whether you need to replace any parts on the library. If you need to order one or more parts, refer to the *EXB-10h 8mm Library Illustrated Parts Catalog*, 311191.

When you have the necessary parts, refer to the chapter that describes how to remove and replace the affected part. If necessary, refer to the locator maps in Chapter 1 for help finding the right chapter.

Each hardware maintenance section includes:

- Tools you will need for each procedure
- Steps you must take before removing the part
- Instructions for removing the part
- Instructions for replacing the part
- Steps you must take after replacing the part

Problems and questions

If you encounter any problems or have any questions about the information in this manual, contact your vendor or contact Exabyte at:

Technical Support
Exabyte Corporation
1685 38th Street
Boulder, CO 80301
U.S.A

Phone: (800) 445-7735 or
(303) 417-7792

Fax: (303) 417-7190

BBS: (303) 417-7100

email: support@exabyte.com

WWW: <http://www.exabyte.com>

For a list of Technical Support phone numbers outside the United States, contact Exabyte on the World Wide Web at <http://www.exabyte.com>.

Conventions used in this manual

In this manual, the following terms are used frequently:

- *Tape drive*: Any Exabyte 8mm half-high tape drive. Also referred to as a *cartridge tape subsystem* (CTS).
- *CHM*: Cartridge handling mechanism. The robotic assembly in the EXB-10h that moves horizontally and vertically to retrieve and place data cartridges.
- *Library*: The EXB-10h in its entirety.

Special information in this manual is highlighted in the following ways:

Note: Text marked “Note” provides hints or additional information about the topic or procedure being discussed.

► **Important** Text marked “Important” will help you successfully complete a procedure or avoid additional steps in a procedure.

CAUTION

Boxed text under the heading “CAUTION” provides information you must know to avoid damaging the equipment or losing data recorded on tape.

WARNING !

Boxed text under the heading “WARNING” provides information you must know to avoid personal injury.

Related publications

Publications in this section are available from Exabyte.

EXB-10h 8mm Library

For information about the EXB-10h, refer to the following publications:

- *Exabyte Bar Code Label Specification for 8mm Cartridges*, 308607
- *EXB-10h 8mm Library Installation and Operation*, 310376
- *EXB-10h 8mm Library Product Specification*, 310377
- *EXB-10h 8mm Library Illustrated Parts Catalog*, 311191
- *EXB-10e and EXB-10h 8mm Libraries SCSI Reference*, 510852

Standards

For information about the standards used for the EXB-10h, refer to the following publications:

- *ANSI Small Computer System Interface (SCSI)*, X3.131-1989
- *ANSI Small Computer System Interface-2 (SCSI-2)*, X3T9/89-042
- *ANSI Helical-Scan Digital Computer Tape Cartridge*, X3B5/89-136, Rev. 6

Notes

1 Overview

The EXABYTE® EXB-10h 8mm Library contains a robotic handler, referred to as a *cartridge handling mechanism (CHM)*, one half-high 8mm tape drive, and storage locations for up to ten 8mm data cartridges.

The library includes an operator panel consisting of a four-line liquid crystal display (LCD) and keypad that allows you to interactively control library operations. Using the LCD and keypad, you can set options, check operating statistics, and diagnose errors.

The major components of the library are described on the following pages.

1.1 Locator maps

This section provides general descriptions and locator maps for library components, as well as information about where to look for detailed information on each component.

Front panel and cover assembly

The library, shown in Figure 1-1, has a **cover assembly** to protect the library's internal components. You must remove the cover assembly to replace most library parts. Refer to Chapter 2 for instructions.

Front Panel

The **front panel** includes the operator panel, the door, and the lock. To replace the front panel components, see Chapter 3.

- The **operator panel** includes a four-line liquid crystal display (LCD) and a keypad to allow you to access menus for manually controlling the library and performing diagnostics from the LCD. For information about using the operator panel, refer to *EXB-10h 8mm Library Installation and Operation*.
- The **door** on the front panel includes a shatterproof window for viewing the interior. When you open the door, interlock switches cause the CHM (the robot) to stop in its current position.
- The **lock** helps provide data security.

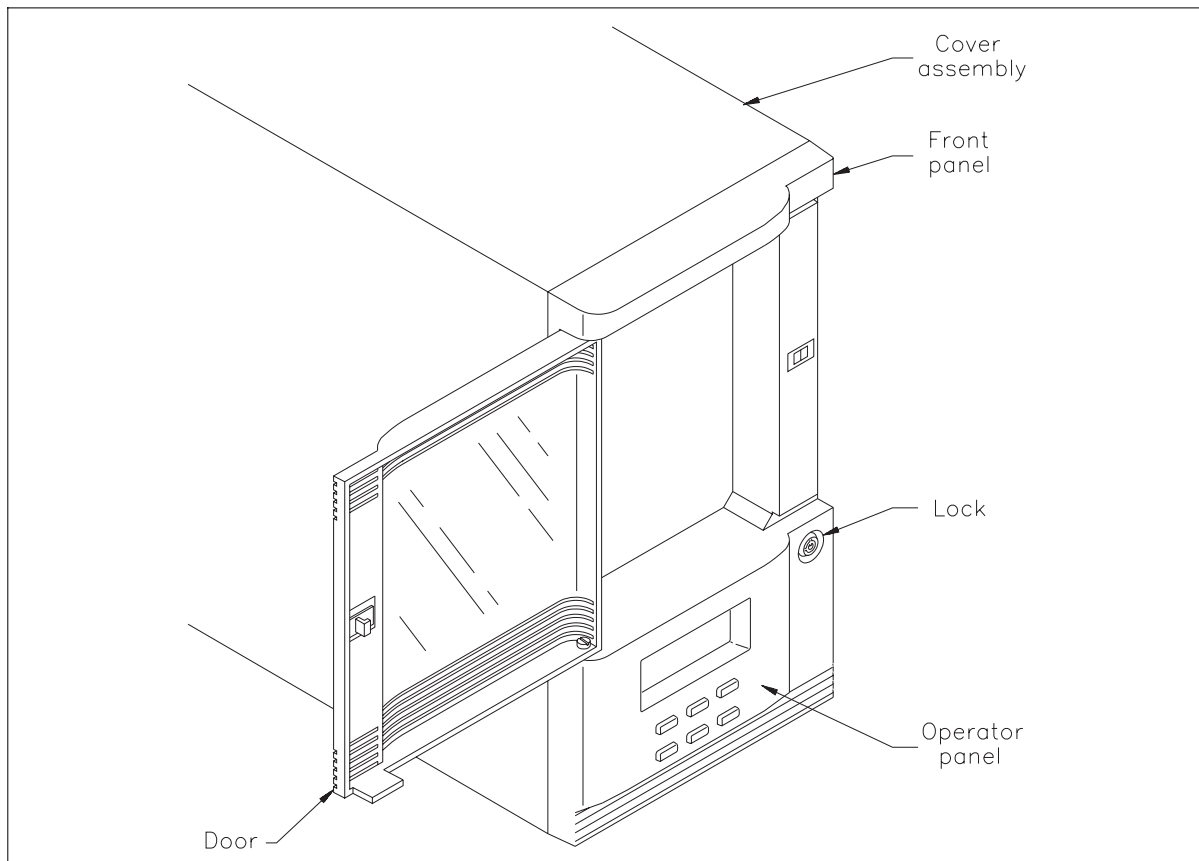


Figure 1-1 Front panel components and cover assembly

Internal components

The library's major internal components include the following:

- Data cartridge magazine
- Exabyte half-high tape drive
- Cartridge handling mechanism (CHM)

Data cartridge magazine

The **data cartridge magazine** (magazine) holds the data cartridges. The **magazine mounting plate** attaches the magazine to the chassis.

To replace the data cartridge magazine, see Chapter 2. To replace the magazine mounting plate, see Chapter 5.

Tape drive

The **tape drive** can be any Exabyte half-high 8mm tape drive. A sensor in the tape drive faceplate allows the library to detect whether the tape drive has ejected a data cartridge.

To replace the tape drive and the tape drive faceplate, see Chapter 5.

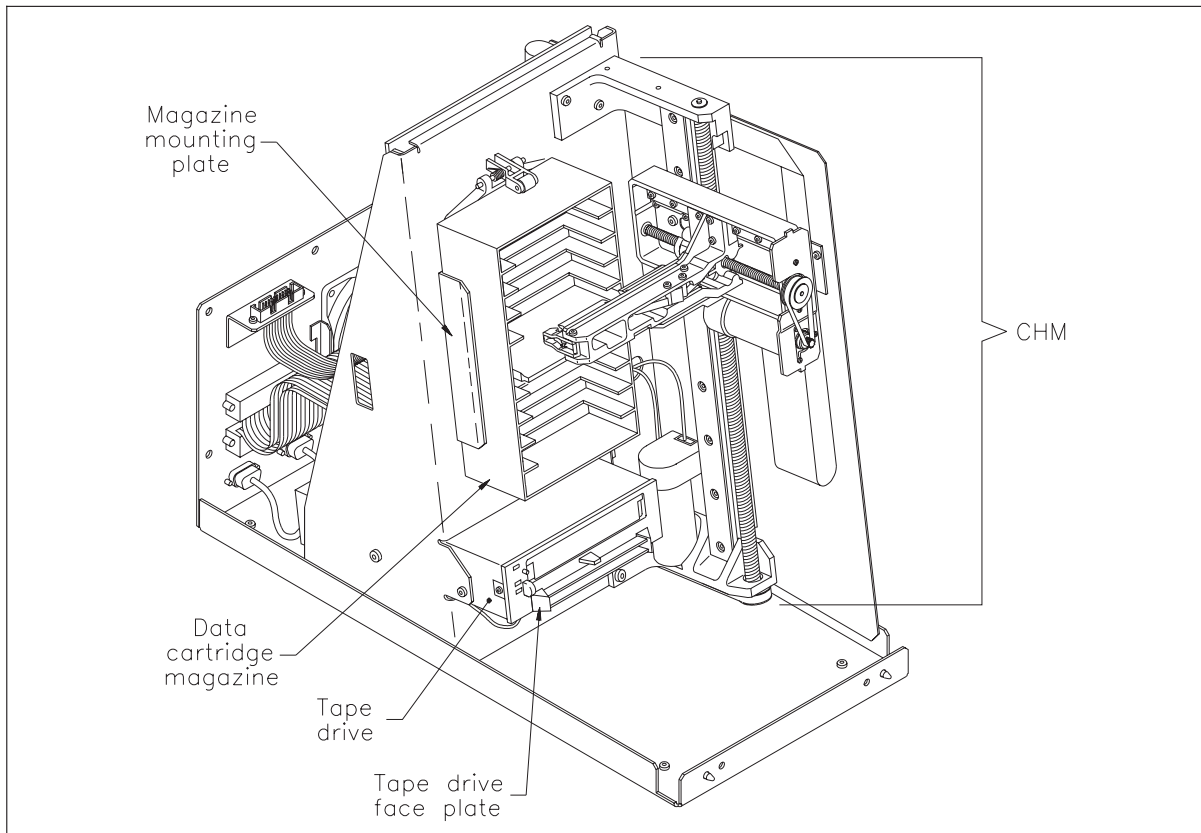


Figure 1-2 Front internal components

Cartridge handling mechanism

The library's **cartridge handling mechanism (CHM)**, shown in Figure 1-3, is the robotic arm that moves data cartridges between the cartridge slots and the tape drive.

The CHM consists of the **CHM base** and its attached **gripper**. The CHM is mounted on the **long axis** assembly, which is attached to the chassis. The vertical motor assembly, including the **vertical drive motor**, the **vertical lead screw**, and **vertical drive belt**, controls the movement of the CHM along the long axis. The CHM moves in and out along the short axis. The horizontal motor assembly, including the **horizontal drive motor**, the **horizontal drive belt**, and the **horizontal lead screw**, controls the horizontal motion of the CHM.

To replace the CHM components, see Chapter 4.

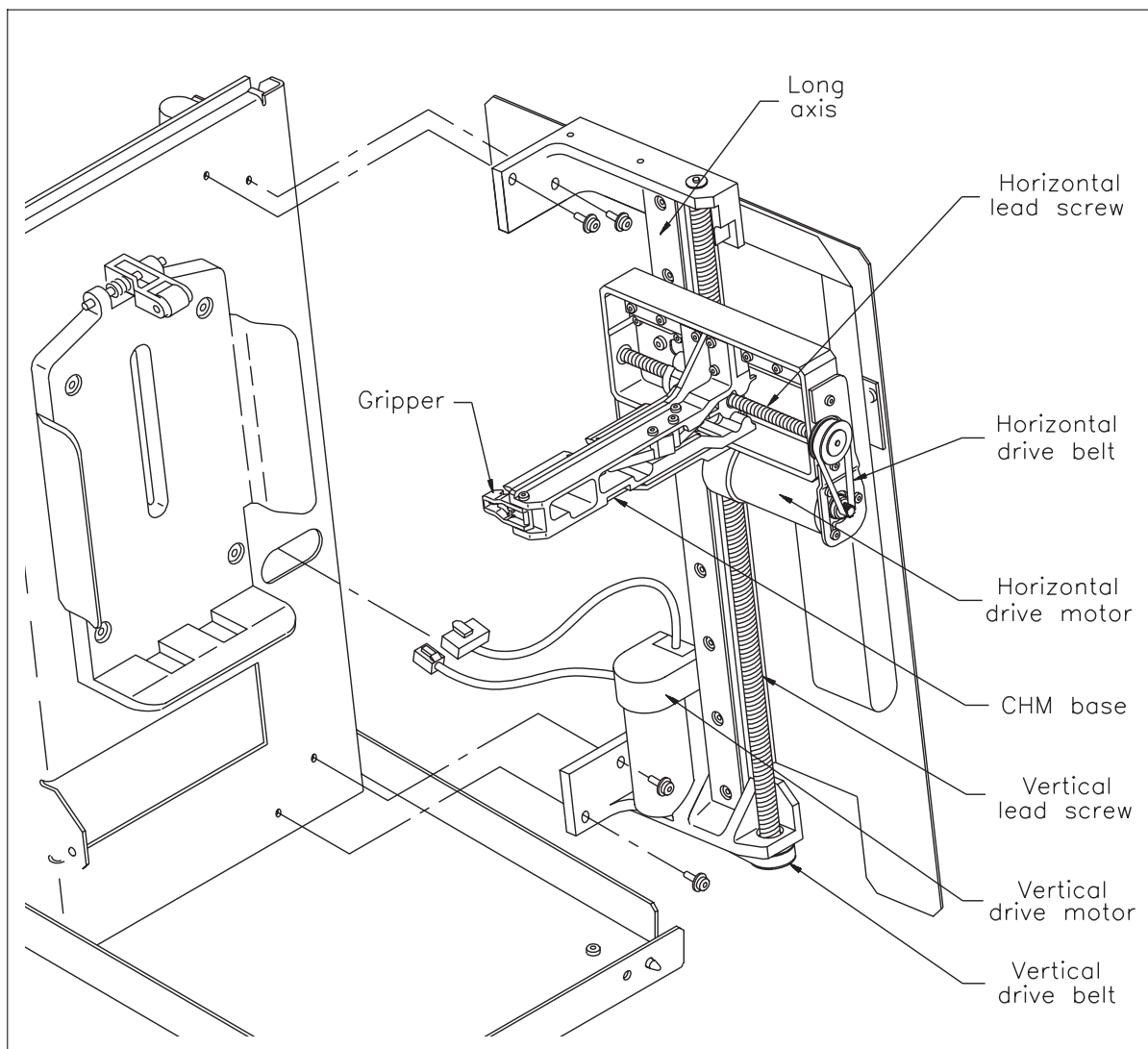


Figure 1-3 CHM components

Rear internal components

The library's rear internal components, shown in Figure 1-4, include the **motor control card**, which provides control for the EXB-10h's robotics, and the **SCSI card**, which provides the SCSI interface for the EXB-10h. The **power supply** provides power for the library and tape drive.

To replace the rear internal components, see Chapter 6.

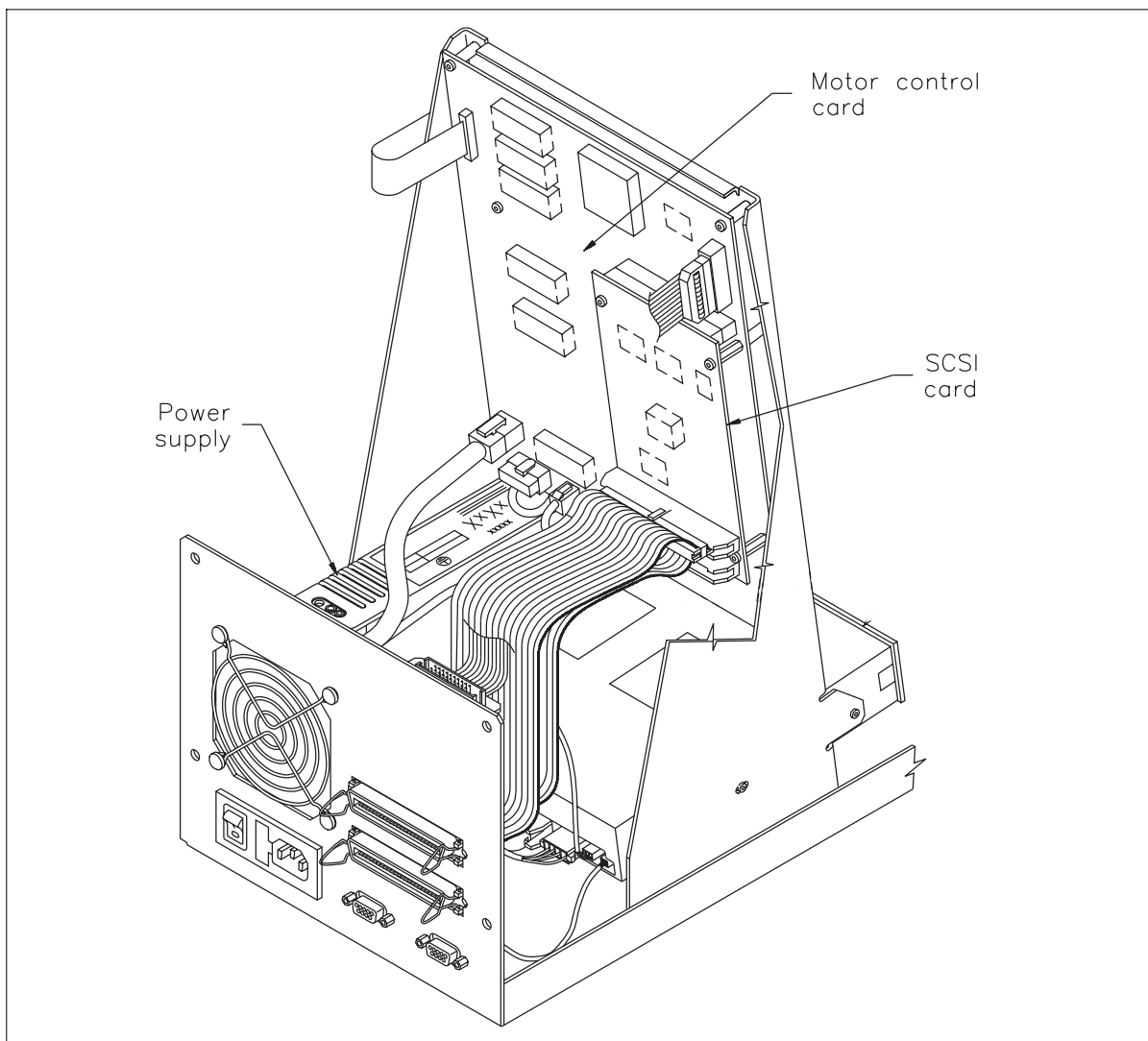


Figure 1-4 Rear internal components

Rear panel components

The rear panel components, shown in Figure 1-5, include the following:

- The two **SCSI connectors** allow multiple SCSI devices to be connected in series for “daisy-chained” configurations. The connectors can accommodate one SCSI cable and an external terminator when the EXB-10h is the terminating device for the SCSI bus.
- The **CTS Monitor diagnostic port** and the **CHS Monitor diagnostic port** allow an authorized service technician to perform diagnostics on the EXB-10h and enclosed tape drive. Many of these diagnostic procedures are also available through the operator panel.
- The power entry module includes the **power switch**, the **AC power connector**, and the **fuse drawer**. The power connector accepts the power cord for the EXB-10h.
- The **fan** reduces the operating temperatures of the CHM and tape drive.

To replace the back panel components, see Chapter 7.

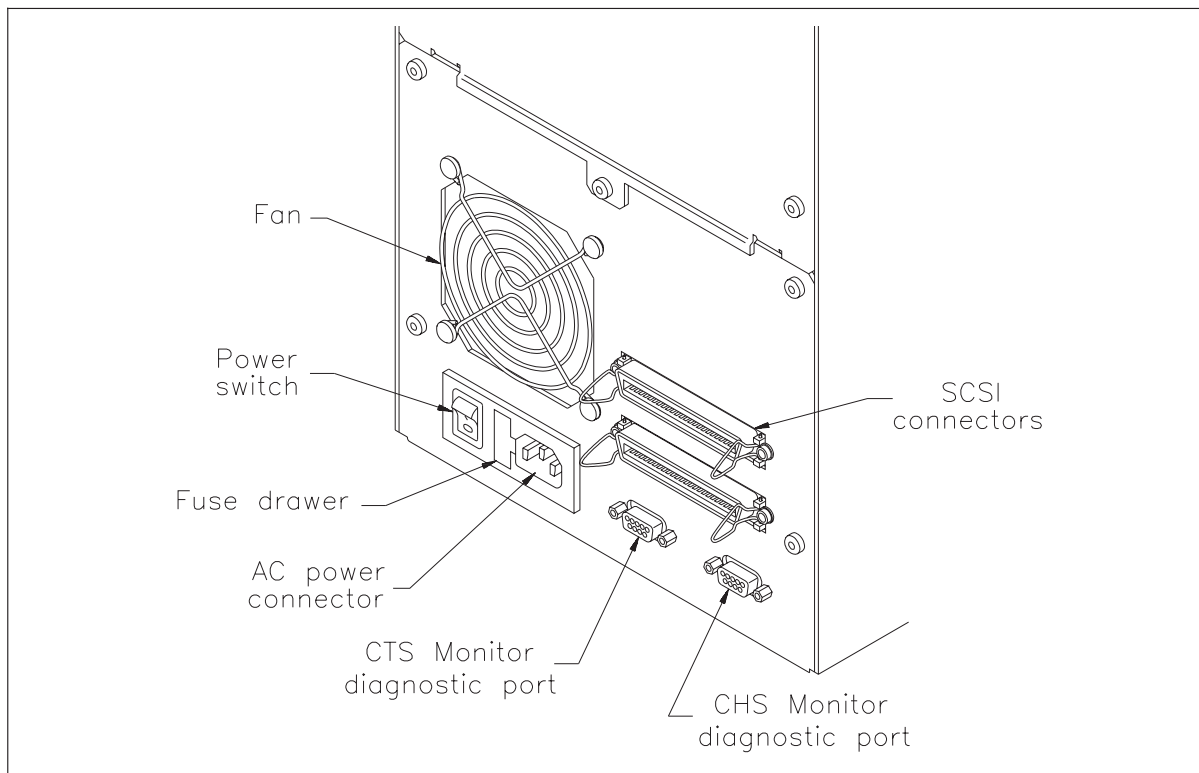


Figure 1-5 Rear panel components

2 Maintenance Preparation

This chapter provides information needed for preparing the EXB-10h for maintenance, including:

- A list of the tools you will need for all of the procedures
- Guidelines for setting up a repair environment free of electrostatic discharge (ESD)
- Instructions for shutting down the library

In addition, this chapter provides instructions for accessing the internal components in preparation for maintenance, including how to:

- Move the CHM to provide access to internal components
- Remove and install the data cartridge magazine
- Remove and install the top and back covers
- Remove and install the magazine mounting plate

WARNING !

Before performing any maintenance procedure, be sure that the library power switch is in the off position and that the power cord is disconnected from the library and the outlet.

2.1 Maintenance tools

The following tools are needed for performing maintenance on the EXB-10h:

- Torque limiting screwdriver with the following TORX® bits (magnetized bits are recommended):
 - T-8
 - T-10
 - T-15
 - T-20
- $\frac{5}{16}$ -inch nut driver
- $\frac{3}{16}$ -inch hex driver
- #0 Phillips screwdriver
- Flat-blade screwdriver
- Flat-nosed wiring pliers
- Wire cutters
- Plastic wire ties

2.2 Electrostatic protection requirements

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

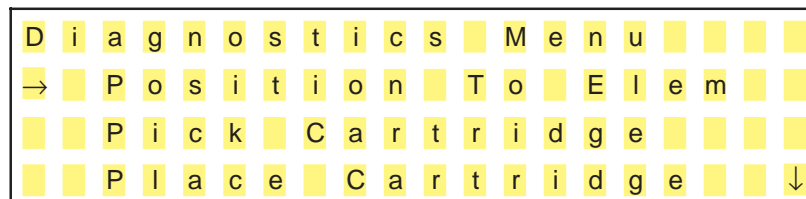
- Place a static protection mat grounded by 1-megohm resistor on the work surface used for library components.
- Wear a static protection wrist band whenever you handle library printed circuit cards that have been removed from their antistatic bags. Connect this wrist band to the static protection mat or to other suitable ESD grounding.
- Keep all printed circuit boards in antistatic bags when not in use.
- Make sure that the host computer used for the diagnostics firmware and for the SCSI bus is properly grounded.
- When the library is in operation, make sure the AC power source is properly grounded.

2.3 Moving the CHM

If you need to move the CHM (to access the tape drive or cartridge magazine, for example), you can use the functions available through the Diagnostics Menu or you can manually move the CHM.

Using the Diagnostics Menu

1. Change the control mode to LCD. Refer to Section A.3 for information about changing control modes.
2. Select Diagnostics Menu from the Main Screen menu. The Diagnostics Menu displays:



3. From the Diagnostics Menu, select either:
 - Park to move the CHM to the bottom
 - Home Y to move the CHM to the top
 - Home Z to move the gripper away from the magazine
 - Position To Element to move the CHM to a position that allows access to the area of interest

Manually moving the CHM

-
- **Important** When moving the CHM, be careful not to touch the spring underneath the gripper and do not pull on the CHM base (see ❶ in the figure).
-

You can move the CHM manually when the library power is off.

- To move the gripper in and out, use your fingers to grasp the gripper (see ❷ in Figure 2-1) and gently pull it out or push it in.
- To move the CHM base up and down, use your fingers to turn the vertical lead screw (see ❸ in the figure).

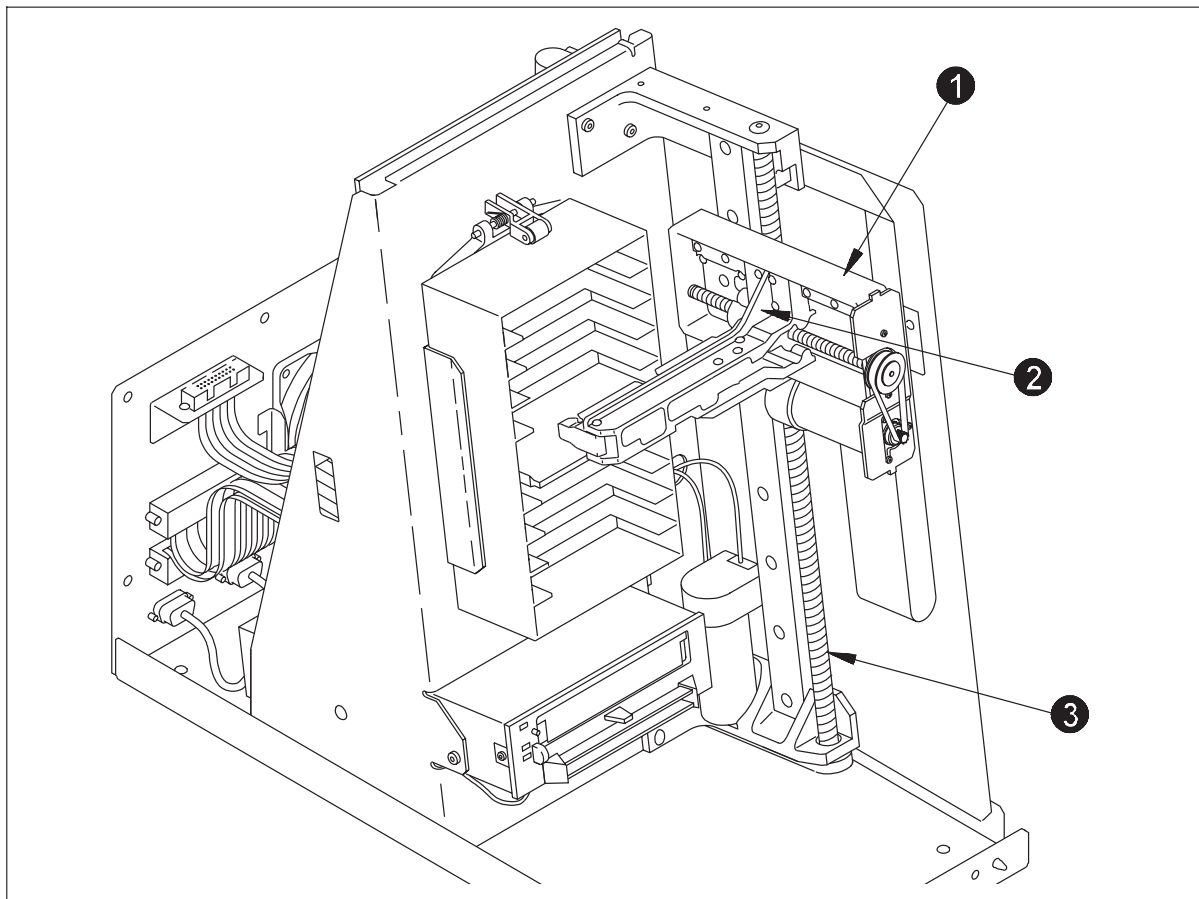


Figure 2-1 Moving the CHM manually

- ❶ CHM base
- ❷ Gripper
- ❸ Vertical lead screw

2.4 Replacing a data cartridge magazine

Before beginning any maintenance procedure, remove the data cartridge magazine from the library to prevent damage to the data cartridges and to improve access to the library components.

Removing a data cartridge magazine

1. If necessary, unlock the door.
2. Press the square on the right edge of the door to release the door latch. This temporarily stops library operations. Open the door.
3. Move the CHM to a position that allows you to access the magazine (see Section 2.3).
4. Remove the data cartridge magazine by pulling it out first from the top, and then the bottom.
5. Place the protective dust cover on the magazine and store it in a safe place until maintenance is complete.

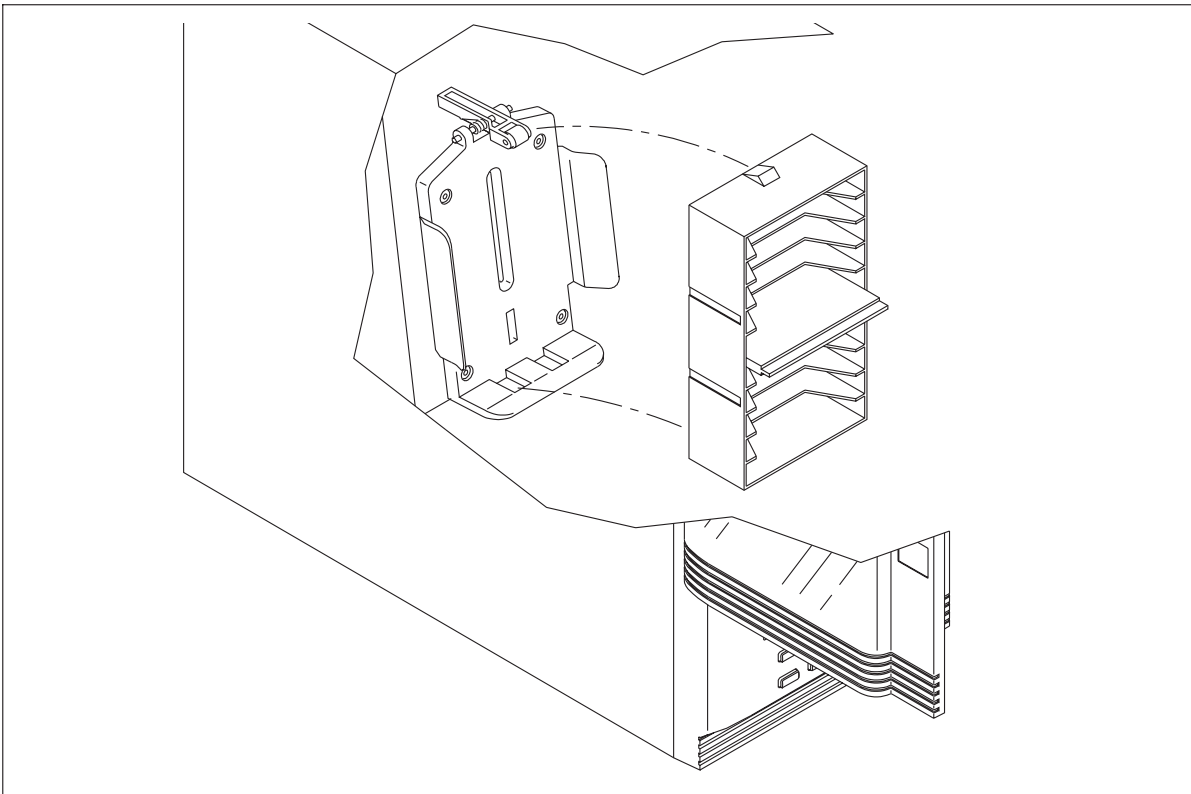


Figure 2-2 Removing a data cartridge magazine

Installing a data cartridge magazine

After completing all the necessary maintenance, remove the dust cover from the magazine and reinstall it in the library.

► **Important** Use only magazines designed for half-high Exabyte 8mm libraries. Do not use data cartridge holders designed for full-high Exabyte libraries.

1. Position the magazine so that the roller (❶ in Figure 2-2) is aligned with the mounting guide (❷ in Figure 2-2) on the magazine.
2. Seat the magazine in the alignment holes in the bottom of the mounting plate, then push on the top of the magazine.

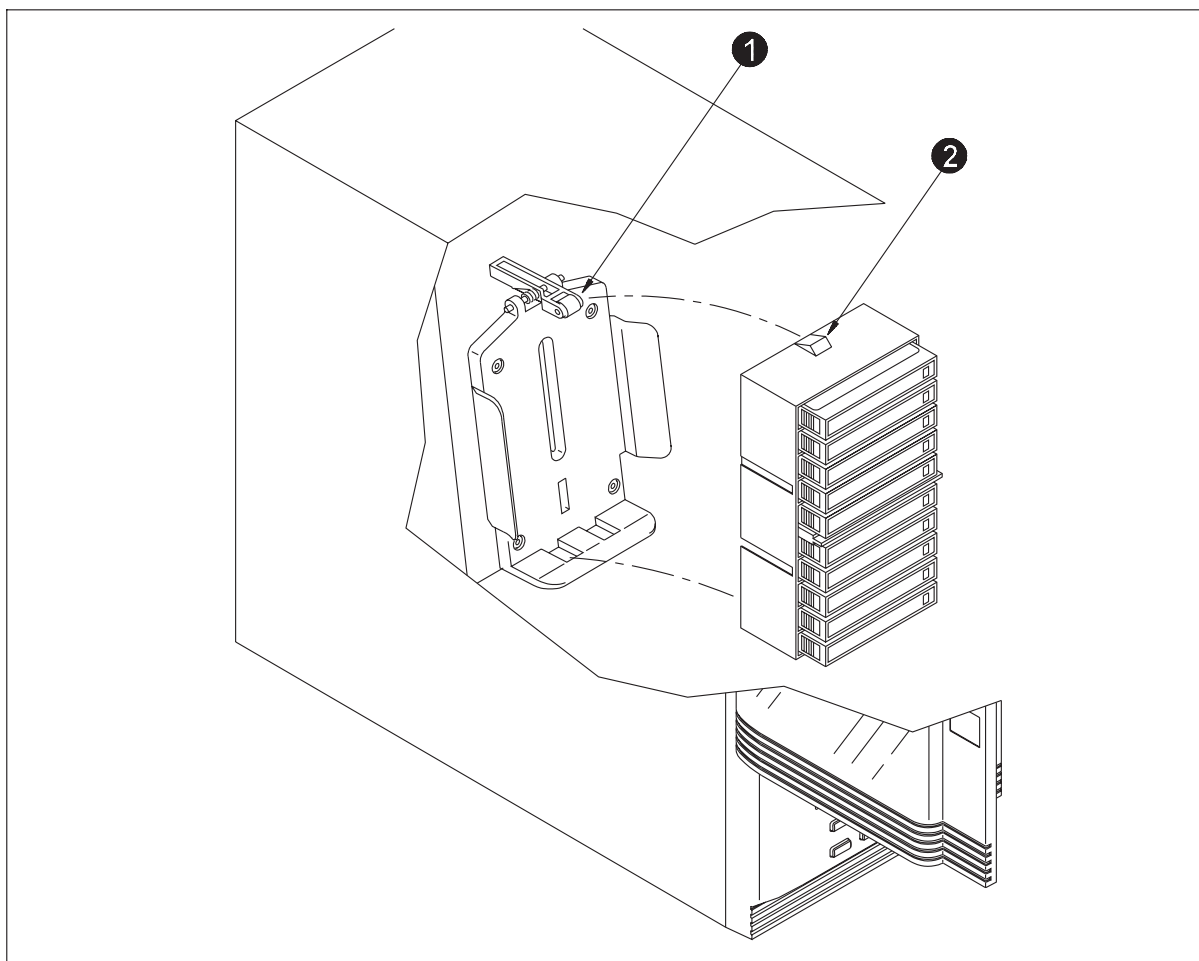


Figure 2-3 Installing a data cartridge magazine

2.5 Shutting down the library

Before beginning any maintenance procedure, you must shut down the library.

► **Important** Before shutting down the library, make sure that it is not currently in use.

If the library is set to use sequential processing, or if the restart option is on, make sure that the tape drive is unloaded and that the CHM gripper is empty before shut-down. Failure to do this may result in an error during power-on.

1. If there is a cartridge in the tape drive or the CHM gripper, remove it, and replace it after you are finished with the maintenance procedure.

To remove cartridges from the tape drive, press the eject button (see Figure 2-4) on the tape drive faceplate while the library is powered on.

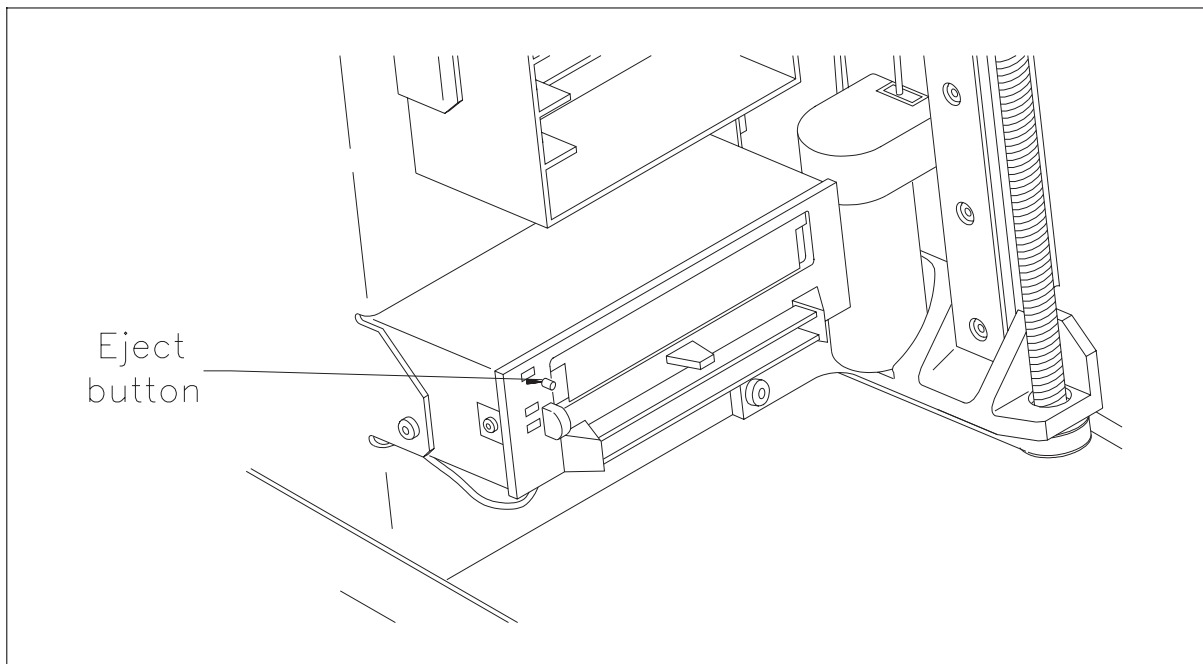


Figure 2-4 Ejecting a data cartridge from the tape drive

WARNING !

Before performing any maintenance procedure, be sure that the library power switch is in the off position and that the power cord is disconnected from the library and the outlet.

2. Turn off the main power switch on the back of the library (see Figure 2-5).
3. Disconnect the power cord from the AC power connector on the back of the library.
4. Disconnect the SCSI cables from the SCSI connectors and set them aside.

Note: You do not need to remove the SCSI terminator (if present).

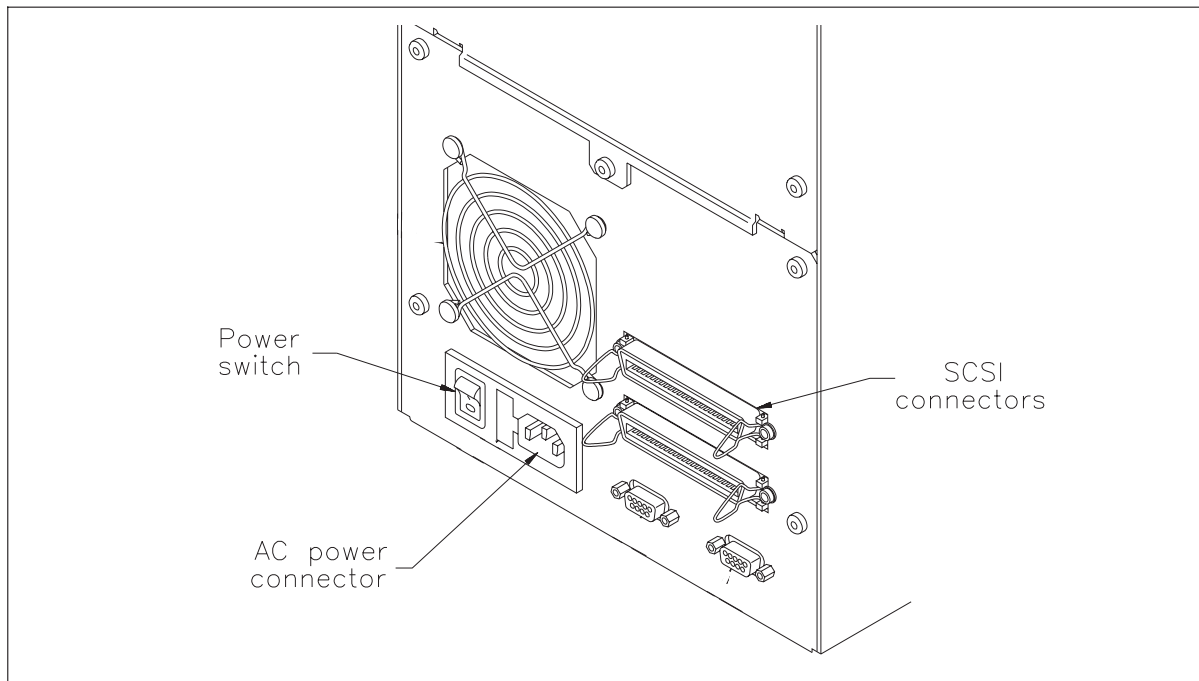


Figure 2-5 Shutting down the library

2.6 Removing the library cover

These instructions describe how to remove the library cover.

Note: You must remove the cover to access and replace almost all library components.

Do this first

- ✓ Follow the static protection precautions and maintenance guidelines in Section 2.2.
- ✓ Obtain these tools:
 - Torque limiting screwdriver
 - T-20 TORX bit
- ✓ Shut down the library (see Section 2.5).

Removing the library cover

1. Using the T-20 bit, remove the seven screws from the upper rear panel. Remove the panel and set it aside.

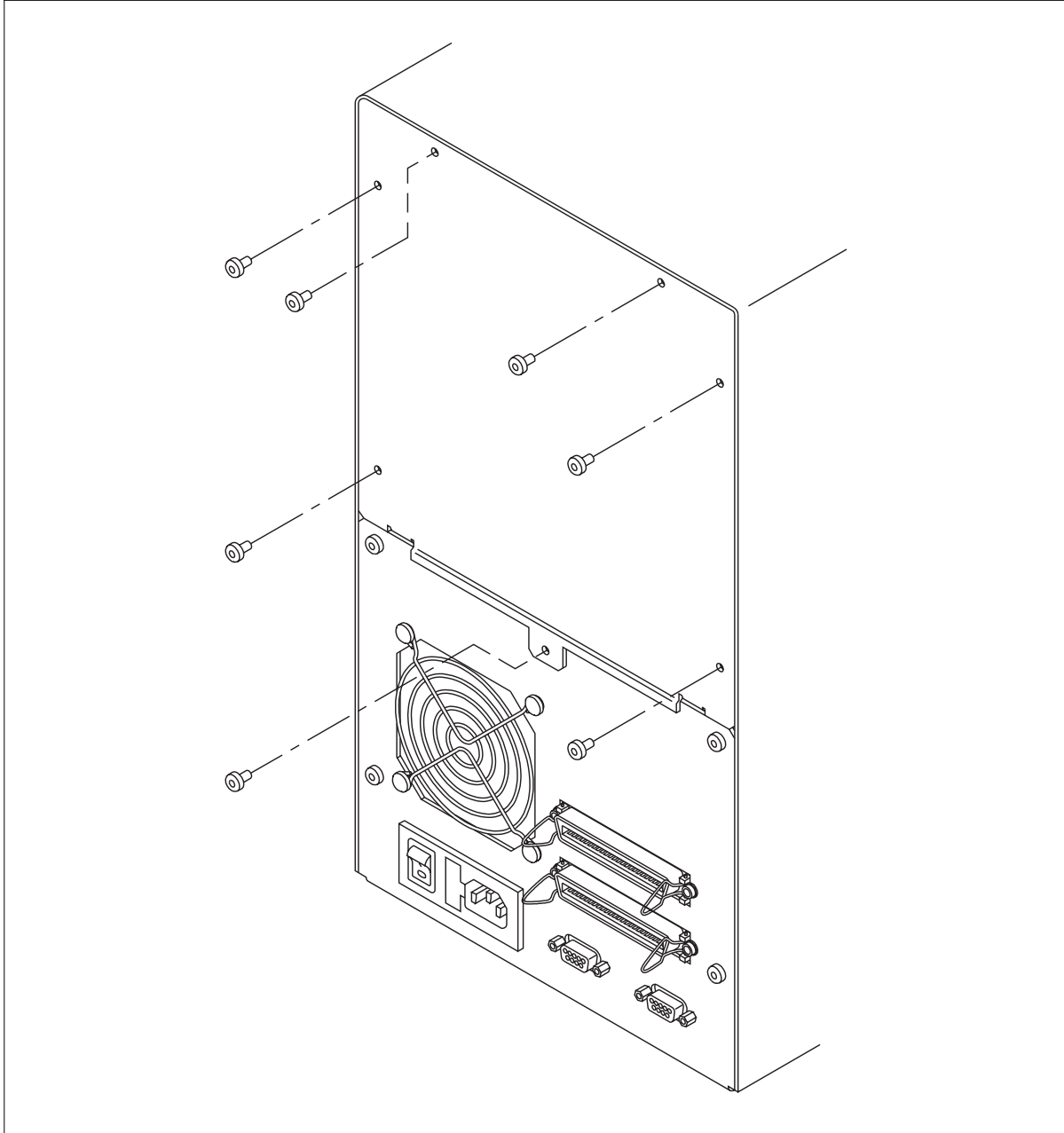


Figure 2-6 Removing the upper rear panel

2. Insert your fingers into the loop on the operator panel cable and pull up to disconnect it from the back of the library.

CAUTION

You must disconnect this cable to avoid damaging it when you remove the cover assembly.

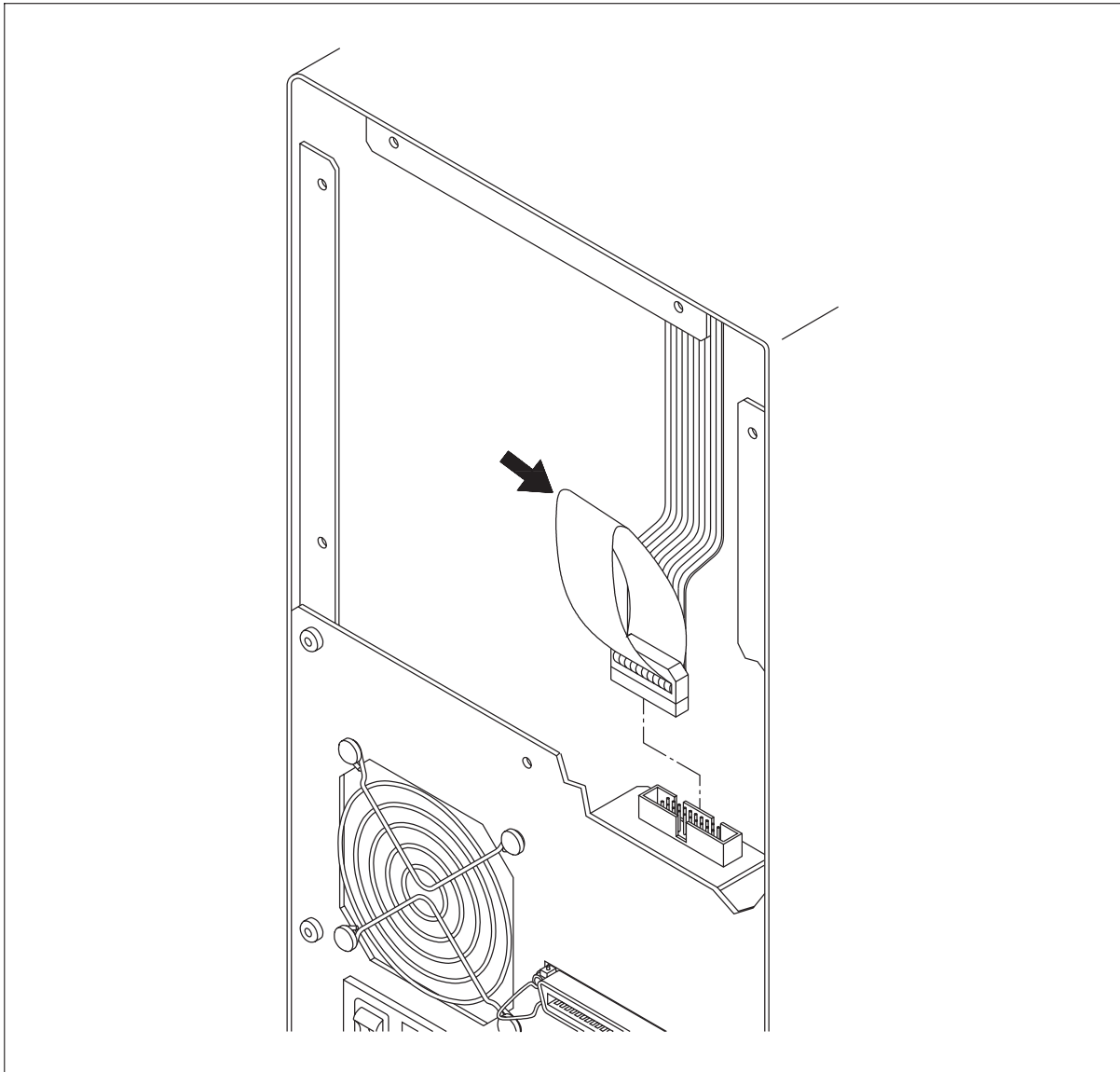


Figure 2-7 Disconnecting the operator panel cable

3. Using the T-20 bit, remove the four screws that hold the cover assembly to the lower back panel.

CAUTION

Removing the cover panel exposes the CHM and printed circuit boards (cards).

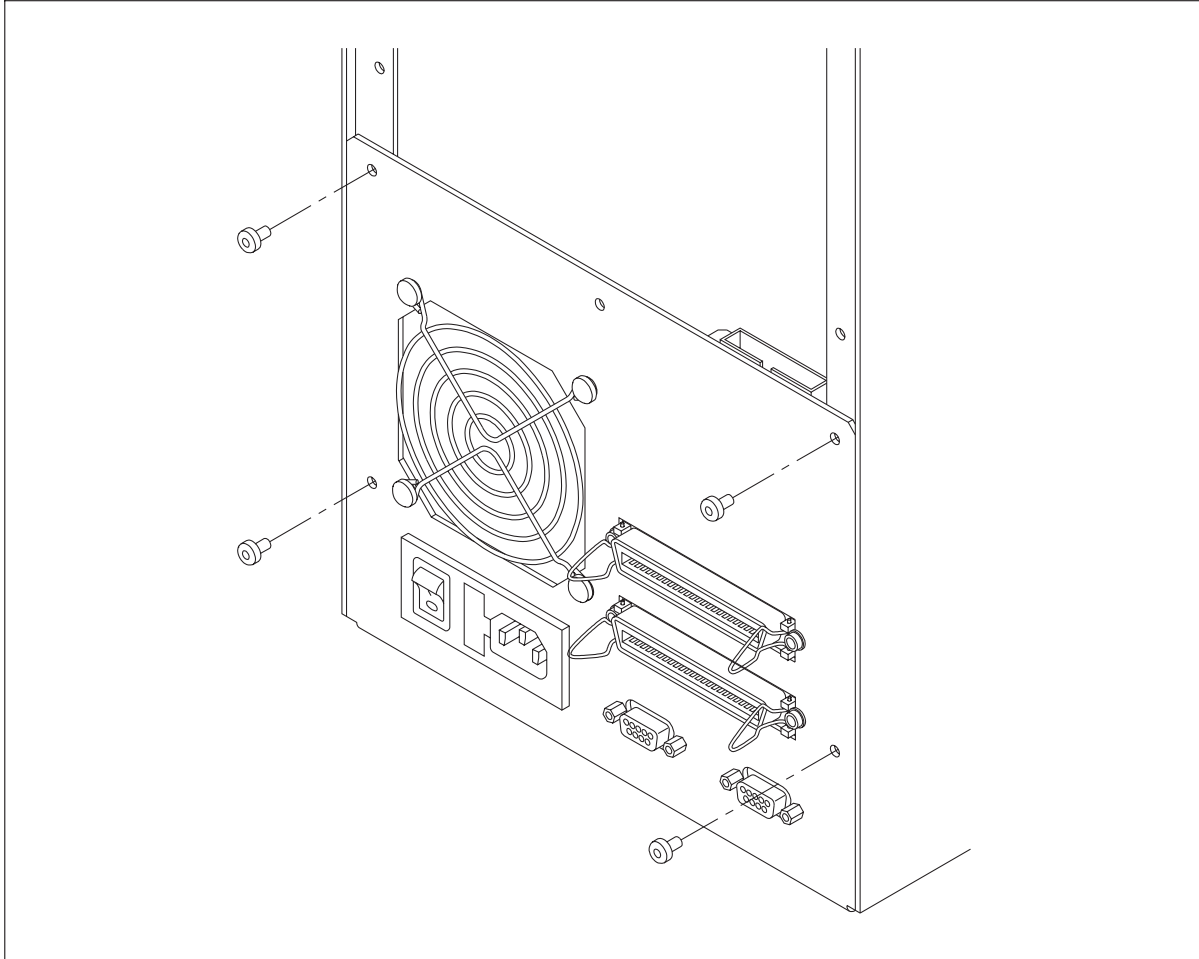


Figure 2-8 Removing screws from the lower back panel

4. Remove the cover as follows:
 - a. Use one hand to hold down the lower rear panel.
 - b. Grasp the top of the cover at the rear and pull up sharply until the cover comes off the chassis.
 - c. Pull the cover forward, away from the rear panel, to disengage the clips and alignment pins.

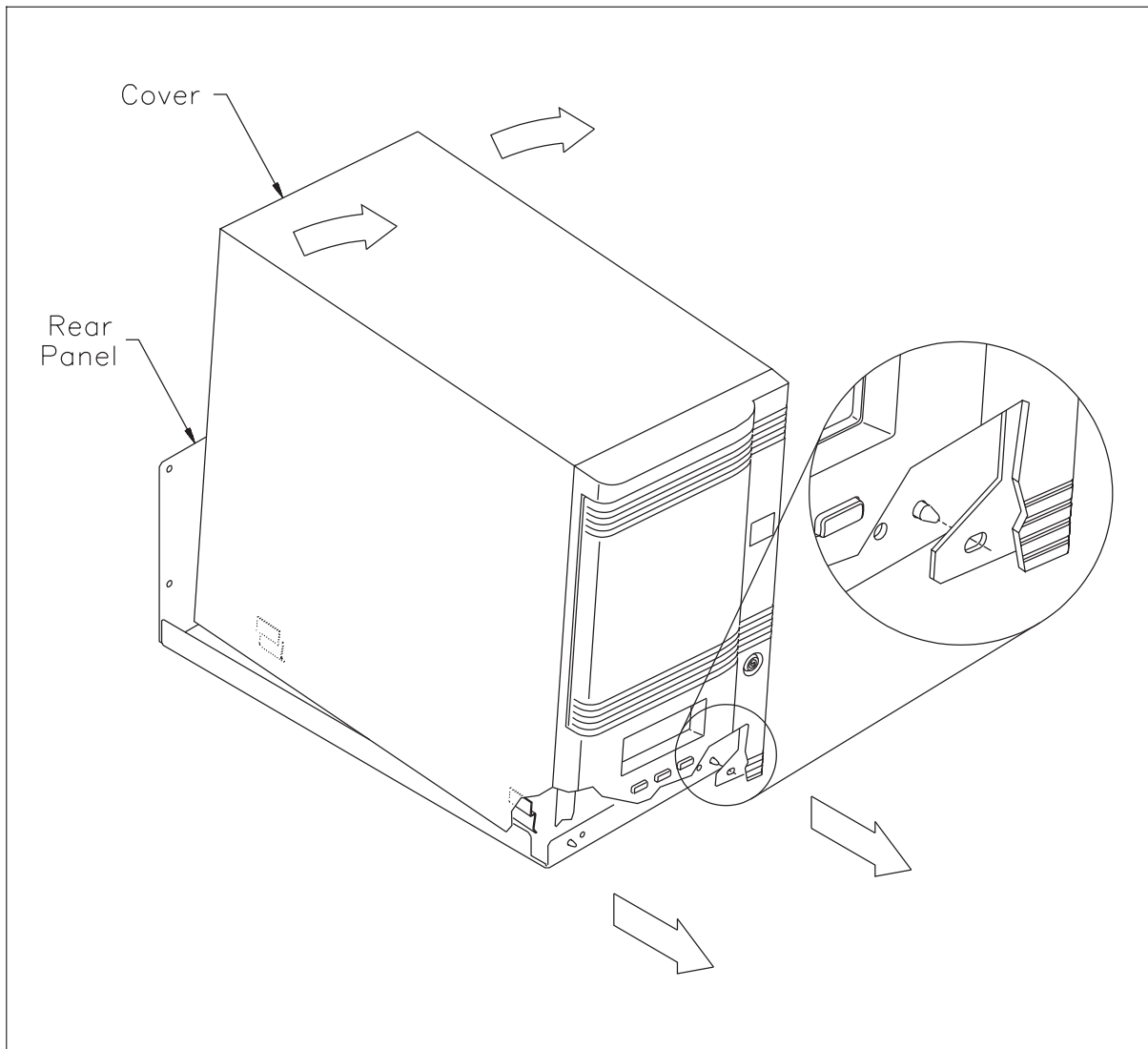


Figure 2-9 Lifting the cover off the chassis

Installing the cover assembly

WARNING !

When installing the cover, make sure none of the cables are caught between the frame and the cover.

Do not connect the power cord or turn on the library power unless the cover is properly installed.

1. Lower the cover over the chassis until it rests on the frame. Make sure the alignment pins on the front of the chassis are aligned with the holes in the cover and the side edges of the chassis are inserted in the clips inside the cover (see Figure 2-10).
2. Push against the front of the cover to snap it into place.

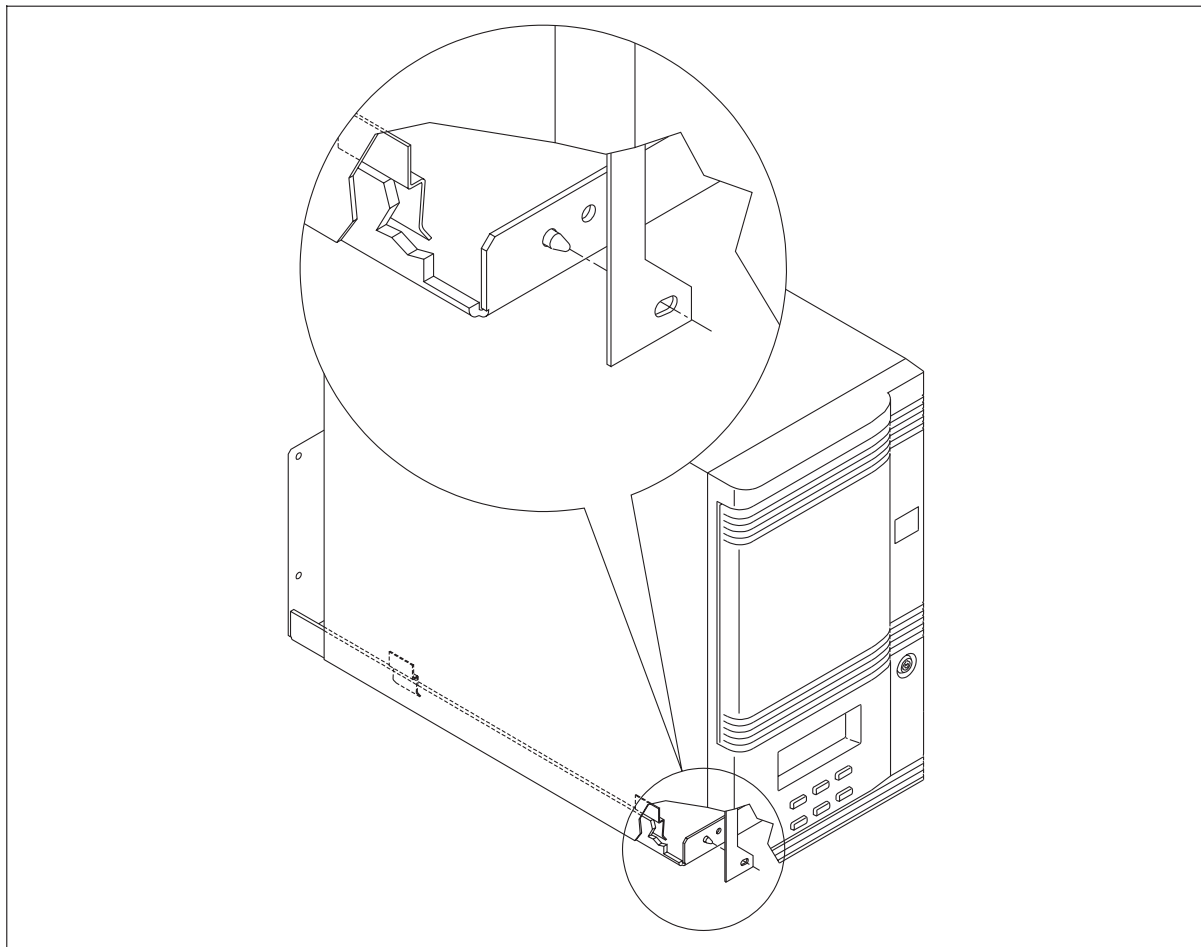


Figure 2-10 Replacing the cover assembly

3. Using a T-20 bit, replace the four screws on the lower back panel of the library. Tighten the screws to 8.0 inch-pounds (9.2 kg-cm) of torque.
4. Connect the operator panel cable to the connector inside the lower back panel (see Figure 2-11).
5. Position the upper back panel above the lower back panel and use a T-20 bit to replace the seven screws. Tighten the screws to 8.0 inch-pounds (9.2 kg-cm) of torque.

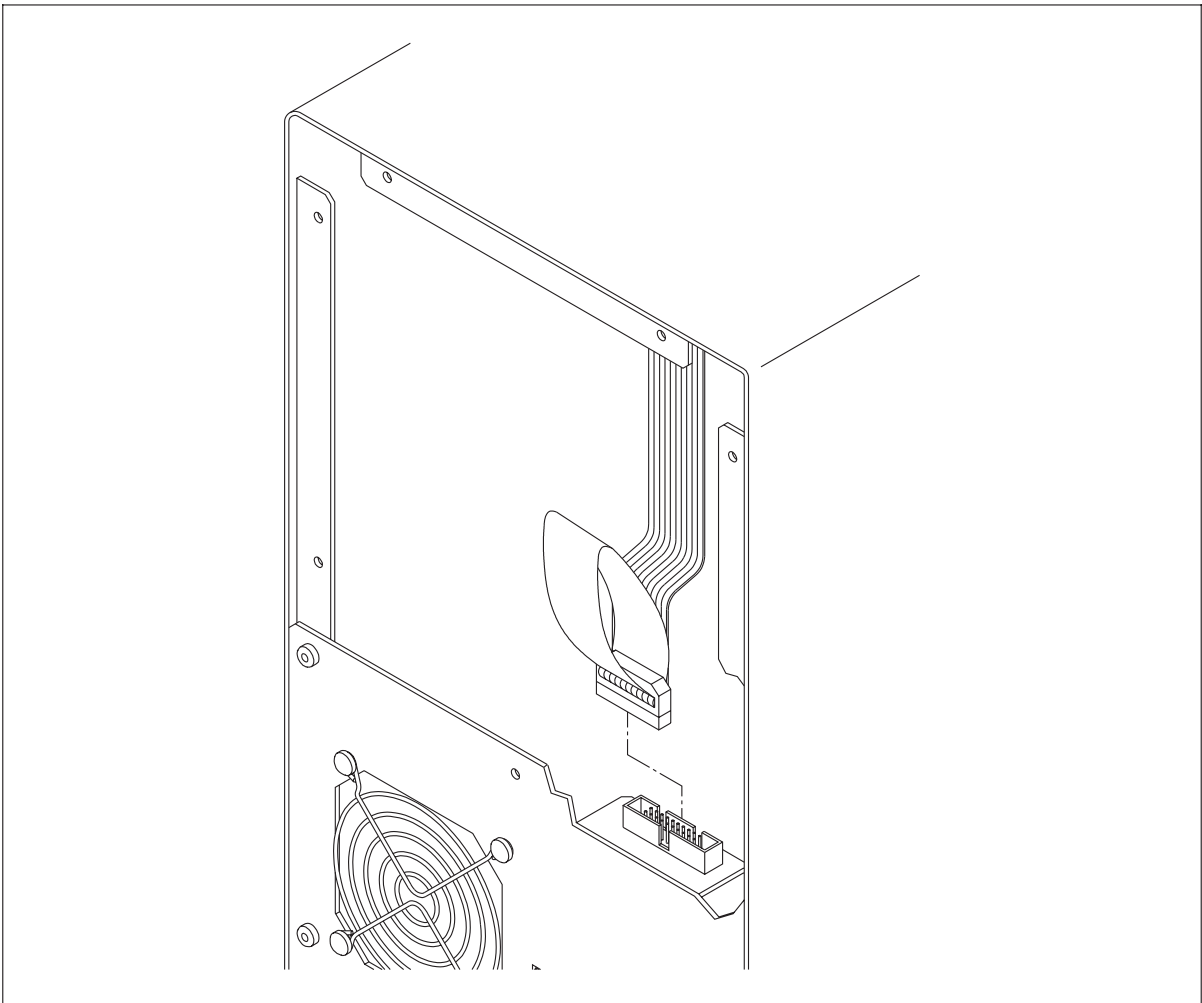


Figure 2-11 Connecting the operator panel cable

After installing the cover assembly

1. Reconnect the SCSI cable(s) and power cord.
2. Turn on the library power. The library and tape drive perform their power-on self-test, then the Main Screen appears on the LCD.

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none">✓ Is the power cord inserted correctly?✓ Are the SCSI cables connected?✓ Is the SCSI bus correctly terminated?✓ Is the operator panel ribbon cable properly connected to the back of the library? See Figure 2-11.✓ Are all connections to the motor control card secure? Refer to Section 6.3.✓ Are all connections to the tape drive secure?

3 Replacing Front Panel Components

This chapter describes how to remove and replace the following:

- Front panel assembly (includes the door)
- Operator panel
- Door

3.1 Maintenance preparation

Before accessing front panel components, follow these maintenance preparation procedures.

WARNING !

Before performing any maintenance procedure, be sure that the library power switch is in the off position and the power cord is disconnected from the library and the outlet.

- ✓ Follow the static protection precautions and maintenance guidelines in Section 2.2.
- ✓ Shut down the library (see Section 2.5).
- ✓ Remove the cover (see Section 2.6).
- ✓ Remove the door key, if any, then place the front panel assembly, with the cover attached, face down on a protective pad.
- ✓ Obtain these tools:
 - Torque limiting screwdriver
 - T-15 bit

3.2 Replacing the front panel assembly and operator panel

After following the maintenance preparation instructions in Section 3.1, follow these instructions to replace the front panel assembly and operator panel.

-
- **Important** The replacement front panel assembly includes a new lock, door, and LCD window, but does not include an operator panel. The operator panel must be ordered separately.
-

Removing the front panel assembly

1. Open the locking clips on the operator panel cable connector, then insert your fingers in the plastic loop on the cable and pull up to disconnect it from the operator panel (see Figure 3-1).

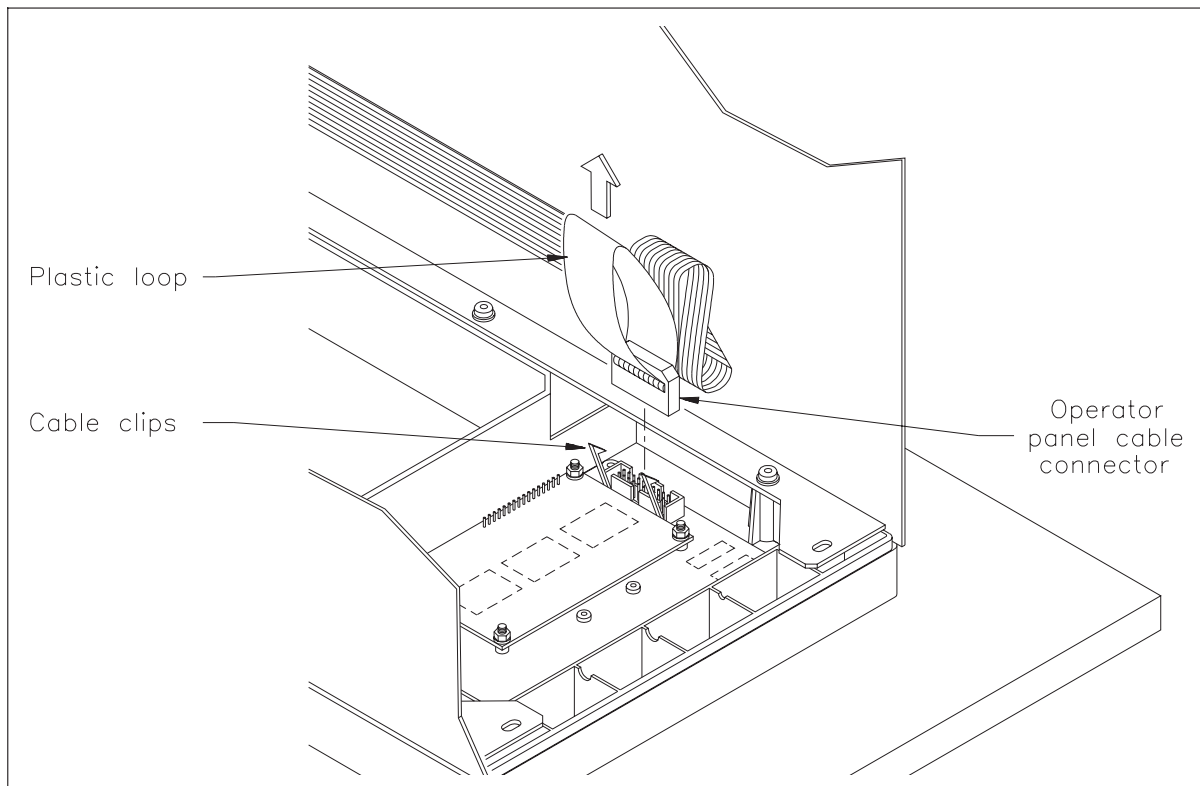


Figure 3-1 Removing the cover from the front panel

2. Using a T-15 bit, remove the screws that hold the front panel assembly to the cover (see Figure 3-2). Lift off the cover.

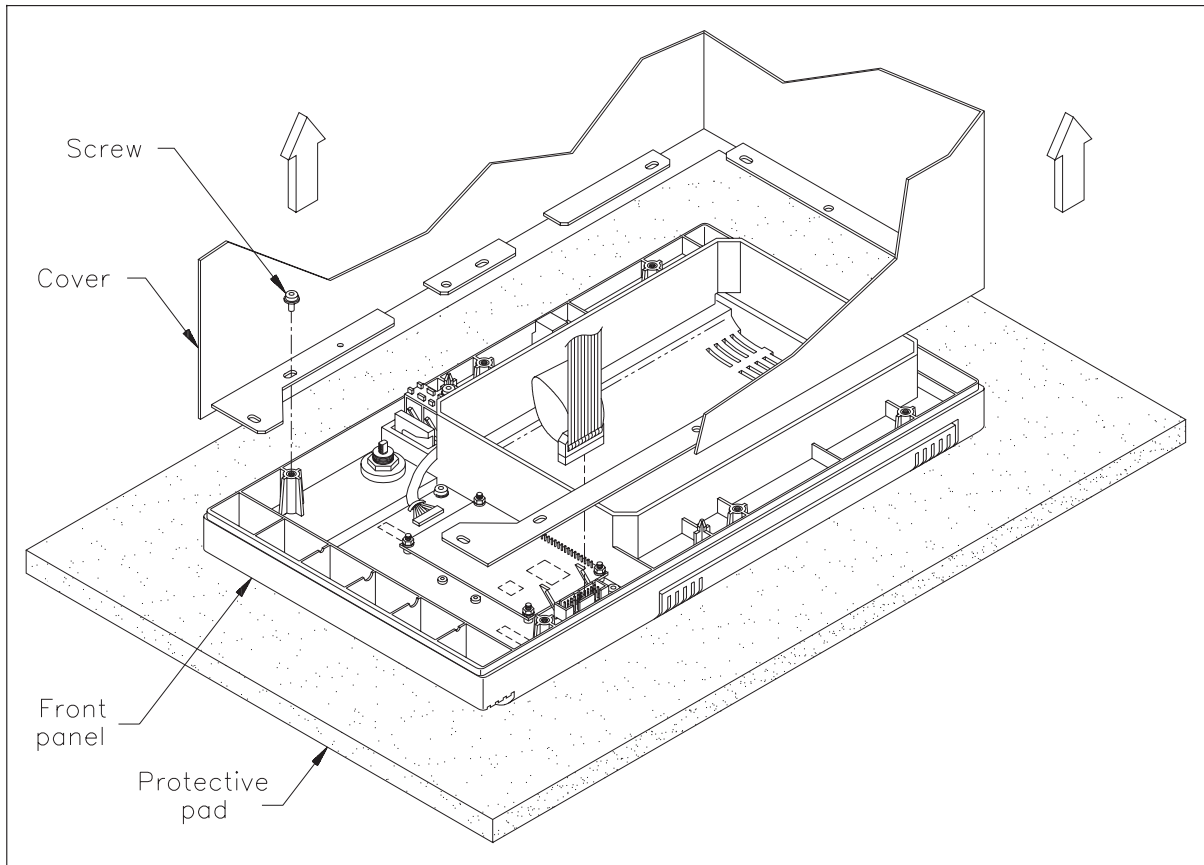


Figure 3-2 Removing the cover from the front panel

Removing the operator panel

1. Use a T-15 bit to remove the screw holding the optical switch to the front panel (see Figure 3-3). The optical switch senses whether the library door is open or closed.
2. Lift the optical switch away from the front panel. Do not pull on the other end of the optical switch cable, which is soldered to the operator panel.
3. Use a T-15 bit to remove the four screws that hold the operator panel to the front panel (see Figure 3-3).

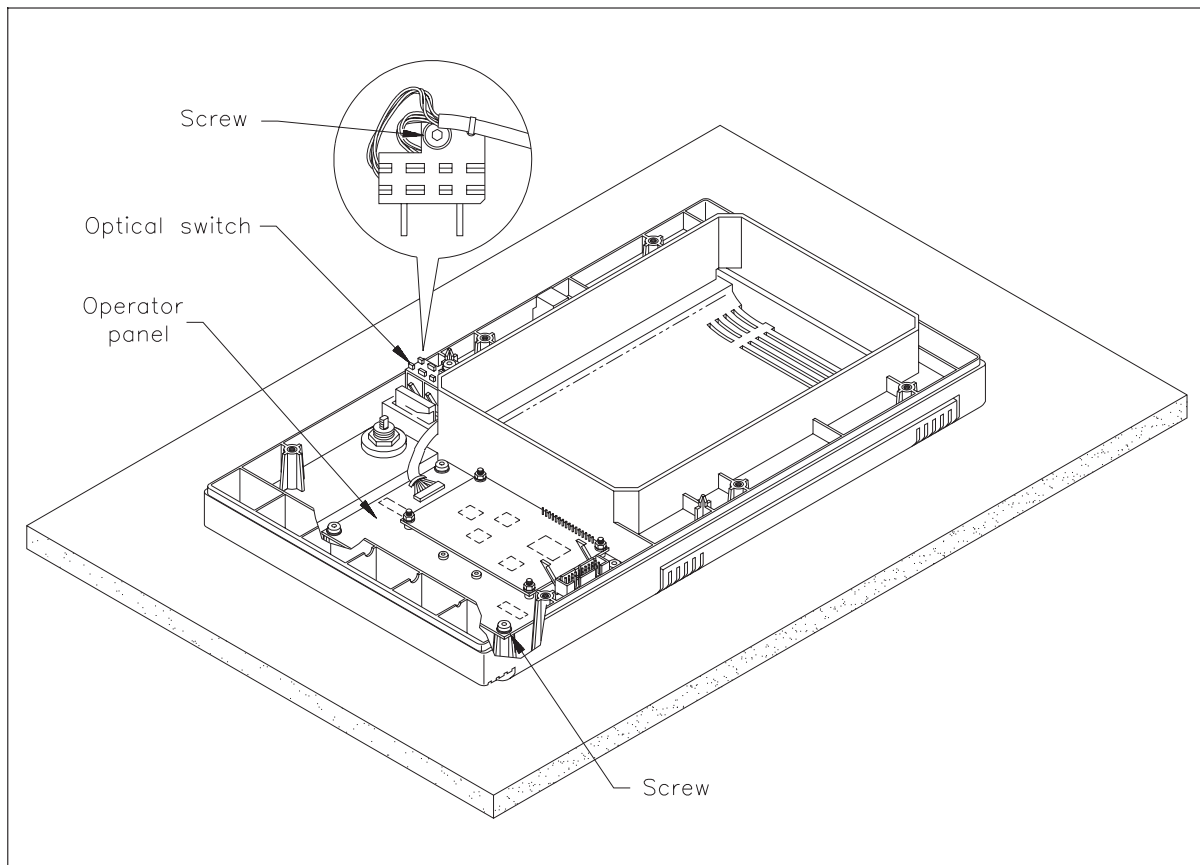


Figure 3-3 Disconnecting the optical switch assembly

4. Lift the operator panel away from the front panel (see Figure 3-4).
5. If you need to replace the LCD window, remove it by pushing against the edge of the window from the outside of the front panel. The window is held in place by a strong adhesive along the edges.

Note: The replacement operator panel includes a new LCD window.

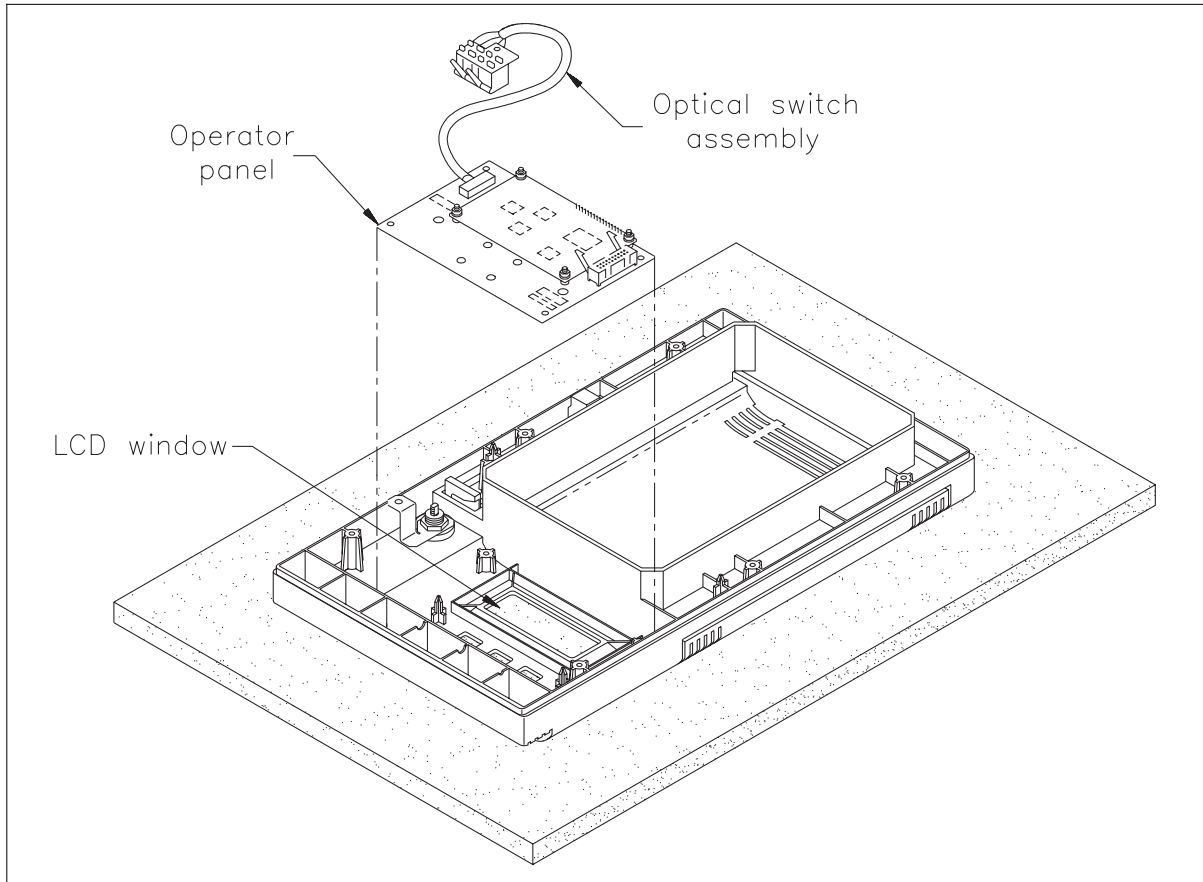


Figure 3-4 Removing the operator panel

Installing the operator panel

1. Place the new front panel assembly face down on a protective mat.
2. Before installing the operator panel, make sure the LCD window is in place.

To replace the LCD window, remove the protective backing from both sides of the window and place the window into the slot with the adhesive side toward the front panel and the notched side toward the top (see Figure 3-5). Press along the edges to secure the adhesive holding the window in place.

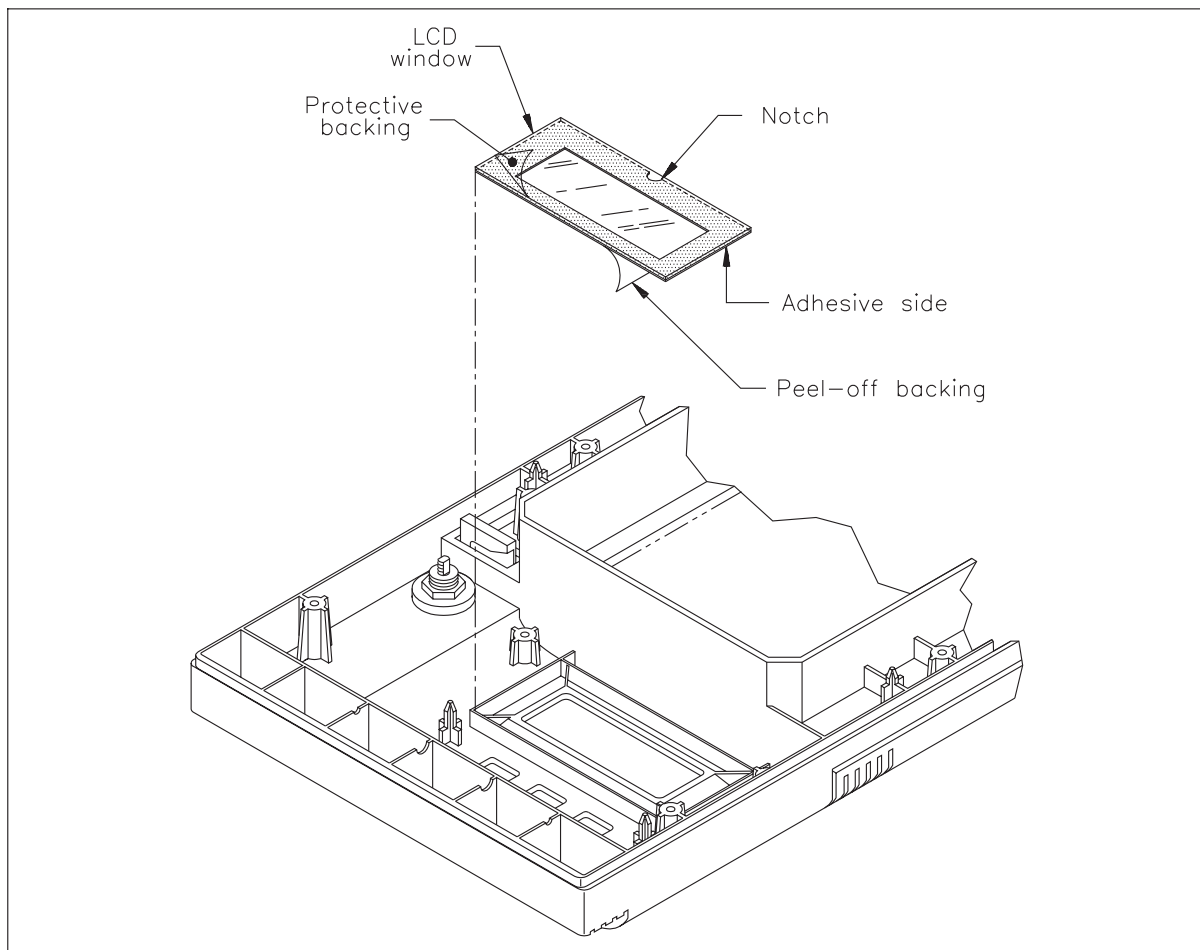


Figure 3-5 Replacing the LCD window

3. Place the operator panel into the front panel (see Figure 3-6). Use the alignment pins to help position the panel correctly.

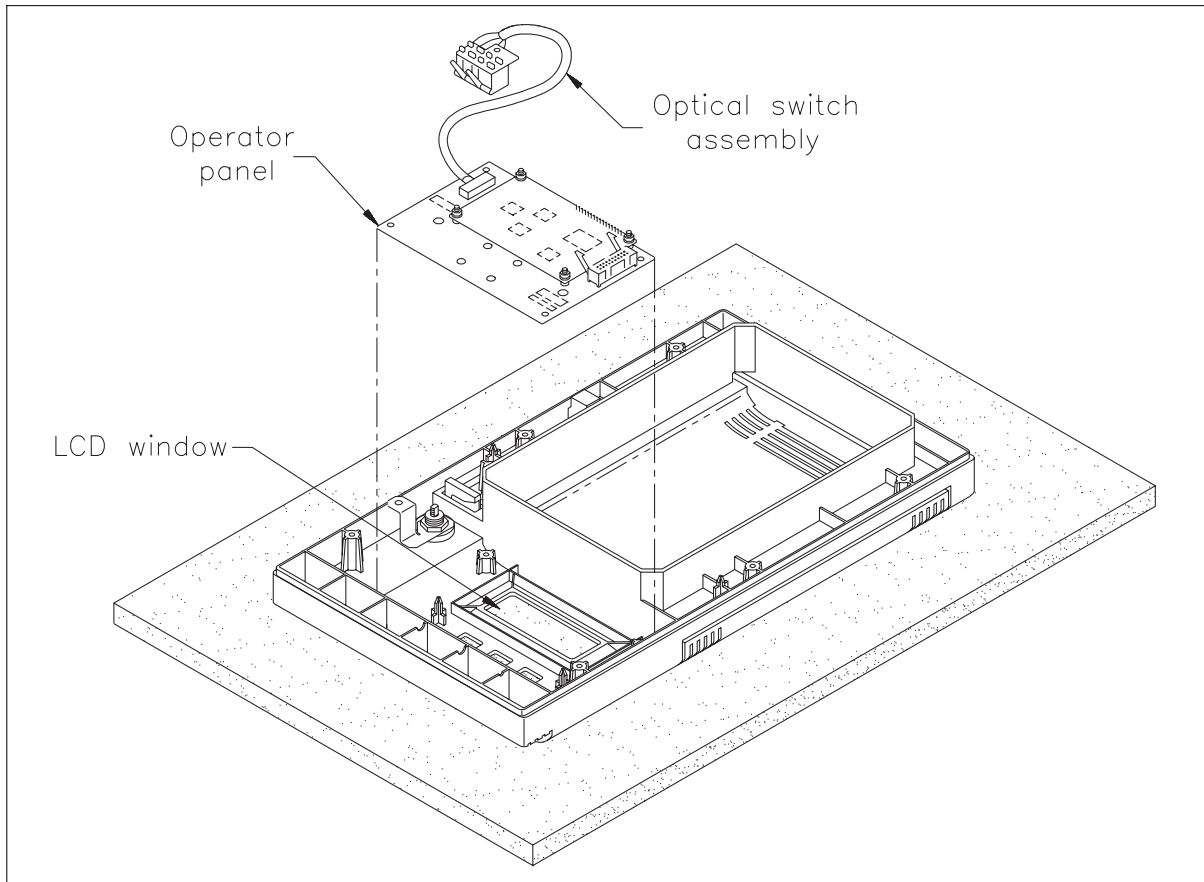


Figure 3-6 Installing the operator panel

3 Replacing Front Panel Components

4. Use a T-15 bit to replace the four screws that hold the operator panel to the front panel (see Figure 3-7). Tighten the screws to 6.0 inch-pounds (6.9 kg-cm) of torque.
5. Use a T-15 bit to replace the screw that holds the optical switch in place. Tighten the screw to 6.0 inch-pounds (6.9 kg-cm) of torque. Tuck the small wires in beside the cover alignment pin to keep them out of the way.

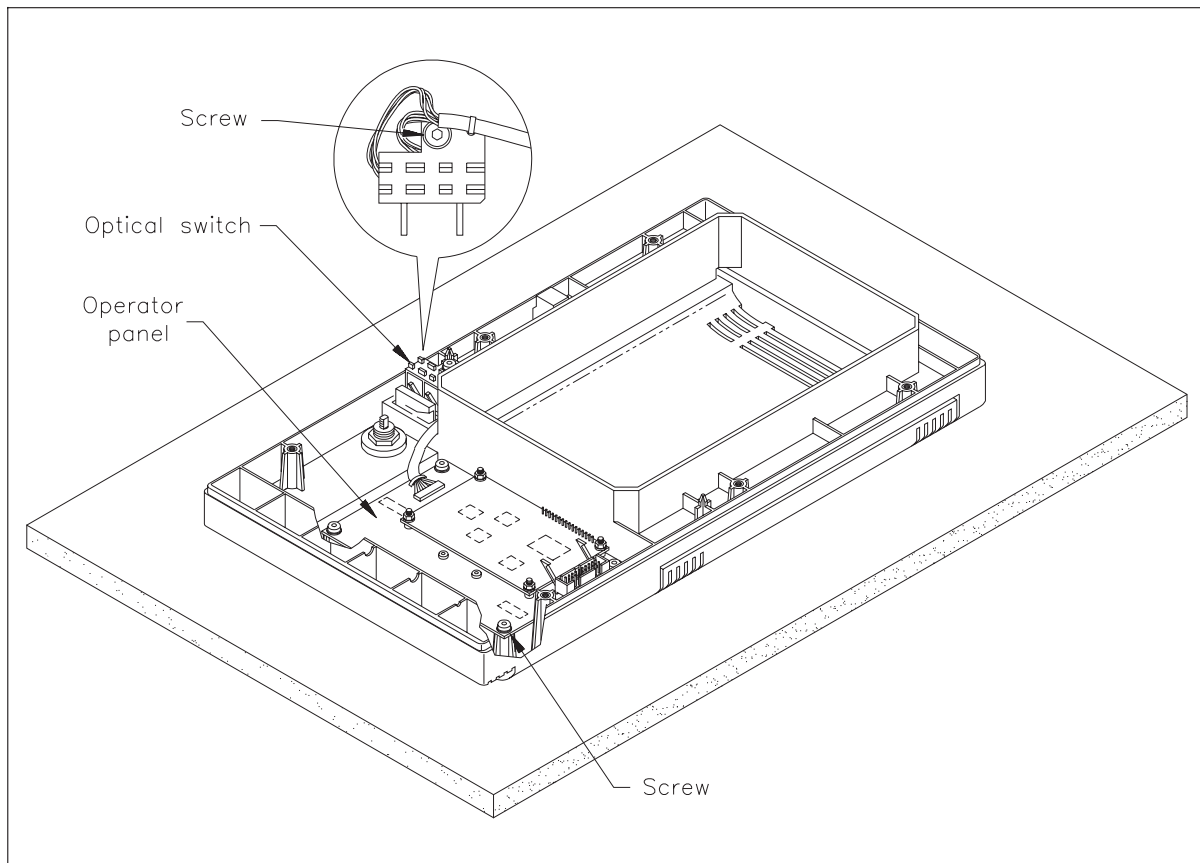


Figure 3-7 Installing the optical switch assembly

Installing the front panel assembly

1. Place the cover over the front panel assembly (see Figure 3-8). Using a T-15 bit, install the screws that hold the front panel assembly to the cover.
2. Reconnect the operator panel cable to the display card and close the locking clips on the operator panel cable connector (see Figure 3-8).

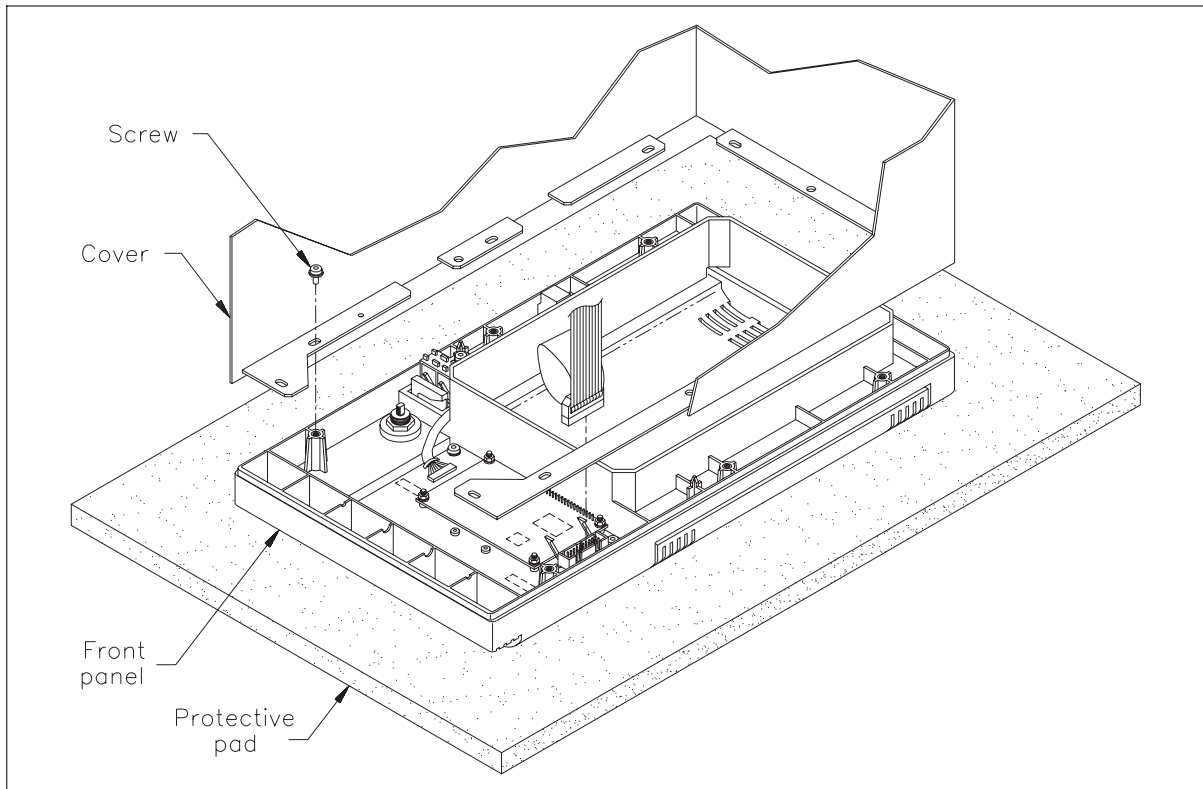


Figure 3-8 Attaching the cover to the front panel

After replacing the front panel assembly and the operator panel

1. Replace the cover assembly (see Section 2.6).
2. Reconnect the SCSI cable(s) and power cord.
3. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the power cord inserted correctly? ✓ Are the SCSI cables connected? ✓ Is the library properly terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library after replacing the cover? See Figure 2-11. ✓ Are all connections to the motor control card secure? Refer to Section 6.3. ✓ Is the operator panel ribbon cable properly connected to the display card? ✓ Is the optical switch securely attached to the front panel and the wires tucked out of the way? ✓ Are the cable connections to the tape drive secure?

3.3 Replacing the door

After following the maintenance preparation instructions in Section 3.1, follow these instructions to replace the library door.

Note: You do not need to remove the cover assembly and place it face down on a protective mat when replacing the door.

Removing the door

1. Unlock the door and open it.
2. From inside the door, use a T-15 bit to remove the two shoulder screws (see Figure 3-9).

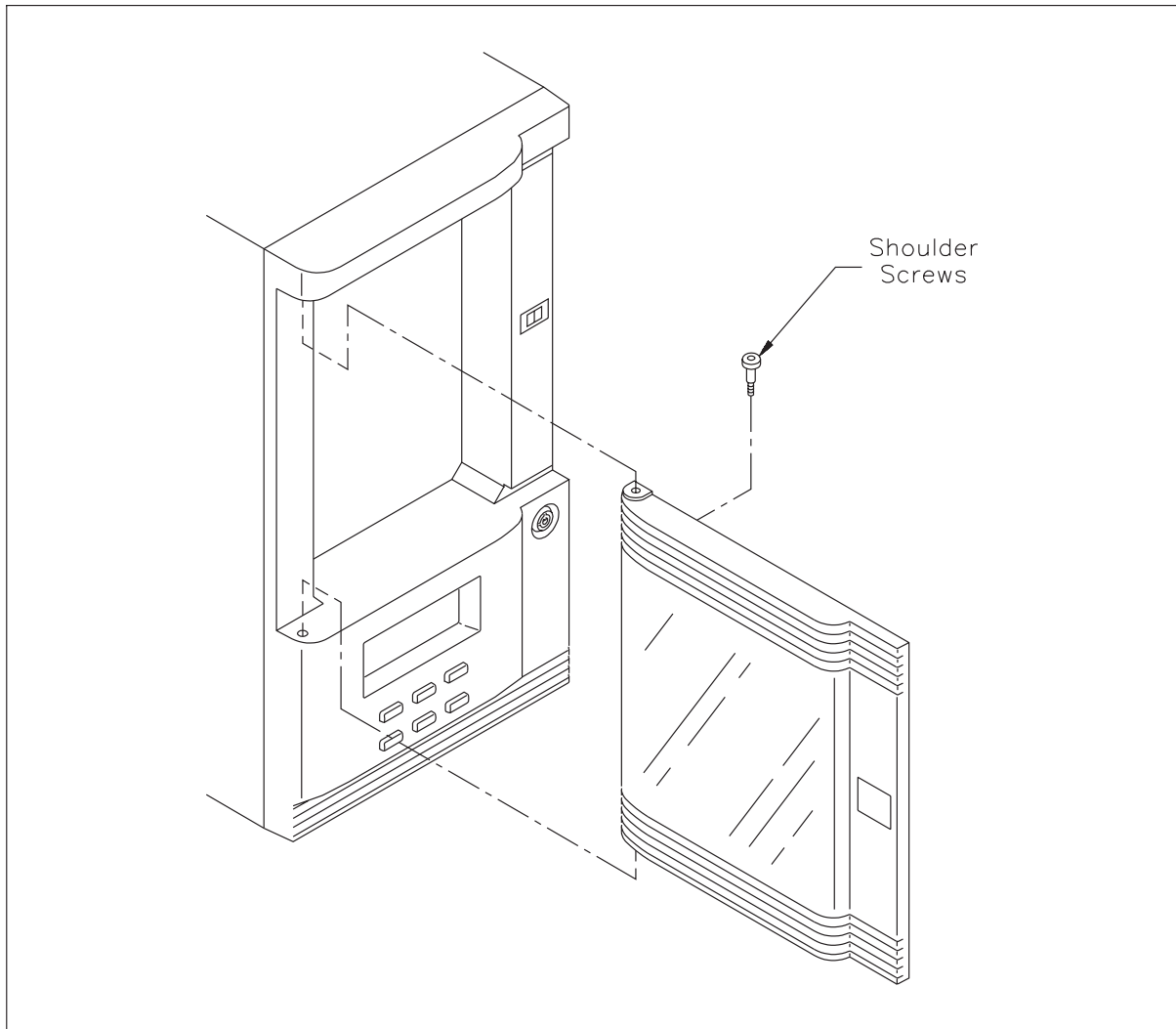


Figure 3-9 Removing the front door

Installing the door

1. Position the door in the front panel (see Figure 3-9).
2. Use a T-15 bit to replace the two shoulder screws. Tighten the screws to 4.0 inch-pounds (4.6 kg-cm) of torque. Be careful not to scratch the door.

3. Insert the latch into the door contact on the front panel.
4. Peel the protective covering off the adhesive on the back of the latch.
5. Clean the area on the door where the latch attaches to improve adhesion. Close the door firmly and hold it closed for a few seconds.
6. When you open the door, the latch will be attached to the door. Secure the latch to the door by applying pressure with your finger for a few more seconds.
7. If desired, remove the protective film from the door.

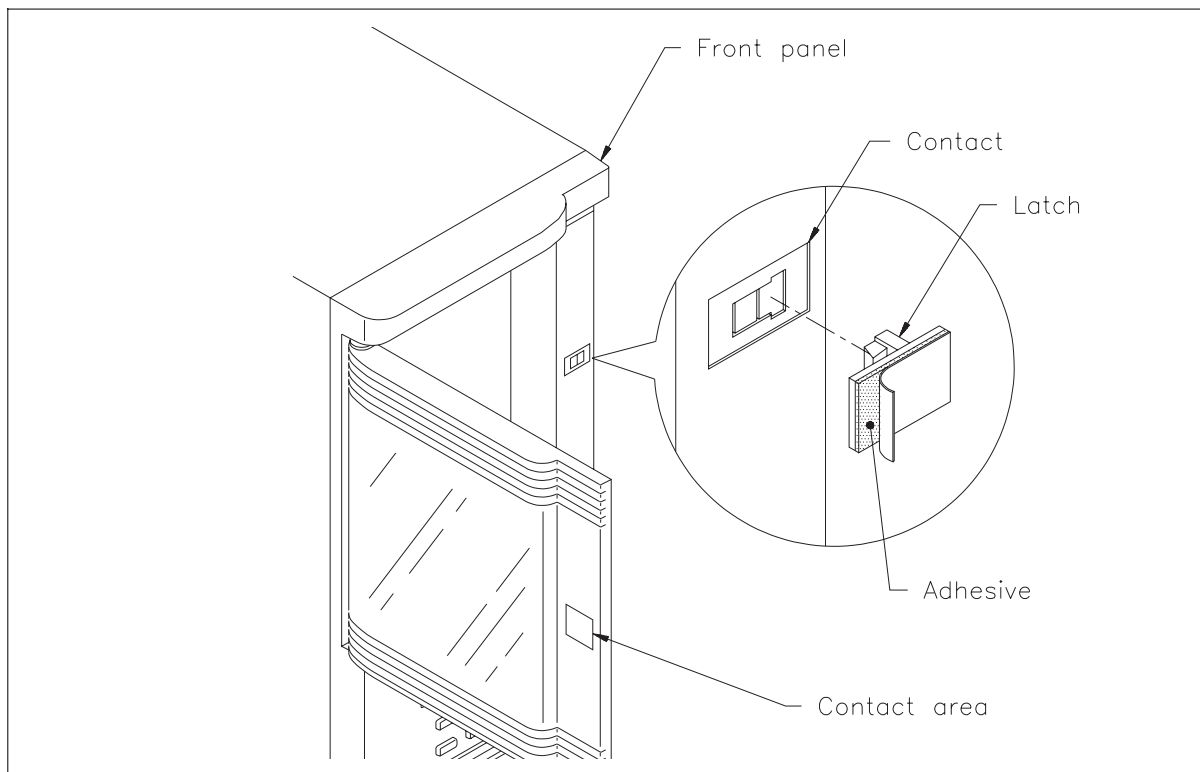


Figure 3-10 Inserting the latch into the door

After replacing the door

1. Close and lock the door.
2. Reconnect the SCSI cable(s) and power cord.
3. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.

4 Replacing CHM Components

This chapter describes how to replace the following cartridge handling mechanism (CHM) components:

- CHM assembly
- ECHM card
- Horizontal drive motor and belt
- Vertical drive motor and belt

4.1 Maintenance preparation

Before accessing CHM components, follow these maintenance preparation procedures.

WARNING !

Before performing any maintenance procedure, be sure that the library power switch is in the off position and that the power cord is disconnected from the library and the outlet.

- ✓ Follow the static protection precautions and maintenance guidelines in Section 2.2.
- ✓ Shut down the library (see Section 2.5).
- ✓ Remove the cover (see Section 2.6).
- ✓ Remove the data cartridge magazine (see Section 2.4).

4.2 Removing the CHM shield

The CHM shield should never require replacing. However, for most of the replacement procedures described in this chapter, you must remove the CHM shield before beginning the procedure. When a procedure is complete, you must reinstall the CHM shield.

After following the maintenance preparation instructions in Section 4.1, follow these instructions to remove the CHM shield.

Do this first

- ✓ Obtain these tools:
 - Torque limiting screwdriver
 - T-15 bit
- ✓ Follow the instructions in Section 2.3 to move the CHM to a position that allows you to access following:
 - The screws that secure the CHM to the bottom of the chassis
 - The screws that hold the CHM shield to the long axis
 - The screws that secure the vertical flex cable to the CHM shield

Note: You may need to move the CHM several times to access all of the screws.

Removing the CHM shield

1. Use a T-15 bit to remove the two screws and lock washers that secure the vertical flex cable to the CHM shield (❶ in Figure 4-1).
2. Using a T-15 bit, remove the three screws holding the CHM shield to the back of the long axis (❷ in Figure 4-1). Remove the CHM shield and put it aside.

Note: Early models of the library have a grounding cable attached to the CHM shield (see Figure 4-2). Use a T-15 bit to disconnect the grounding cable, if present, from the CHM shield.

3. Continue with the procedure for the component you are replacing.

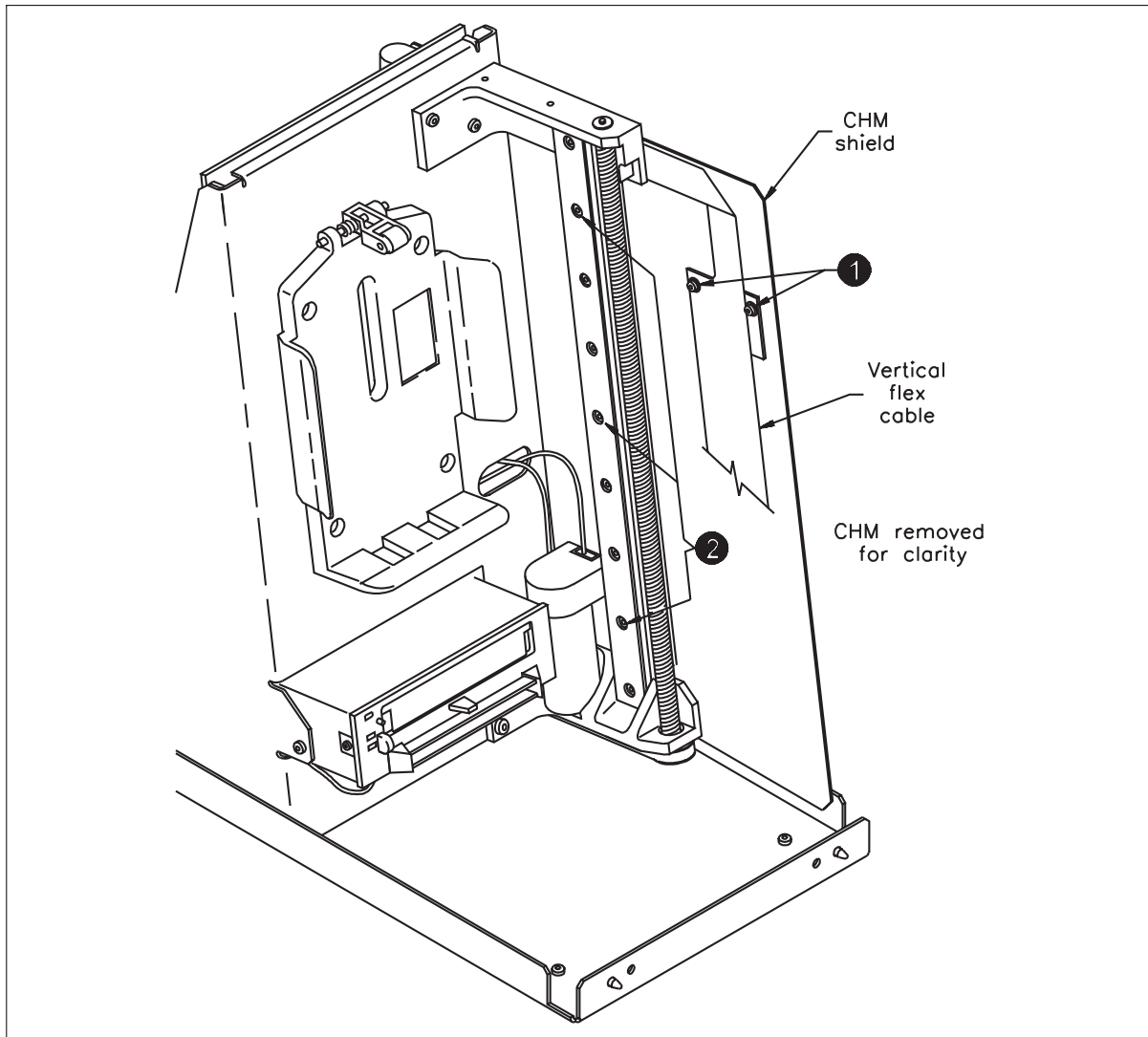


Figure 4-1 Removing the CHM shield (parts of CHM removed for clarity)

Installing the CHM shield

1. Use a T-15 bit to replace the two screws and lock washers that secure the vertical flex cable to the CHM shield (❶ in Figure 4-1). Tighten the screws to 4.0 inch-pounds (4.6 kg-cm) of torque.
2. Using the two alignment pins for guidance, position the CHM shield against the CHM. Make sure the wires attached to the vertical motor and the vertical flex cable are not caught between the long axis and the shield.
3. Use a T-15 bit to install the three screws and lock washers that attach the CHM shield to the long axis (❷ in Figure 4-1). Tighten the screws to 4.0 inch-pounds (4.6 kg-cm) of torque.

4. If your library had a grounding cable attached to the CHM shield, use a T-15 bit to reconnect the grounding cable to the CHM shield (see Figure 4-2).
5. Complete the procedure for the component you are replacing.

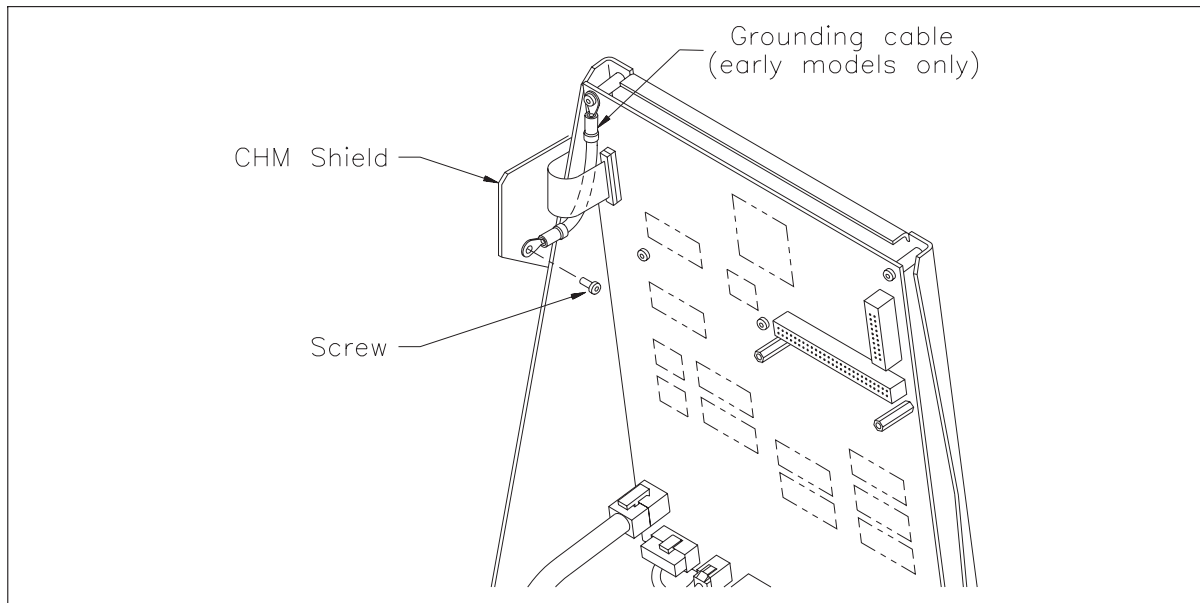


Figure 4-2 Disconnecting the grounding cable from the CHM shield (early models only)

4.3 Replacing the CHM

After following the maintenance preparation instructions in Section 4.1, follow these instructions to replace the CHM.

Do this first

- ✓ Locate the green calibration block included with the replacement CHM. You will need this block to make sure the CHM is properly installed.
- ✓ Obtain these tools:
 - Torque limiting screwdriver
 - T-8 bit
 - T-15 bit
 - T-20 bit
- ✓ Remove the CHM shield (see Section 4.2).

Removing the CHM assembly

1. Disconnect the following cables from the motor control card (see Figure 4-3).

Disconnect the...	From the...
Vertical flex cable	ZIF connector (J3)
Vertical encoder cable	Y-encoder connector (J12)
Vertical motor cable	Y-motor connector (J11)

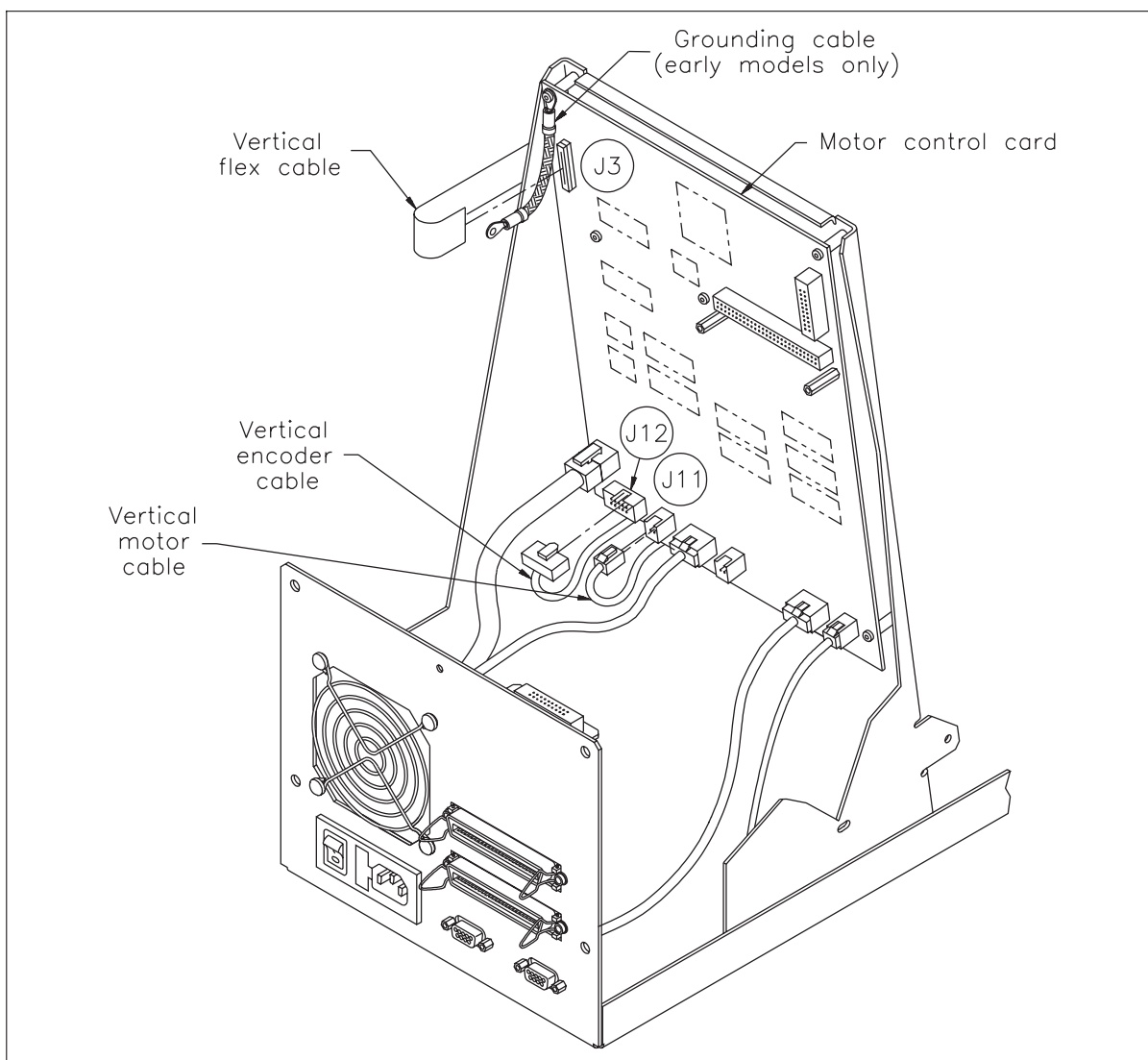


Figure 4-3 Disconnecting CHM cables from the motor control card

2. Using a T-8 bit, remove the screw holding the vertical flex cable ground connection to the horizontal motor assembly (see Figure 4-4).
3. Push down gently on both sides of the ZIF connector, then pivot the connector upward to open it (see Figure 4-4). Slide the vertical flex cable out of the connector and set it aside; this cable is not included with the replacement CHM assembly.

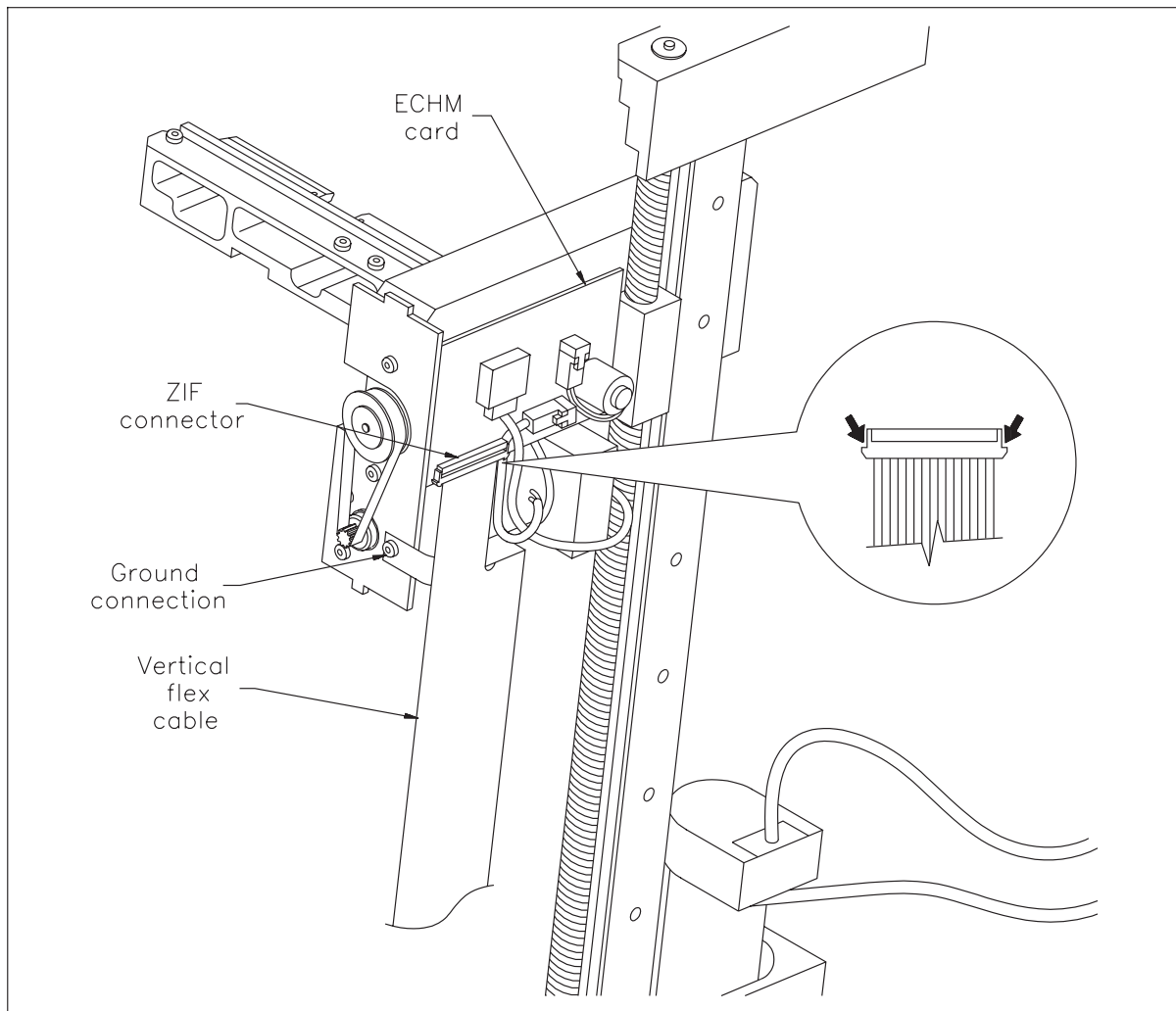


Figure 4-4 Disconnecting the vertical flex cable

4. Carefully pull the vertical-encoder and vertical-motor cables attached to the vertical motor through the access hole.
5. Use a T-20 bit to remove the two screws that hold the CHM to the lower chassis wall (❶ in Figure 4-5). While holding the CHM by the upper or lower mount, remove the two screws holding the CHM to the upper chassis wall (❷ in Figure 4-5).

CAUTION

Do not hold the CHM by the CHM base, the vertical or horizontal lead screws, or the long axis.

6. Remove the CHM and lay it on a flat surface with the CHM base pointing up.

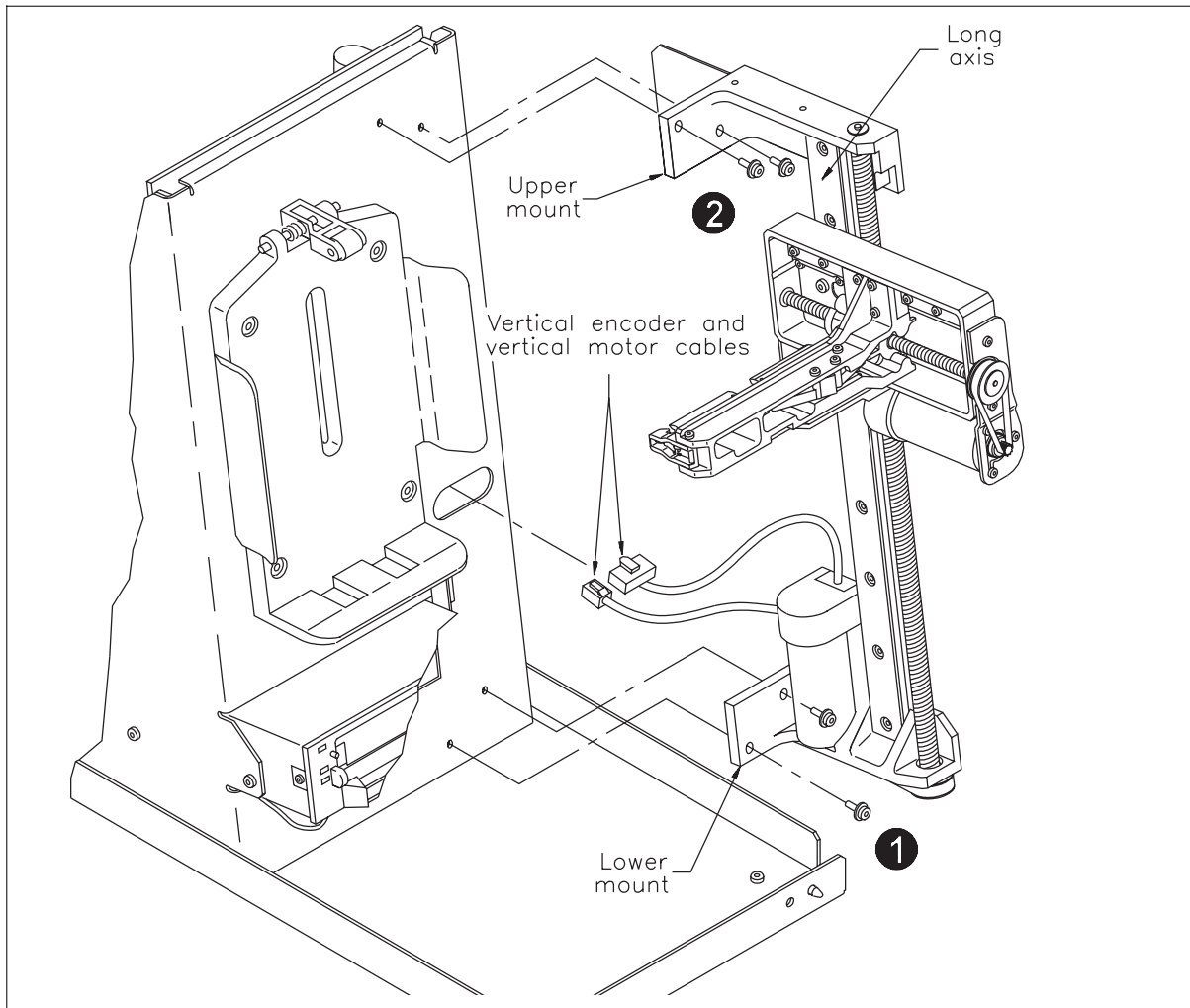


Figure 4-5 Removing the CHM from the library

Installing the CHM

1. While holding the CHM by the upper or lower mount, use the alignment pins to position the CHM against the chassis.

CAUTION

Do not hold the CHM by the CHM base, the vertical or horizontal lead screws, or the long axis.

2. Use a T-20 bit to replace the two screws and lock washers that hold the CHM to the upper chassis wall (② in Figure 4-5). Replace the two screws and lock washers that hold the CHM to the lower chassis wall (① in Figure 4-5). Tighten all screws to 12.0 inch-pounds (13.8 kg-cm) of torque.
3. Carefully insert the wires attached to the vertical motor through the access hole in the chassis (see Figure 4-5).
4. Carefully slide the vertical flex cable into the ZIF connector on the ECHM card. Push up on both sides of the connector to close it (see Figure 4-6).
5. Using a T-8 bit, attach the vertical flex cable ground connection to the horizontal motor assembly. Tighten all screws to 2.0 inch-pounds (2.2 kg-cm) of torque.

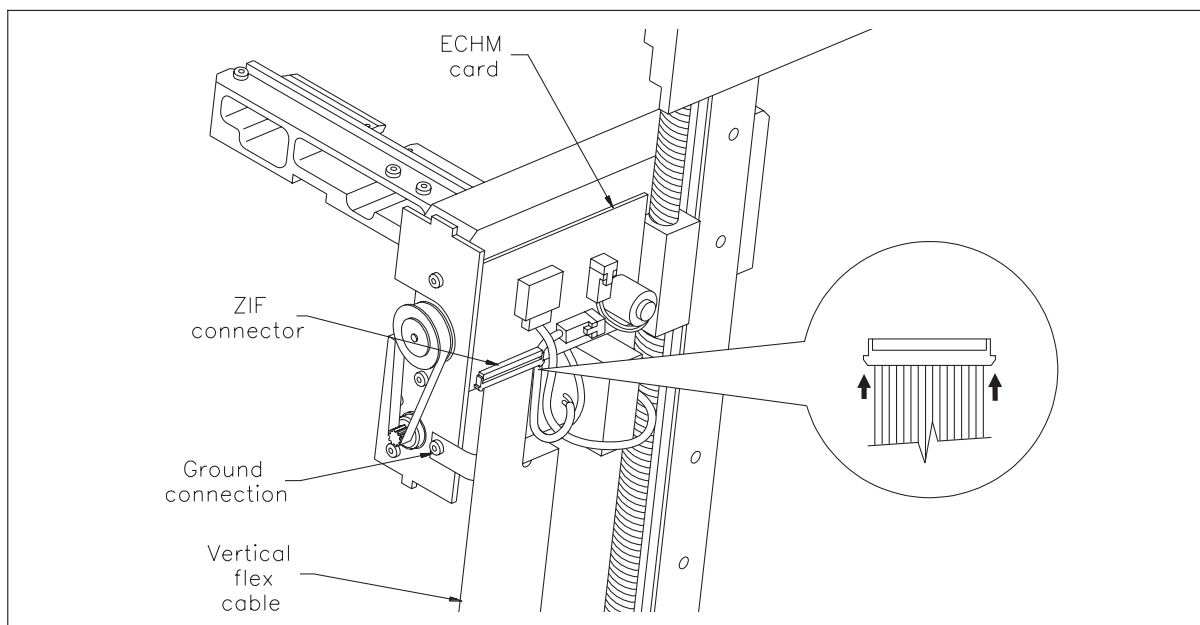


Figure 4-6 Connecting the vertical flex cable

6. Reconnect the vertical flex cable and vertical motor wires to the motor control card as indicated in the following table (see Figure 4-7). Gently push the motor cables against the vertical chassis, away from the CHM assembly so they do not interfere with the movement of the CHM.

Connect the...	To the...
Vertical flex cable	ZIF connector (J3)
Vertical encoder cable	Y-encoder connector (J12)
Vertical motor cable	Y-motor connector (J11)

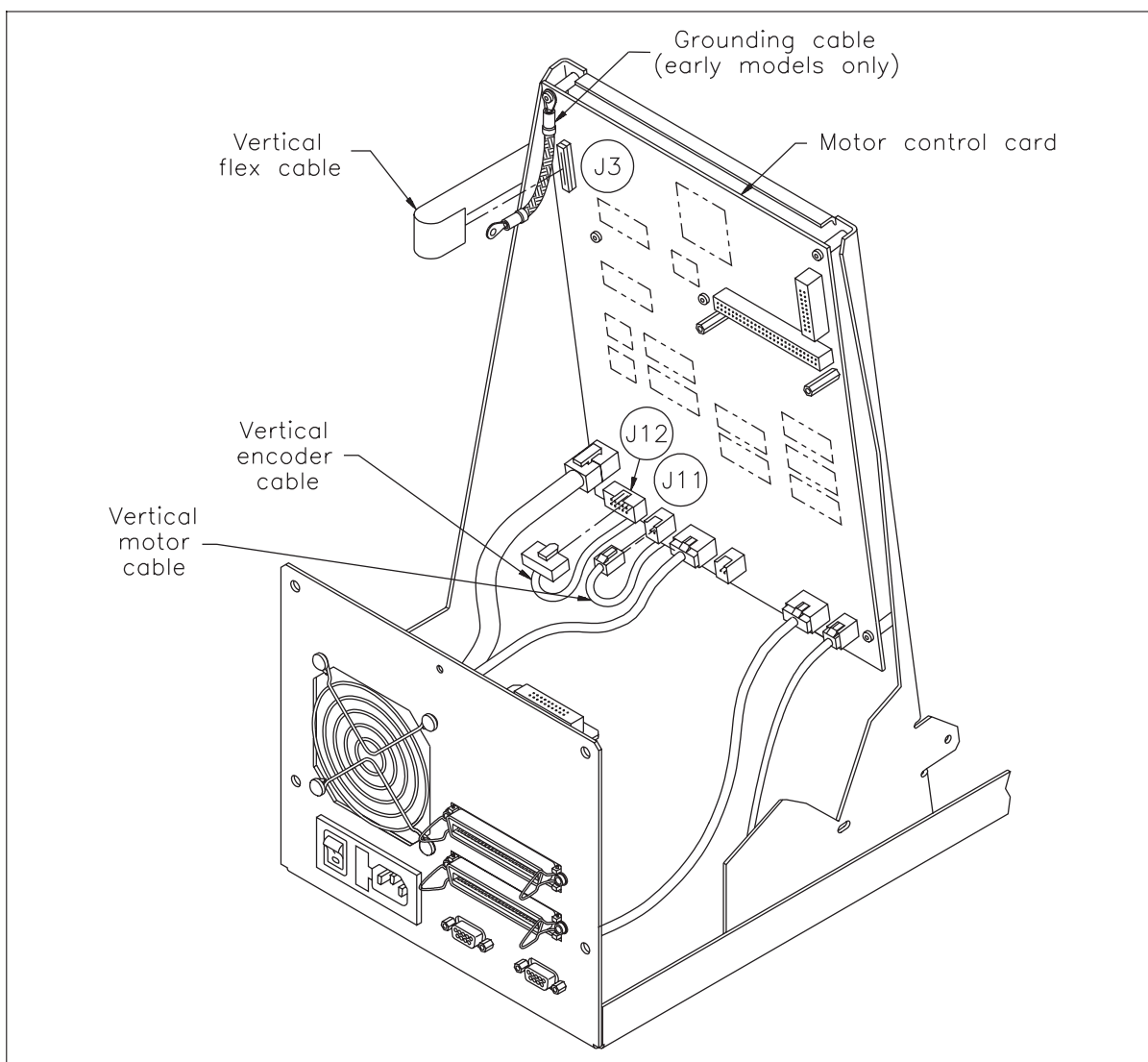


Figure 4-7 Disconnecting CHM cables from the motor control card

After replacing the CHM

1. Reinstall the CHM shield and attach the vertical flex cable to it (see Section 4.2).
2. Reinstall the data cartridge magazine (see Section 2.4).
3. Replace the cover assembly (see Section 2.6).
4. Reconnect the SCSI cable(s) and power cord.
5. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.
6. Calibrate the cartridge sensor position and the eject position (see Appendix B).

► **Important** If you do not calibrate the cartridge sensor position and the eject position after installing the CHM, the CHM will not be able to successfully pick and place cartridges.

7. Optionally, use Diagnostics on the LCD menu to move the CHM along the horizontal and vertical axes, cycle the solenoid, and perform picks, places, and moves (see Appendix A).

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the power cord inserted correctly? ✓ Are the SCSI cables connected? ✓ Is the library properly terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library? ✓ Are all connections to the motor control card secure? Refer to Section 6.3. ✓ Is the vertical flex cable firmly seated in the ZIF connectors on the ECHM card and the motor control card? ✓ Are the vertical motor wires securely attached to the motor control card? ✓ Are all connections to the tape drive secure?

4.4 Replacing the ECHM card

After following the maintenance preparation instructions in Section 4.1, follow these instructions to replace the ECHM card.

Do this first

- ✓ Locate the calibration block included with the replacement CHM. You will need this block to calibrate the CHM.
- ✓ Obtain these tools:
 - Torque limiting screwdriver
 - T-8 bit
- ✓ Remove the CHM shield (see Section 4.2).

Removing the ECHM card

1. Using a T-8 bit, remove the screw holding the vertical flex cable ground connection to the horizontal motor assembly.
2. Push down on both sides of the ZIF connector to open it. Slide the vertical flex cable out of the connector (see Figure 4-8). Move the cable aside.

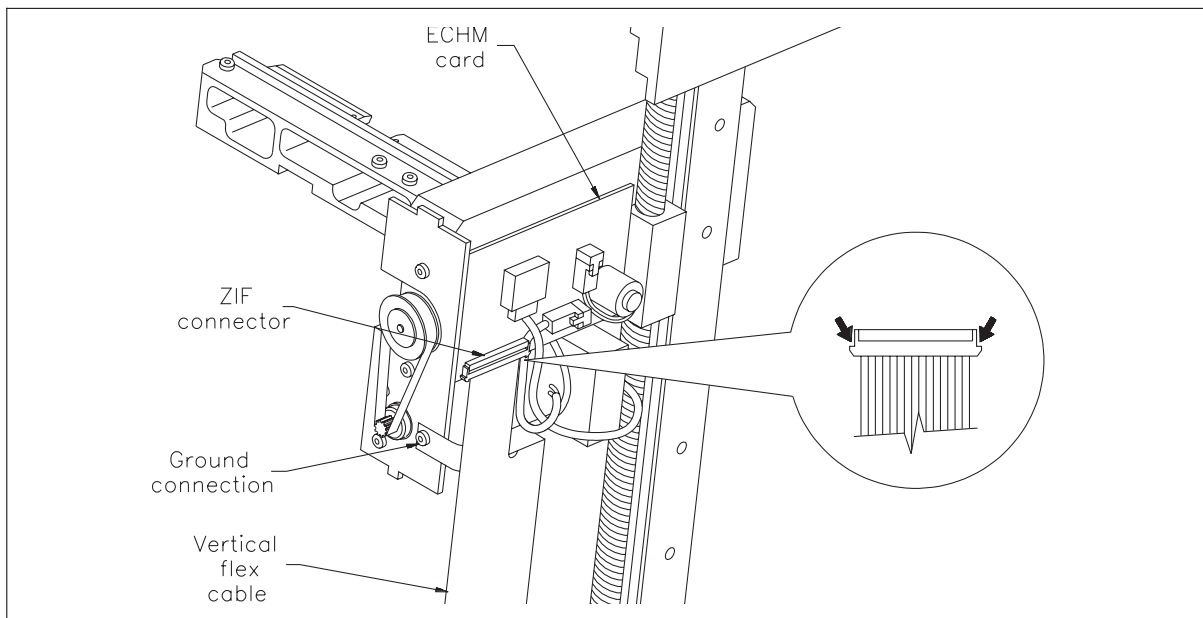


Figure 4-8 Disconnecting the vertical flex cable

3. Disconnect the following cables from the ECHM card (see Figure 4-9):

Disconnect the ...	From ...
Encoder connector (4-pin) (do not unplug from the motor)	Connector J3 (4-pin)
Power connector (2-pin)	Connector J2 (2-pin)
Solenoid connector (2-pin)	Connector J4 (2-pin)

4. Using a T-10 bit, remove the single screw that holds the ECHM card to the CHM (see Figure 4-9).
5. Hold the card by the edges and rotate it away from the CHM.

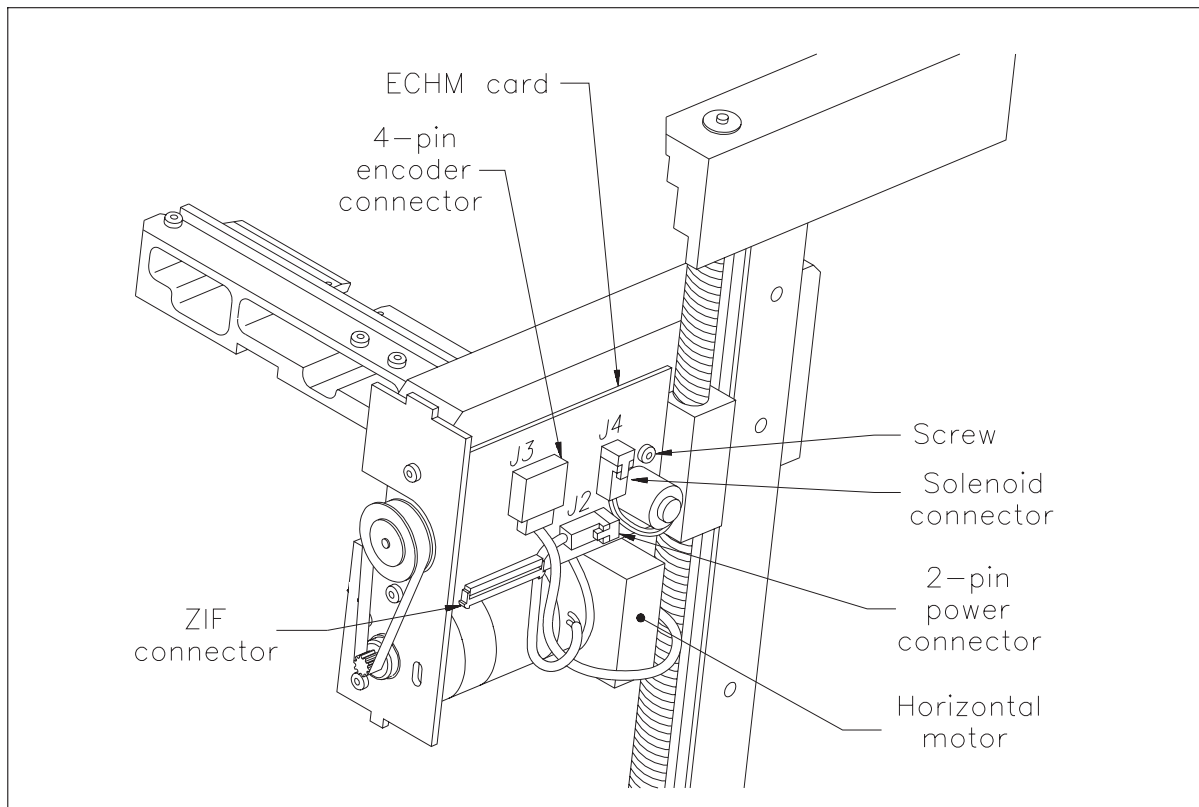


Figure 4-9 Removing the ECHM card

Installing the ECHM card

1. Use the three alignment pins and alignment slot to position the ECHM card on the CHM and push the card into place.
2. Replace the single ECHM screw with a T-10 bit. Tighten the screw to 4.0 inch-pounds (4.6 kg-cm) of torque.

3. Connect the following cables to the ECHM card (see Figure 4-9):

Connect the...	To ...
Encoder connector (4-pin)*	Connector J3 (4-pin)
Power connector (2-pin)	Connector J2 (2-pin)
Solenoid connector (2-pin)	Connector J4 (2-pin)

* Route the 4-pin encoder cable under, then over, the 2-pin power cable (so the 4-pin encoder cable is on top, as shown in Figure 4-10) before connecting it to J3 on the ECHM card.

4. Gently push the power and encoder cables down against the horizontal motor so they will not rub against the CHM shield or vertical flex cable during operation.
5. Carefully slide the vertical flex cable into the ZIF connector on the ECHM card (see Figure 4-10). Gently push up on both sides of the connector to close it.
6. Using a T-8 bit, attach the vertical flex cable ground connection to the horizontal motor assembly. Tighten the screw to 2.0 inch-pounds (2.2 kg-cm) of torque.

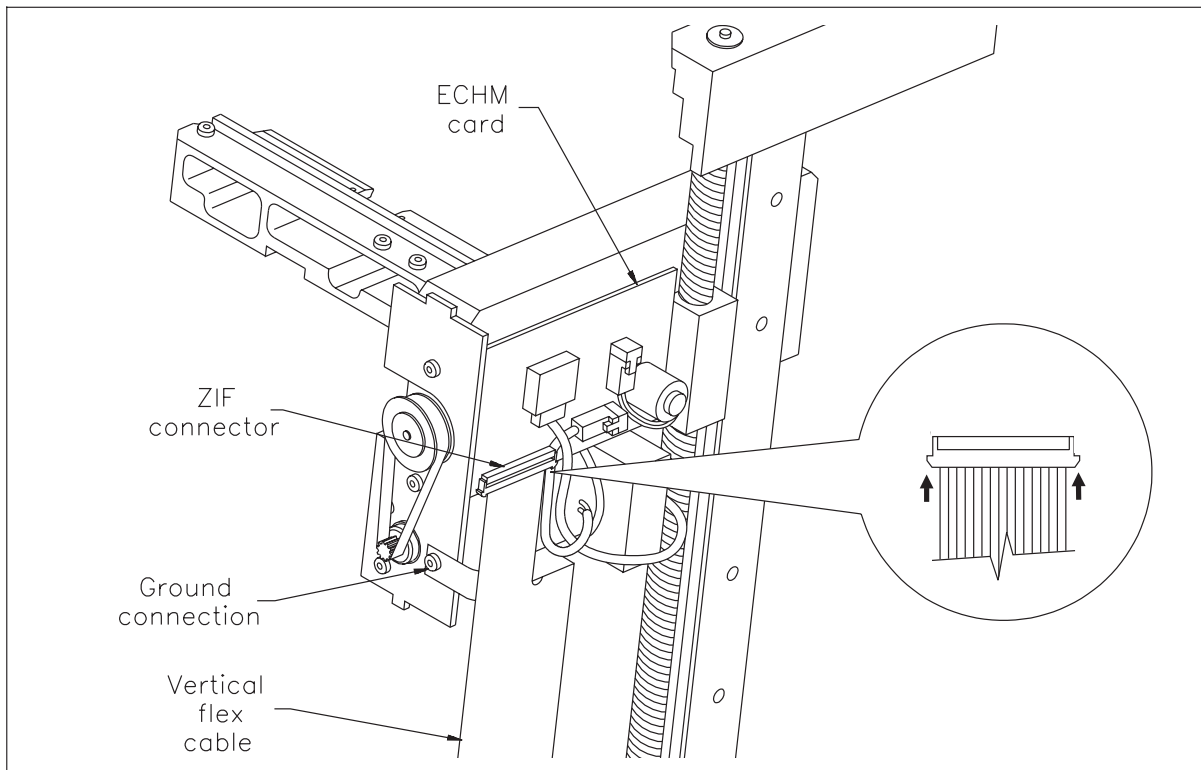


Figure 4-10 Connecting the vertical flex cable

After replacing the ECHM card

1. Reinstall the CHM shield and attach the vertical flex cable to it (see Section 4.2).
2. Reinstall the data cartridge magazine (see Section 2.4).
3. Replace the cover assembly (see Section 2.6).
4. Reconnect the SCSI cable(s) and power cord.
5. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.
6. Calibrate the cartridge sensor position and the eject position (see Appendix B).

► **Important** If you do not calibrate the cartridge sensor position and the eject position after installing the ECHM card, the CHM will not be able to successfully pick and place cartridges.

7. Optionally, use Diagnostics on the LCD menu to move the CHM along the horizontal and vertical axes, cycle the solenoid, and perform picks, places, and moves (see Appendix A).

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the power cord inserted correctly? ✓ Are the SCSI cables connected? ✓ Is the library properly terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library after replacing the cover? See Figure 2-7. ✓ Are all connections to the motor control card secure? Refer to Section 6.3. ✓ Is the vertical flex cable firmly seated in the ZIF connectors on the ECHM card and the motor control card? ✓ Are the cables securely attached to the ECHM card? ✓ Are all connections to the tape drive secure?

4.5 Replacing the horizontal drive belt

After following the maintenance preparation instructions in Section 4.1, follow these instructions to replace the horizontal drive belt.

Removing the horizontal drive belt

Using your fingers, turn the horizontal lead-screw pulley to the left while gently pulling the belt off the motor pulley (see Figure 4-11).

► **Important** Do not dislodge the vertical flex cable from its ZIF connector on the ECHM card.

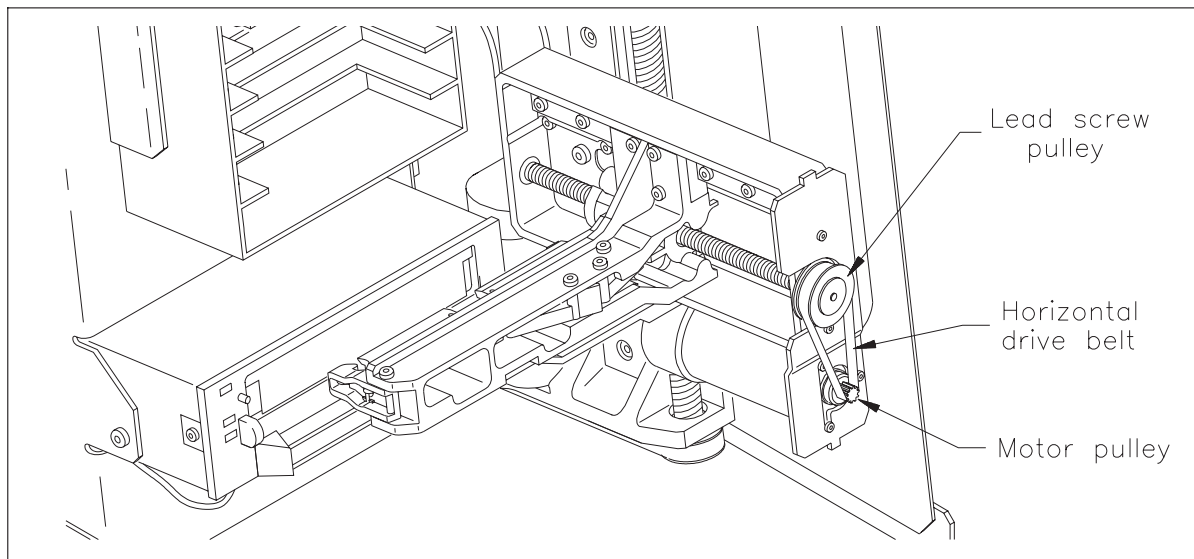


Figure 4-11 Removing the horizontal drive belt

Installing the horizontal drive belt

1. Place one end of the belt around the horizontal lead-screw pulley, then slide the other end onto the motor pulley. Make sure that the teeth on the belt mesh with the teeth on both pulleys.

► **Important** Do not dislodge the vertical flex cable from its ZIF connector on the EMCH card.

2. Gently turn the horizontal lead-screw pulley to the right and gradually push the belt back until it is secure on the pulley.
3. Check the belt tension by pinching the belt together. There should be a $\frac{1}{4}$ -inch (6.4 mm) gap in the middle when you apply 3.5 in-pounds (4.0 kg-cm) of pressure on the belt. If you need to adjust the tension, loosen the screws and push the motor down to apply tension to the belt.

CAUTION

Too tight tension on the belt will cause excessive wear of the motor.

4. When the belt is properly adjusted, tighten the screws to 2.0 inch-pounds (2.3 kg-cm) of torque.

After replacing the horizontal drive belt

1. Reconnect the SCSI cable(s) and power cord.
2. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the power cord inserted correctly? ✓ Are the SCSI cables connected? ✓ Is the SCSI bus terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library? See Figure 2-7. ✓ Are all connections to the motor control card secure? Refer to Section 6.3. ✓ Is the operator panel ribbon cable properly connected to the display card? ✓ Are the connections to the tape drive secure? ✓ Is the tension on the horizontal drive belt properly adjusted?

4.6 Replacing the horizontal drive motor

After following the maintenance preparation instructions in Section 4.1, follow these instructions to replace the horizontal drive motor.

Do this first

- ✓ Locate the green calibration block included with the replacement CHM. You will need this block to make sure the CHM is properly installed.
- ✓ Obtain these tools:
 - Torque limiting screwdriver
 - T-8 bit
 - T-15 bit
- ✓ Remove the data cartridge magazine (see Section 2.4).
- ✓ Remove the CHM shield (see Section 4.2).

Removing the horizontal drive motor

1. Remove the horizontal drive belt (see Section 4.5).
2. Using a T-8 bit, remove the screw and lock washer holding the vertical flex cable ground connection to the horizontal drive motor assembly.

3. Push down on both sides of the ZIF connector to open it. Slide the vertical flex cable out of the connector (see Figure 4-12) and set it aside.

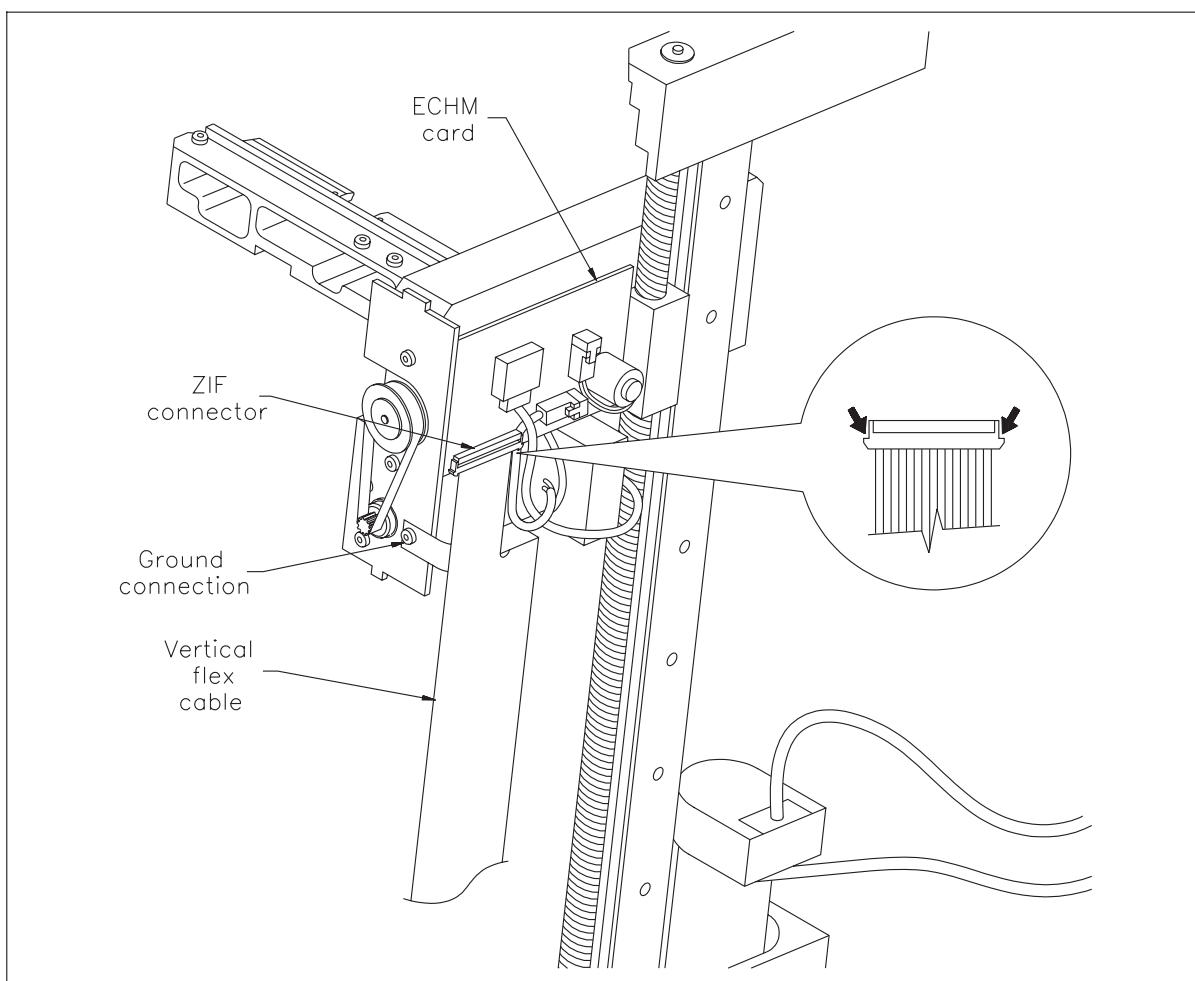


Figure 4-12 Disconnecting the vertical flex cable

4. Using your fingers, turn the horizontal lead-screw pulley to the left while gently pulling the horizontal drive belt off the motor pulley.

5. Disconnect the following cables from the ECHM card (see Figure 4-13):

Disconnect the ...	From ...
Encoder connector (4-pin) (do not unplug from the motor)	Connector J3 (4-pin)
Power connector (2-pin)	Connector J2 (2-pin)

6. While holding the motor with one hand, use a T-8 bit to remove the two remaining screws and lock washers that hold the motor in place (see Figure 4-13).

7. Remove the motor from the mounting bracket.

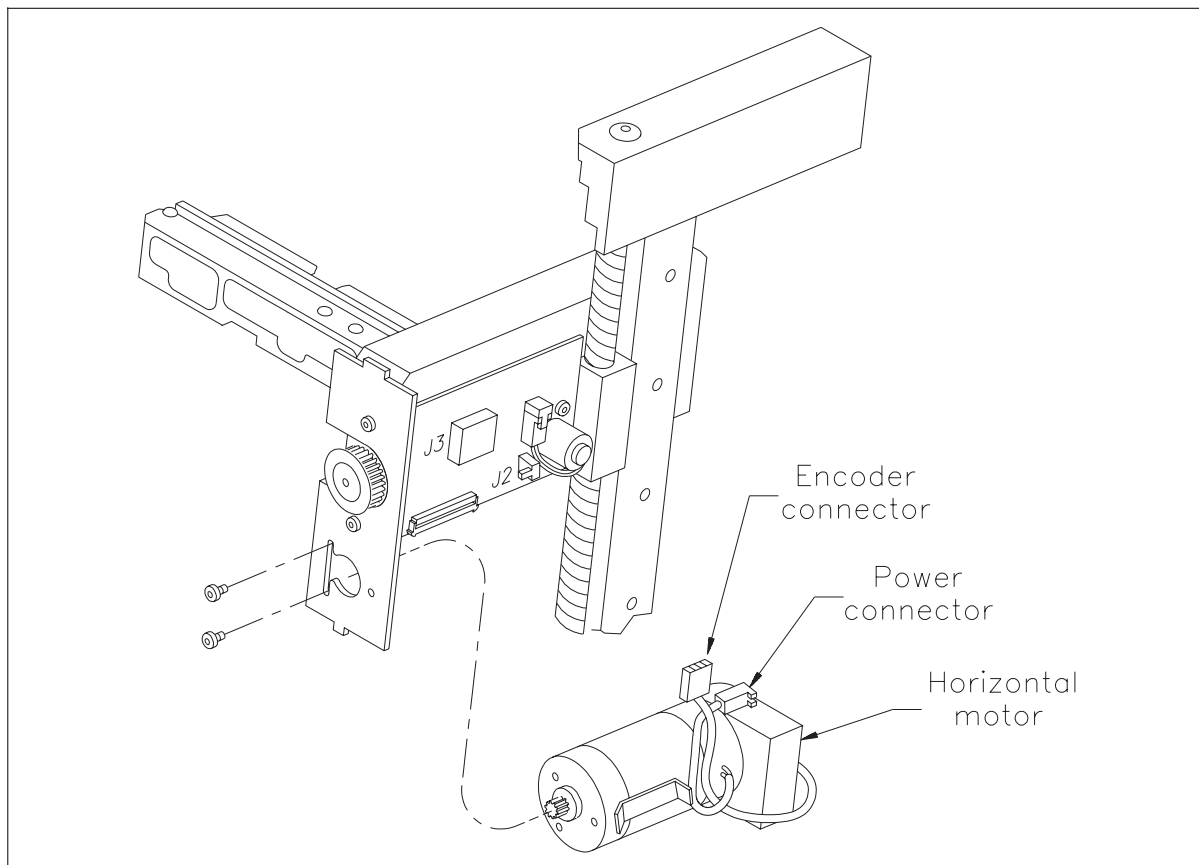


Figure 4-13 Replacing the horizontal motor

Installing the horizontal drive motor

1. Position the motor against the mounting bracket and use a T-8 bit to replace the leftmost screws and lock washers (see Figure 4-13). Do not tighten the screws yet, and do not replace the third grounding screw that connects to the vertical flex cable.
2. Reinstall the horizontal drive belt. Place one end of the horizontal drive belt around the lead-screw pulley (the larger pulley attached to the lead screw) and slide the other end onto the motor pulley. Make sure that the teeth on the belt mesh with the teeth on both pulleys.

► **Important** Do not dislodge the vertical flex cable from its ZIF connector.

2. Gently turn the horizontal lead-screw pulley to the right and gradually push the belt back until it is secure on the pulley.
3. Push down on the motor to apply tension to the belt and tighten one screw. Check the belt tension by using your thumb and forefinger to pinch the belt together in the middle. There should be a $\frac{1}{4}$ -inch (6.4 mm) gap in the middle when you apply 3.5 in-pounds (4.0 kg-cm) of pressure on the belt. If you need to adjust the tension, loosen the screw and reposition the motor.

CAUTION

Too tight tension on the belt will cause excessive wear of the motor.

4. When the belt tension is correct, tighten the upper and lower screws to 2.0 inch-pounds (2.3 kg-cm) of torque.
5. Connect the following cables to the ECHM card (see Figure 4-13):

Connect the ...	To ...
Encoder connector (4-pin)*	Connector J3 (4-pin)
Power connector (2-pin)	Connector J2 (2-pin)

* Route the 4-pin encoder cable under, then over, the 2-pin power cable (so the 4-pin encoder cable is on top as shown in Figure 4-13) before connecting it to J3 on the ECHM card.

6. Gently push the power and encoder cables down against the horizontal motor so they will not rub against the CHM shield or vertical flex cable during operation.
7. Carefully slide the vertical flex cable into the ZIF connector on the ECHM card. Push up on both sides of the connector to close it (see Figure 4-14).
8. Using a T-8 bit, attach the vertical flex cable ground connection to the horizontal motor assembly (see Figure 4-14). Tighten the screw to 2.0 inch-pounds (2.2 kg-cm) of torque.

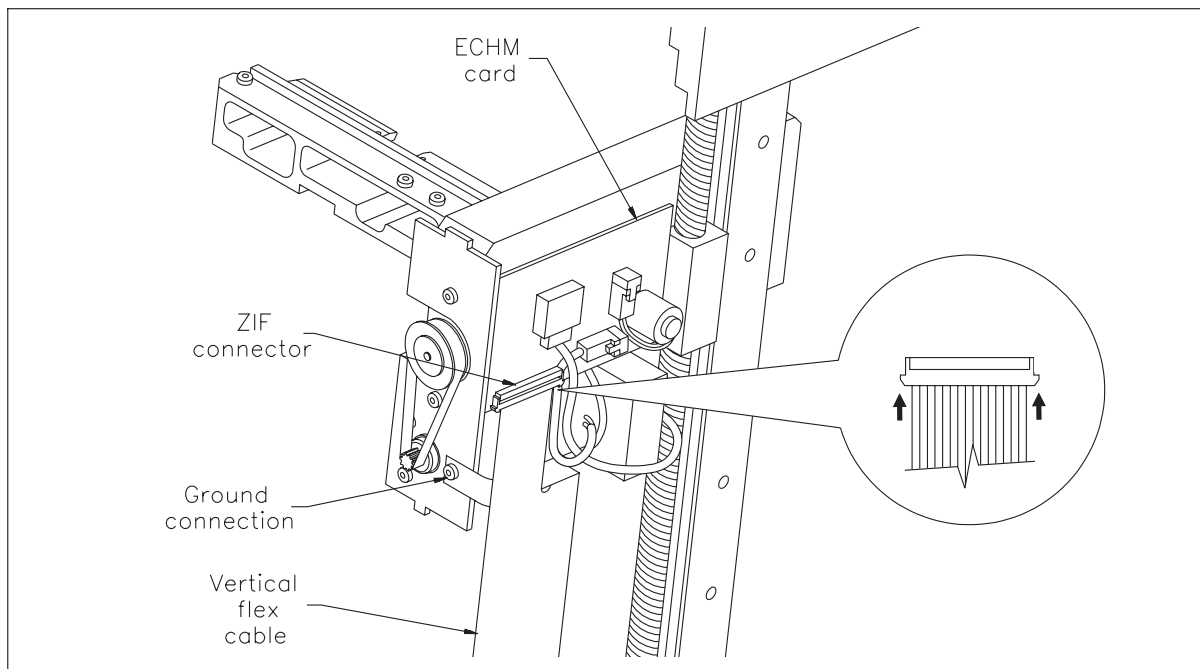


Figure 4-14 Connecting the vertical flex cable

After replacing the horizontal drive motor

1. Reinstall the CHM shield and attach the vertical flex cable to it (see Section 4.2).
2. Replace the cover assembly (see Section 2.6).
3. Reconnect the SCSI cable(s) and power cord.
4. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.
5. Calibrate the cartridge sensor position and the eject position (see Appendix B).

► **Important** If you do not calibrate the cartridge sensor position and the eject position after installing the tape drive, the CHM will not be able to successfully pick and place cartridges.

6. Optionally, use Diagnostics on the LCD menu to move the CHM along the horizontal and vertical axes, cycle the solenoid, and perform picks, places, and moves (see Appendix A).

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the power cord inserted correctly? ✓ Are the SCSI cables connected? terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library? ✓ Are all connections to the motor control card secure? Refer to Section 6.3. ✓ Are the connections to the tape drive secure? ✓ Is the tension on the horizontal drive belt properly adjusted? ✓ Is the vertical flex cable firmly seated in the ZIF connectors on the ECHM card and the motor control card? ✓ Are the cables securely attached to the ECHM card?

4.7 Replacing the vertical drive belt

After following the maintenance preparation instructions in Section 4.1, follow these instructions to replace the vertical drive belt.

Note: Replace the vertical drive belt whenever you replace the motor.

Do this first

- ✓ Locate the calibration block included with the replacement CHM. You will need this block to make sure the CHM is properly installed.
- ✓ Remove the data cartridge magazine (see Section 2.4).
- ✓ Remove the CHM shield (see Section 4.2)
- ✓ Remove the CHM (see Section 4.3) and place it on a flat, protected surface with the vertical drive belt toward you.

Removing the vertical drive belt

Using your fingers, turn the vertical lead-screw pulley to the left while gently pulling the belt off the motor pulley (see Figure 4-15).

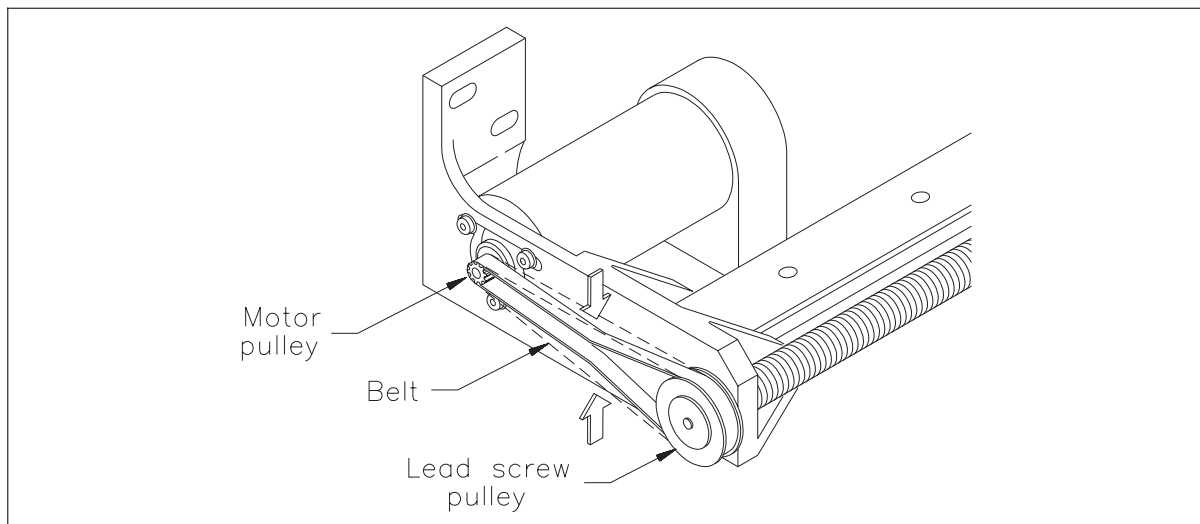


Figure 4-15 Replacing the vertical drive belt

Installing the vertical drive belt

1. Place one end of the belt around the vertical lead-screw pulley, then slide the other end onto the motor pulley. Make sure that the teeth on the belt mesh with the teeth on both pulleys.
2. Gently turn the vertical lead-screw pulley to the right and gradually push the belt back until it is secure on the pulley.
3. Check the belt's tension by pinching the belt together (see Figure 4-15). There should be a $\frac{1}{4}$ -inch (6.4 mm) gap in the middle when you apply 3.5 in-pounds (4.0 kg-cm) of pressure on the belt. If you need to adjust the tension, loosen the screws and push the motor to the left to apply tension to the belt.

CAUTION

Too tight tension on the belt will cause excessive wear of the motor.

4. When the belt is properly adjusted, tighten the three screws to 2.0 inch-pounds of torque (2.2 kg-cm).

After replacing the vertical drive belt

1. Reinstall the CHM (see Section 4.3).
2. Reinstall the CHM shield and attach the vertical flex cable to it (see Section 4.2).
3. Reconnect the SCSI cable(s) and power cord.
4. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.
5. Calibrate the cartridge sensor position and the eject position (see Appendix B).

► **Important** If you do not calibrate the cartridge sensor position and the eject position after installing the vertical drive belt, the CHM will not be able to successfully pick and place cartridges.

6. Optionally, use Diagnostics on the LCD menu to move the CHM along the horizontal and vertical axes, cycle the solenoid, and perform picks, places, and moves (see Appendix A).

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the power cord inserted correctly? ✓ Are the SCSI cables connected? terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library? See Figure 2-7. ✓ Are all connections to the motor control card secure? Refer to Section 6.3. ✓ Are the connections to the tape drive secure? ✓ Is the tension on the vertical drive belt properly adjusted? ✓ Is the vertical flex cable firmly seated in the ZIF connectors on the ECHM card and the motor control card?

4.8 Replacing the vertical drive motor

After following the maintenance preparation instructions in Section 4.1, follow these instructions to replace the vertical drive motor.

Do this first

- ✓ Locate the calibration block included with the replacement CHM. You will need this block to calibrate the CHM.
- ✓ Obtain these tools:
 - Torque limiting screwdriver
 - T-8 bit
- ✓ Remove the data cartridge magazine (see Section 2.4).
- ✓ Remove the CHM shield (see Section 4.2).
- ✓ Remove the CHM (see Section 4.3) and place it on a flat, protected surface with the vertical drive belt toward you.
- ✓ Remove the vertical drive belt (see Section 4.7).

Note: For best results, install a new vertical drive belt whenever you replace the motor.

Removing the vertical drive motor

1. Using a T-8 bit, remove the three screws and lock washers that hold the vertical drive motor to the lower CHM mounting bracket (see Figure 4-16).
2. Lift the motor away from the mounting bracket.

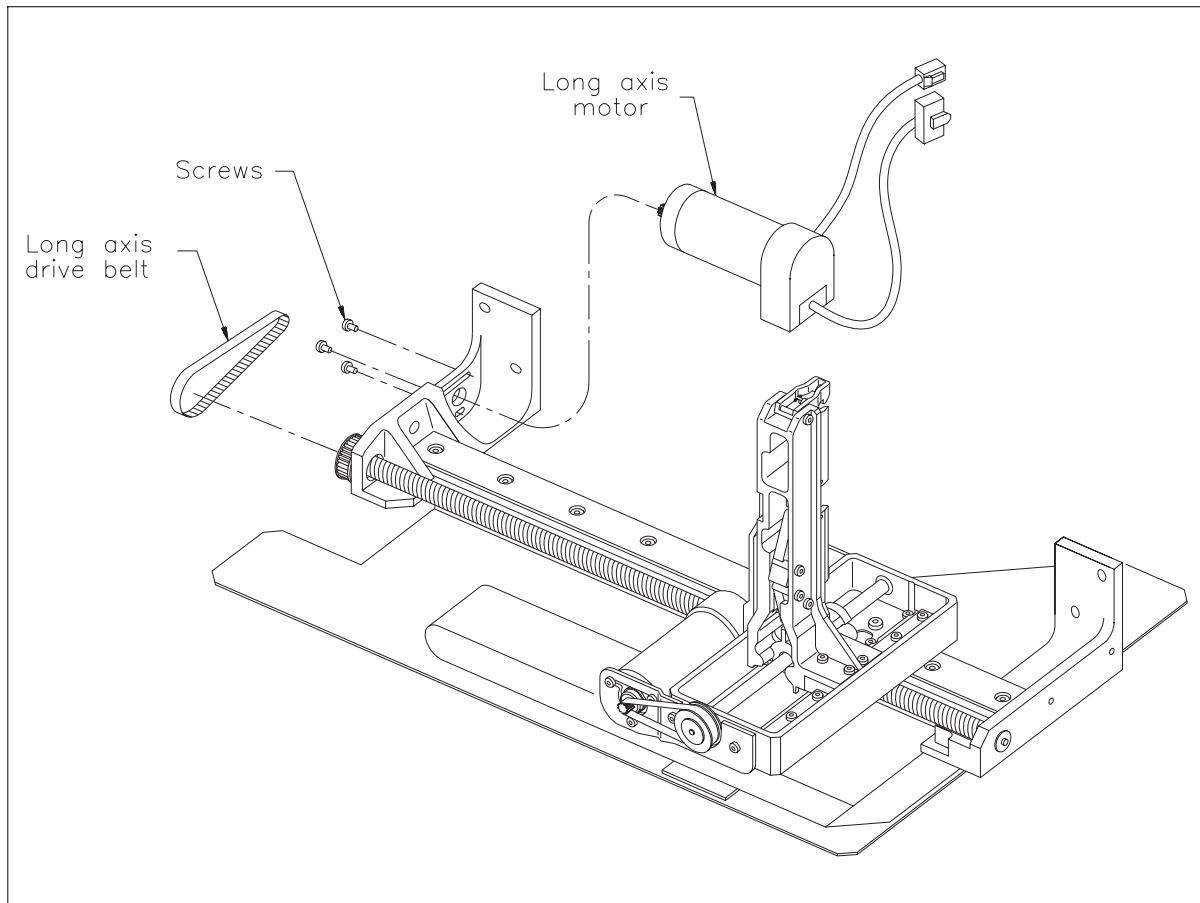


Figure 4-16 Replacing the vertical drive motor

Installing the vertical drive motor

1. Position the motor against the mounting bracket. Using a T-8 bit, replace but do not tighten the three screws.
2. Install a new vertical drive belt. Place one end of the belt around the vertical lead-screw pulley, then slide the other end onto the motor pulley. Make sure that the teeth on the belt mesh with the teeth on both pulleys.

2. Gently turn the vertical lead-screw pulley to the right and gradually push the belt back until it is secure on the pulley.
3. Check the belt's tension by pinching the belt together (see Figure 4-17). There should be a $\frac{1}{4}$ -inch (6.4 mm) gap in the middle when you apply 3.5 in-pounds (4.0 kg-cm) of pressure on the belt. If you need to adjust the tension, loosen the screws and push the motor to the left to apply tension to the belt.

CAUTION

Too tight tension on the belt will cause excessive wear of the motor.

4. When the belt is properly adjusted, tighten the three screws to 2.0 inch-pounds of torque (2.3 kg-cm).

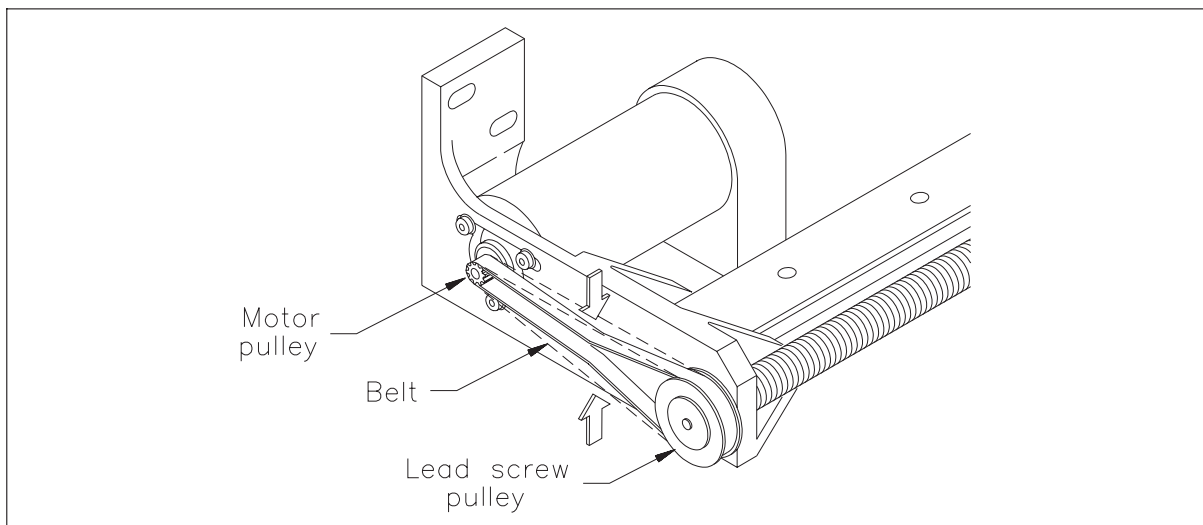


Figure 4-17 Installing the vertical drive belt

After replacing the vertical drive motor

1. Reinstall the CHM (see Section 4.3).
2. Reinstall the CHM shield (see Section 4.2)
3. Replace the cover assembly (see Section 2.6).
4. Reconnect the SCSI cable(s) and power cord.
5. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.
6. Calibrate the cartridge sensor position and the eject position (see Appendix B).

► **Important** If you do not calibrate the cartridge sensor position and the eject position after installing the vertical drive motor, the CHM will not be able to successfully pick and place cartridges.

7. Optionally, use Diagnostics on the LCD menu to move the CHM along the horizontal and vertical axes, cycle the solenoid, and perform picks, places, and moves (see Appendix A).

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Are the SCSI cables connected? terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library? See Figure 2-7. ✓ Are all connections to the motor control card secure? Refer to Section 6.3. ✓ Is the tension on the vertical drive belt properly adjusted? ✓ Is the vertical flex cable firmly seated in the ZIF connectors on the ECHM card and the motor control card? ✓ Are all connections to the tape drive secure?

5 Replacing Tape Drive and Cartridge Components

This chapter describes how to replace the following tape drive and cartridge components:

- Tape drive
- Tape drive faceplate with sensor
- Data cartridge mounting plate

5.1 Maintenance preparation

Before accessing tape drive components, follow these maintenance preparation procedures.

WARNING !

Before performing any maintenance procedure, be sure that the library power switch is in the off position and that the power cord is disconnected from the library and the outlet.

- ✓ Follow the static protection precautions and maintenance guidelines in Section 2.2.
- ✓ Remove any cartridge from the tape drive (see Section 2.5).
- ✓ Move the CHM to a position that allows you to access the screws that secure the tape drive to the chassis (see Section 2.3).
- ✓ Shut down the library (see Section 2.5).
- ✓ Remove the cover (see Section 2.6).

5.2 Replacing the tape drive

After following the maintenance preparation instructions in Section 5.1, follow these instructions to replace the tape drive.

Do this first

✓ Obtain these tools:

- Torque limiting screwdriver
- T-10 bit
- T-15 bit
- #0 Phillips screwdriver
- Flat-nose wiring pliers (if the tape drive includes resistor terminators)

Removing the tape drive

1. Disconnect the drive sensor cable from the tape drive faceplate (see Figure 5-1).

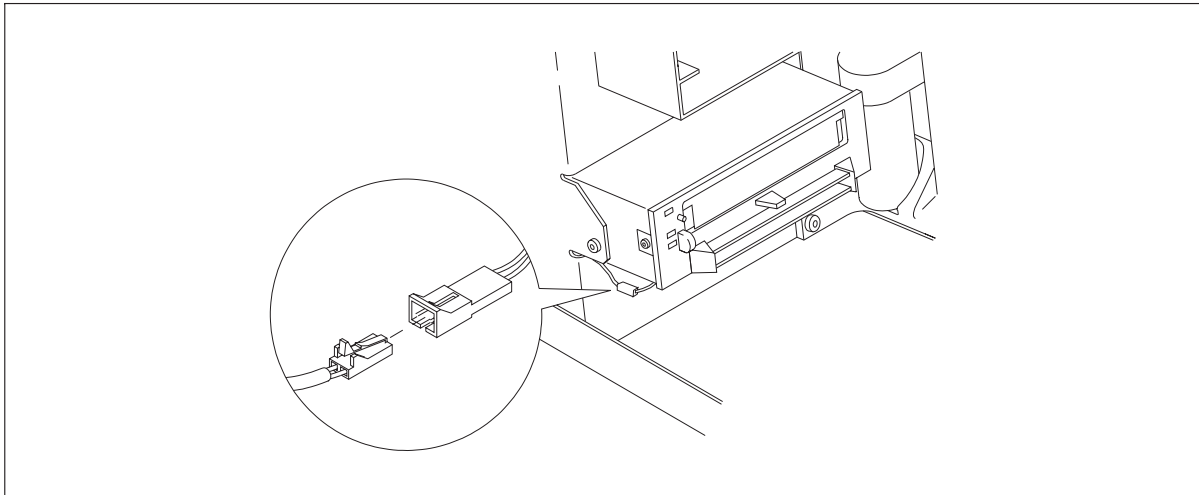


Figure 5-1 Disconnecting the drive sensor cable

2. Using a T-15 bit, remove the single mounting screw (❷ in Figure 5-2) on the right side of the tape drive. Using a T-10 bit, remove the two mounting screws (❶ in Figure 5-2) on the left side.

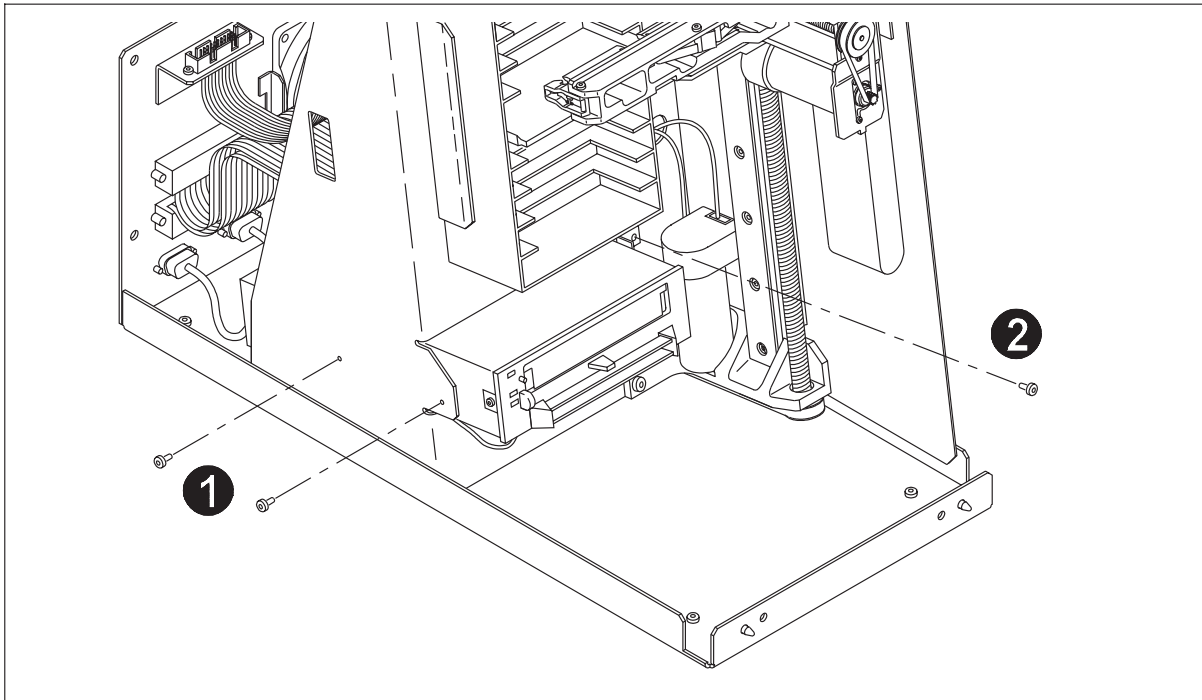


Figure 5-2 Removing the tape drive screws

3. Slide the tape drive forward (approximately 2 inches or 5 cm) so you can reach the cables and connectors on the back of the tape drive from the interior of the library.
4. Disconnect all of the cables from the back of the tape drive.
5. From the front of the library, slide the tape drive out of the enclosure.

CAUTION

Be careful not to disturb the cables attached to the CHM assembly.

Preparing the tape drive

If you are reinstalling the tape drive originally installed in the library, skip the following sections and go to page 5-6. If you are installing a new tape drive or replacing the faceplate on the a tape drive, you must first prepare the tape drive as described in the following sections.

Install the tape drive faceplate

A specially designed faceplate is required for proper library operation.

Note: Do not remove the faceplate from the tape drive being replaced and install it on another tape drive. Refer to *EXB-10h 8mm Library Illustrated Parts Catalog* if you need to order a faceplate.

1. Use a #0 Phillips screwdriver to remove the screws holding the original faceplate to the tape drive.
2. On the back of the replacement faceplate, thread the two wires in the drive sensor cable through the groove. Make sure that the wires lie flat and untwisted in the groove (see Figure 5-3).

► **Important** If the cable wires do not lie flat in the groove, the drive sensor may not function.

3. Mount the faceplate over the tape drive. Use a #0 Phillips screwdriver to replace the screws on each side and tighten them to 1.9 inch-pounds (2.19 kg-cm) of torque.

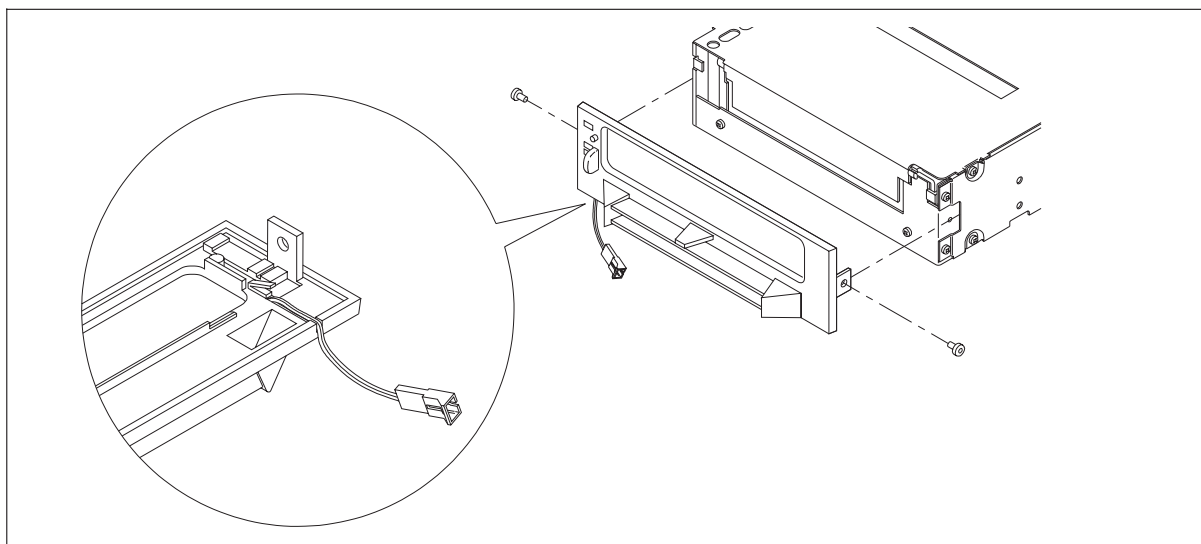


Figure 5-3 Installing the tape drive faceplate

Remove the terminators and jumpers

1. If the tape drive has resistor terminators (❶ in Figure 5-4) installed, use flat-nosed wiring pliers to remove them.
2. Remove any jumpers from the SCSI ID jumper block (❷ in Figure 5-4).

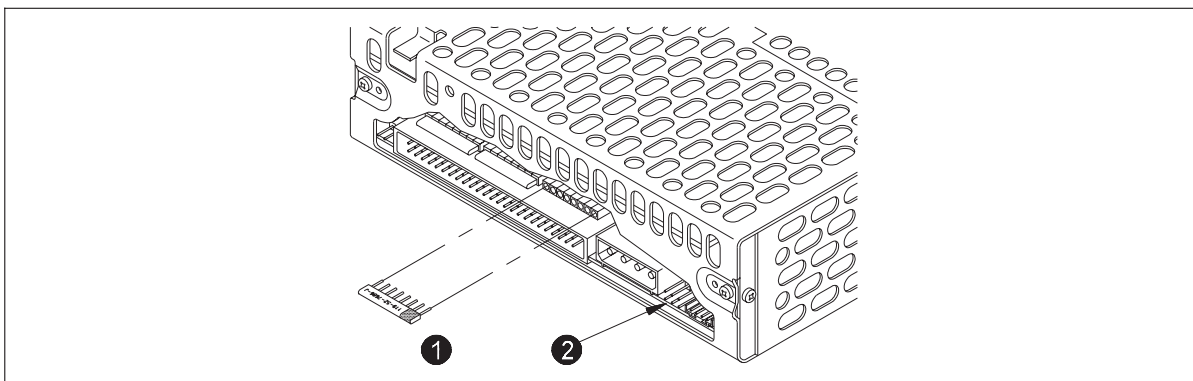


Figure 5-4 Removing the terminators and SCSI ID jumpers (**Note:** The position of the terminators and SCSI ID jumpers may differ on your tape drive.)

Install the mounting bracket

1. Place the mounting bracket against the right side of the tape drive. Insert two #3 metric screws in the lower two holes in the mounting bracket.
2. While holding the bracket against the tape drive and applying pressure toward the back of the tape, use a T-10 bit to tighten the screws to 4.0 inch-pounds (4.6 kg-cm) of torque.

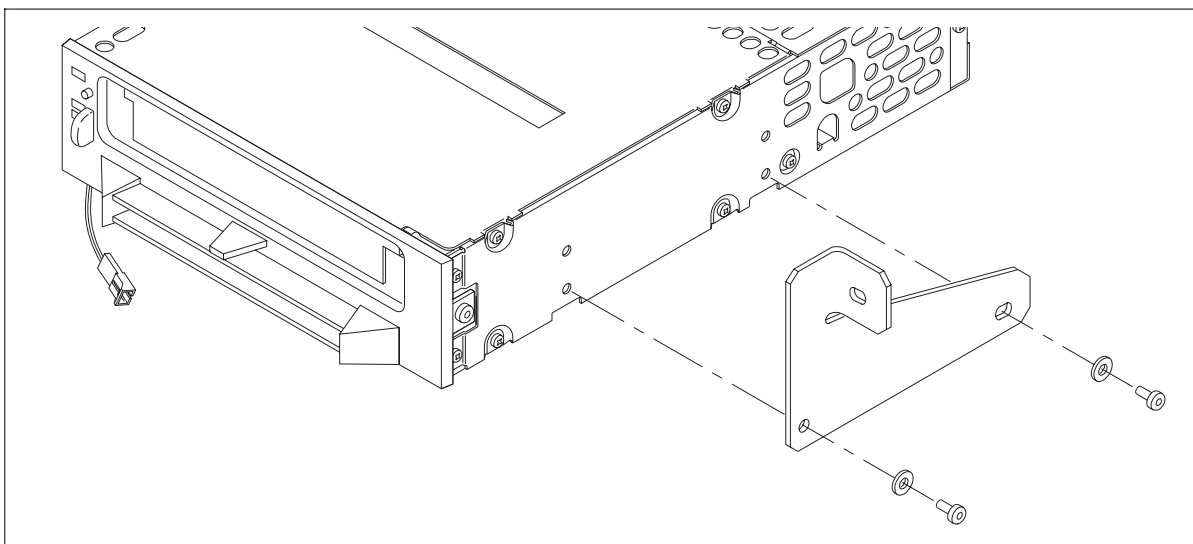


Figure 5-5 Attaching the mounting bracket to the tape drive

Installing the tape drive

CAUTION

Before installing the tape drive, make sure the CHM cables and the drive sensor cable are not in the way.

1. From the front of the library, slide the tape drive into the library enclosure, raising the rear of the tape drive slightly so that it clears the baffle (❶ in Figure 5-6) on the lower frame.

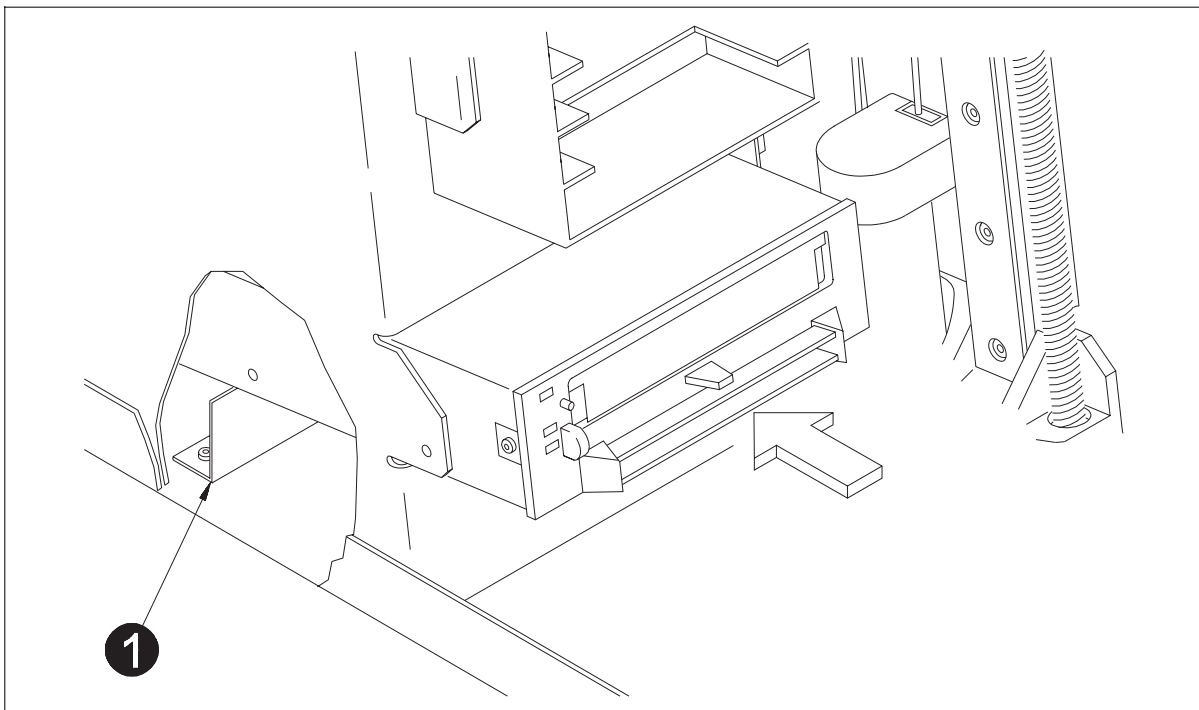


Figure 5-6 Sliding the tape drive into the chassis

2. Refer to Figure 5-7 and connect the cables to the back of the tape drive as follows:

Connect the...	To the...
SCSI cable (50-pin ribbon cable)	SCSI connector (❶ in Figure 5-7) on the back of the tape drive.
Internal power cable connector (4-pin, female)	Power connector (❷ in Figure 5-7) on the back of the tape drive (4-pin male). The connector is keyed and only fits one way.
SCSI ID select cable connector (6-pin, female)	SCSI ID jumper block (❸ in Figure 5-7) on the back of the tape drive. Make sure that pin 1 of the 6-pin connector (labeled with a white mark on the top of the connector) is connected to pin 1 of the SCSI ID jumper block on the tape drive.
CTS Monitor cable connector (3-pin, female)	Monitor port (❹ in Figure 5-7) on the back of the tape drive. Note: The CTS Monitor port on the back of the library has two cables attached to it. If you are installing a tape drive with a 4-pin Monitor port on the back, connect the cable with a 4-pin connector to the tape drive.

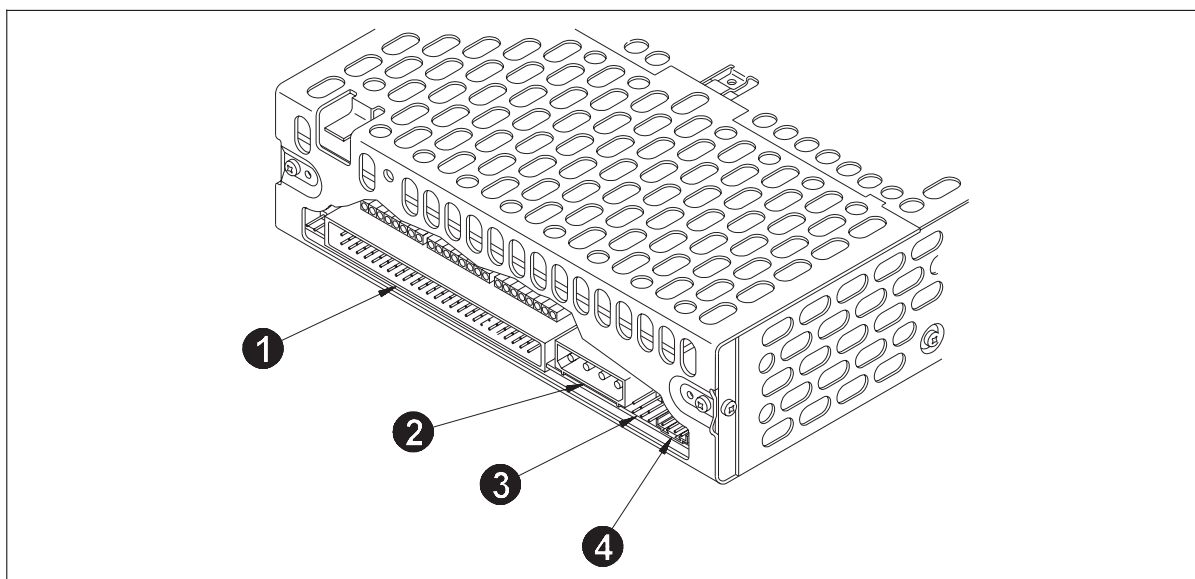


Figure 5-7 Cable connections to the tape drive (**Note:** The position of the connectors may differ on your tape drive.)

3. Connect the drive sensor cable (see Figure 5-8).

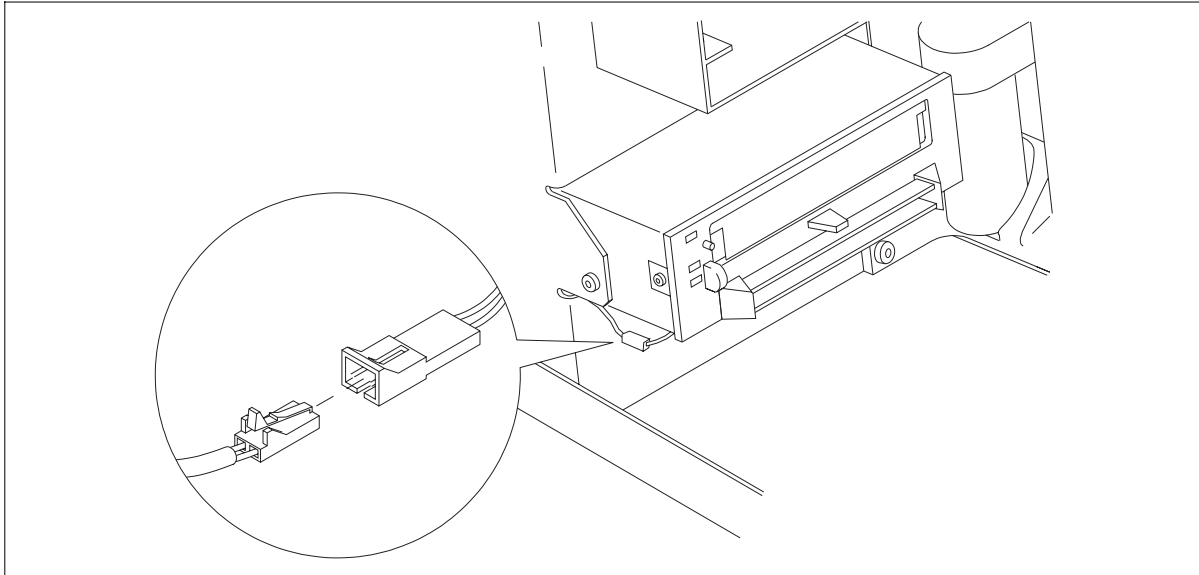


Figure 5-8 Connecting the drive sensor cable

4. Make sure that the library's internal SCSI cable is securely connected to the SCSI card. If you have a differential SCSI configuration, make sure the cable is connected to the differential SCSI connector on the SCSI card. If you have a single-ended SCSI configuration, make sure the cable is connected to the single-ended SCSI connector on the SCSI card (see Figure 5-9).

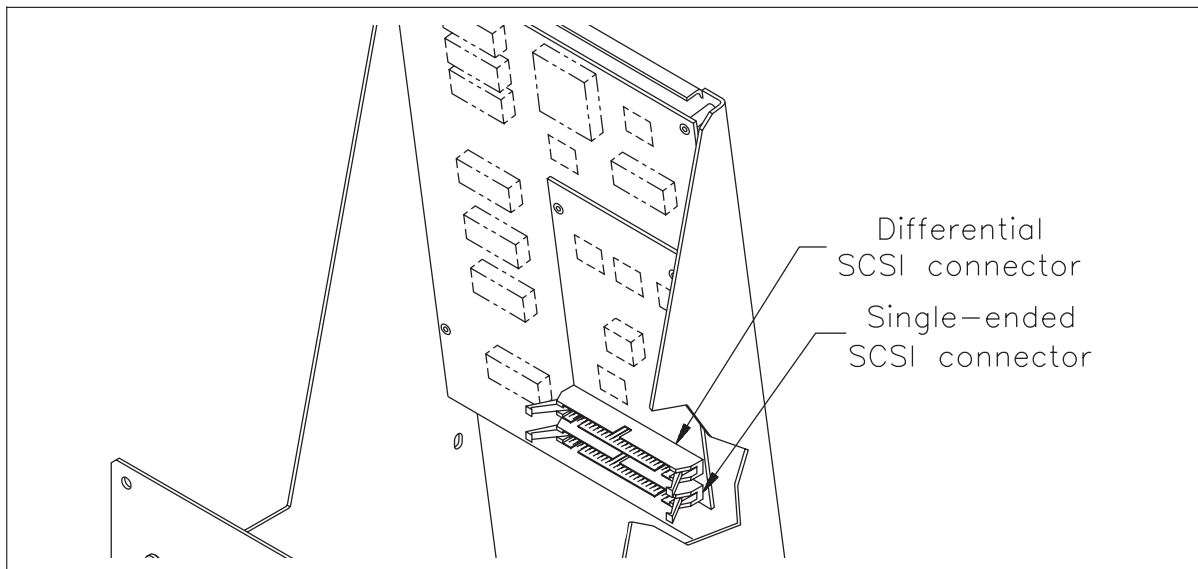


Figure 5-9 Connecting the tape drive SCSI cable to the SCSI card

5. Align the three mounting holes for the tape drive with the two holes in the left side of the library chassis. Align the hole in the tape drive mounting bracket with the hole in the right side of the library chassis. Make sure the tape drive is flush against the chassis.
6. Use a T-10 bit to insert the two #3 metric screws (❶ in Figure 5-10) on the left side of the tape drive, but do not tighten them. Use a T-15 bit to insert the #6-32 screw (❷ in Figure 5-10) into the right side of the tape drive, but do not tighten it.
7. While gently pushing the tape drive toward the back of the library, tighten the two screws (❶ in Figure 5-10) on the left side to 4.0 inch-pounds (4.6 kg-cm) of torque. Tighten the screw (❷ in Figure 5-10) on the right to 8.0 inch-pounds (9.2 kg-cm) of torque.

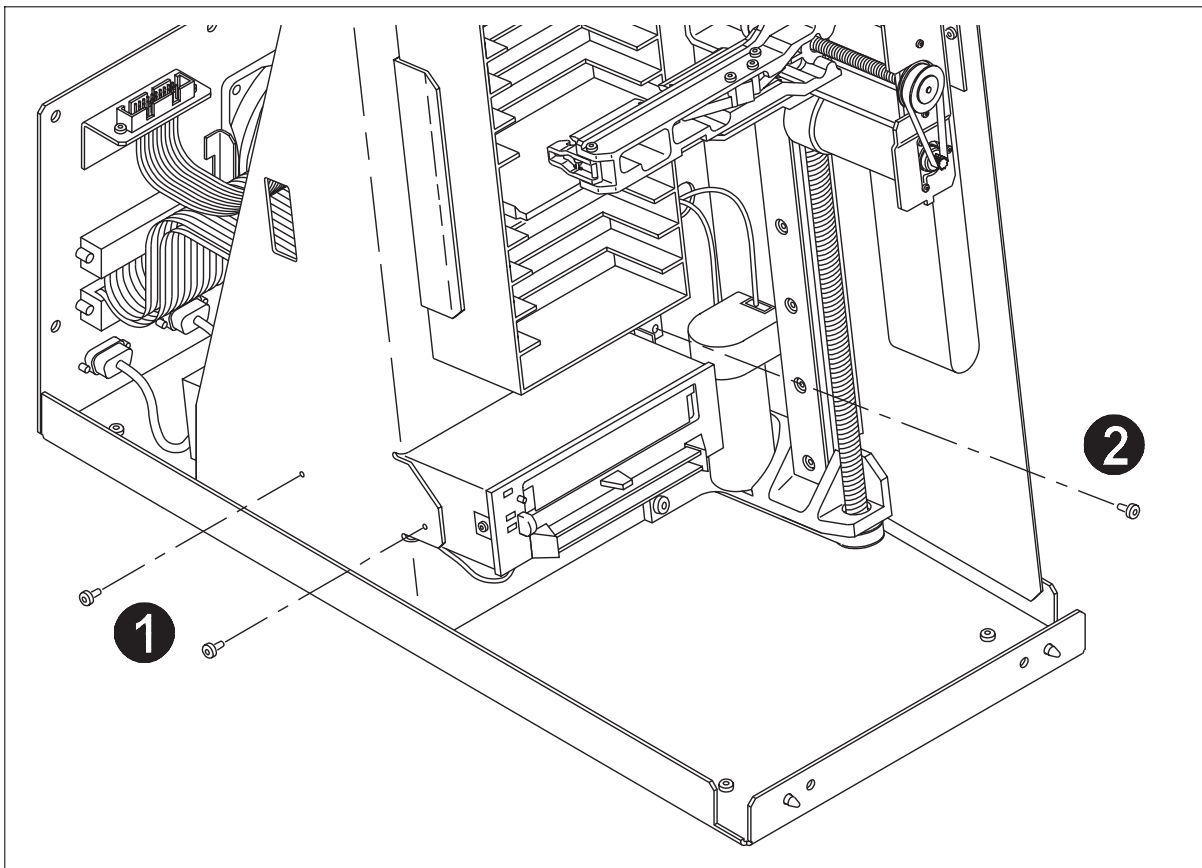


Figure 5-10 Attaching the tape drive to the chassis

After replacing the tape drive

1. Replace the cover assembly (see Section 2.6).
2. Reconnect the SCSI cable(s) and power cord.
3. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.

Note: When you replace the tape drive, the new tape drive automatically assumes the SCSI ID of the old tape drive. If you need to change the SCSI ID, refer to *EXB-10h 8mm Library Installation and Operation*.

4. If desired, check the tape drive installation as follows (see Appendix A for instruction for using the LCD menu):
 - a. Change the control mode to LCD.
 - b. Locate a blank cartridge and place it in slot 1 (the bottommost slot of the magazine).
 - c. Display the Diagnostics Menu. Use Move Cartridge to pick the cartridge from slot 1 (source index 1) and move it to the tape drive (destination index 0), then select Load Drive. This determines whether the tape drive is correctly positioned so that the CHM can load a cartridge.
 - d. Display the System Sensors screen. Make certain the Drive Unloaded line displays 0 (cartridge loaded in the tape drive). Open the library door, and press the tape drive's unload button to eject the cartridge from the tape drive. Make certain the Drive Unload line displays 1 (no cartridge loaded in the tape drive). This determines whether the faceplate is installed correctly and whether the sensor on the back of the faceplate is operating.
 - e. Return to the original control mode.

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the power cord inserted correctly? ✓ Are the SCSI cables connected? ✓ Is the SCSI bus terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library? See Figure 2-7. ✓ Are all connections to the motor control card secure and the SCSI card secure? Refer to Section 6.3. ✓ Did you remove the resistor terminators and SCSI ID jumpers from the back of the tape drive? ✓ Are all connections to the tape drive secure?
The library does not detect an ejected cartridge.	Remove the tape drive faceplate and make sure that the wires lie flat and untwisted in the groove. Failure to do so will prevent the sensor switch from operating correctly (see Section 5.2).

5.3 Replacing the magazine mounting plate

Follow these instructions to remove or replace the magazine mounting plate.

Do this first

- ✓ Follow the ESD guidelines provided in Section 2.2.
- ✓ Move the CHM to a position that allows you to access the data cartridge magazine and magazine mounting plate (see Section 2.3).
- ✓ Turn off the library power.
- ✓ Remove the data cartridge magazine, if any (see Section 2.4).
- ✓ Obtain these tools:
 - Torque limiting screwdriver
 - T-15 TORX bit

Removing the magazine mounting plate

1. Using a T-15 TORX bit, remove the four screws that secure the mounting plate to the chassis wall (see Figure 5-11).

Note: The library is shown without the cover for clarity. You do not need to remove the cover to replace the mounting plate.

2. Remove the mounting plate.

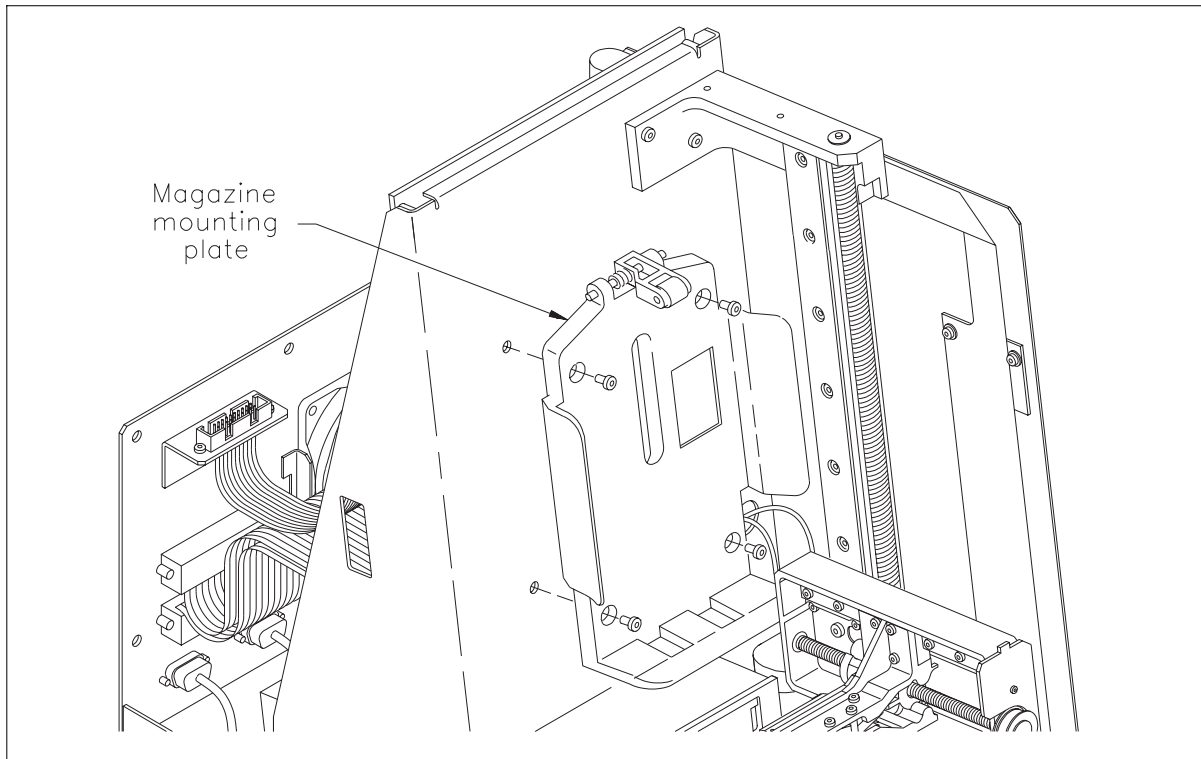


Figure 5-11 Removing the magazine mounting plate (library shown without cover for clarity)

Installing the magazine mounting plate

1. Position the mounting plate against the chassis (see Figure 5-11). Make sure that the alignment pins on the mounting plate engage the alignment holes in the chassis wall.
2. Using a T-15 bit, replace the four 6-32 \times 0.5 panhead screws that hold the mounting plate to the chassis wall. Tighten the screws to 8.0 inch-pounds (9.2 kg-cm) of torque.

After replacing a magazine mounting plate

Reinstall the data cartridge magazine and turn on the power.

Notes

6 Replacing Internal Electronic Components

This chapter describes how to replace the following internal components:

- SCSI card
- Motor control card
- Power supply

6.1 Maintenance preparation

Before accessing internal components, follow these maintenance preparation procedures.

WARNING !

Before performing any maintenance procedure, be sure that the library power switch is in the off position and that the power cord is disconnected from the library and the outlet.

- ✓ Follow the static protection precautions and maintenance guidelines in Section 2.2.
- ✓ Shut down the library (see Section 2.5).
- ✓ Remove the cover (see Section 2.6).

6.2 Replacing the SCSI card

After following the maintenance preparation instructions in Section 6.1, follow these instructions to replace the SCSI card.

Do this first

- ✓ Obtain these tools:
 - Torque limiting screwdriver
 - T-15 bit
- ✓ Place a sheet of paper over the top of the tape drive. This may help prevent you from accidentally dropping the screws down into the chassis and tape drive.

Removing the SCSI card

1. Disconnect the interface cable from the motor control card (see Figure 6-1).
2. Disconnect the SCSI ribbon cable from the SCSI card by releasing the retaining clips on the connector.
3. Using a T-15 bit, remove the four screws that hold the SCSI card onto the hex standoffs.

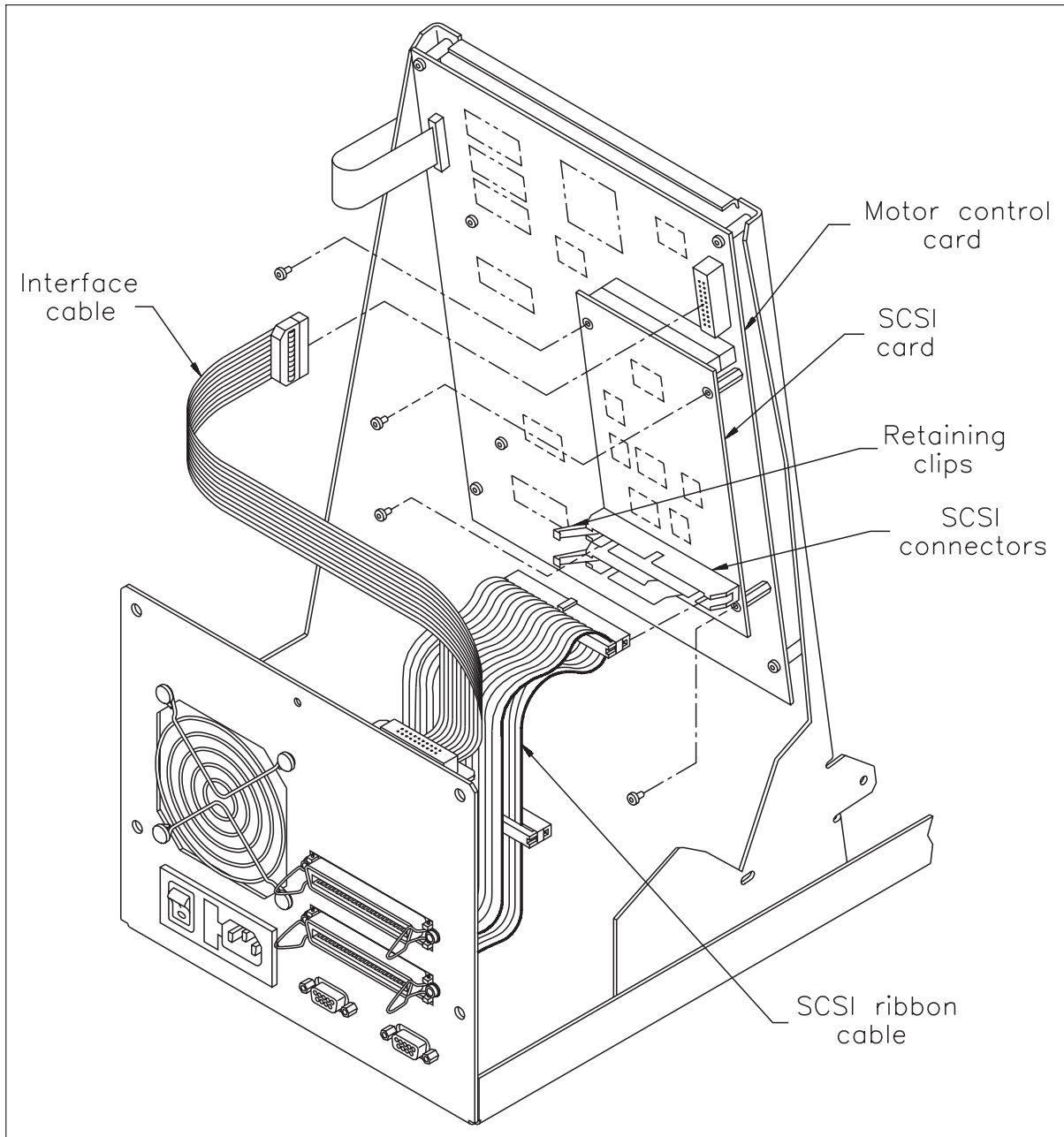


Figure 6-1 Disconnecting the SCSI card

4. Insert your fingers behind the SCSI card and pull gently and evenly on both sides of the card to disengage it from the 50-pin connector on the motor control card (see Figure 6-2).

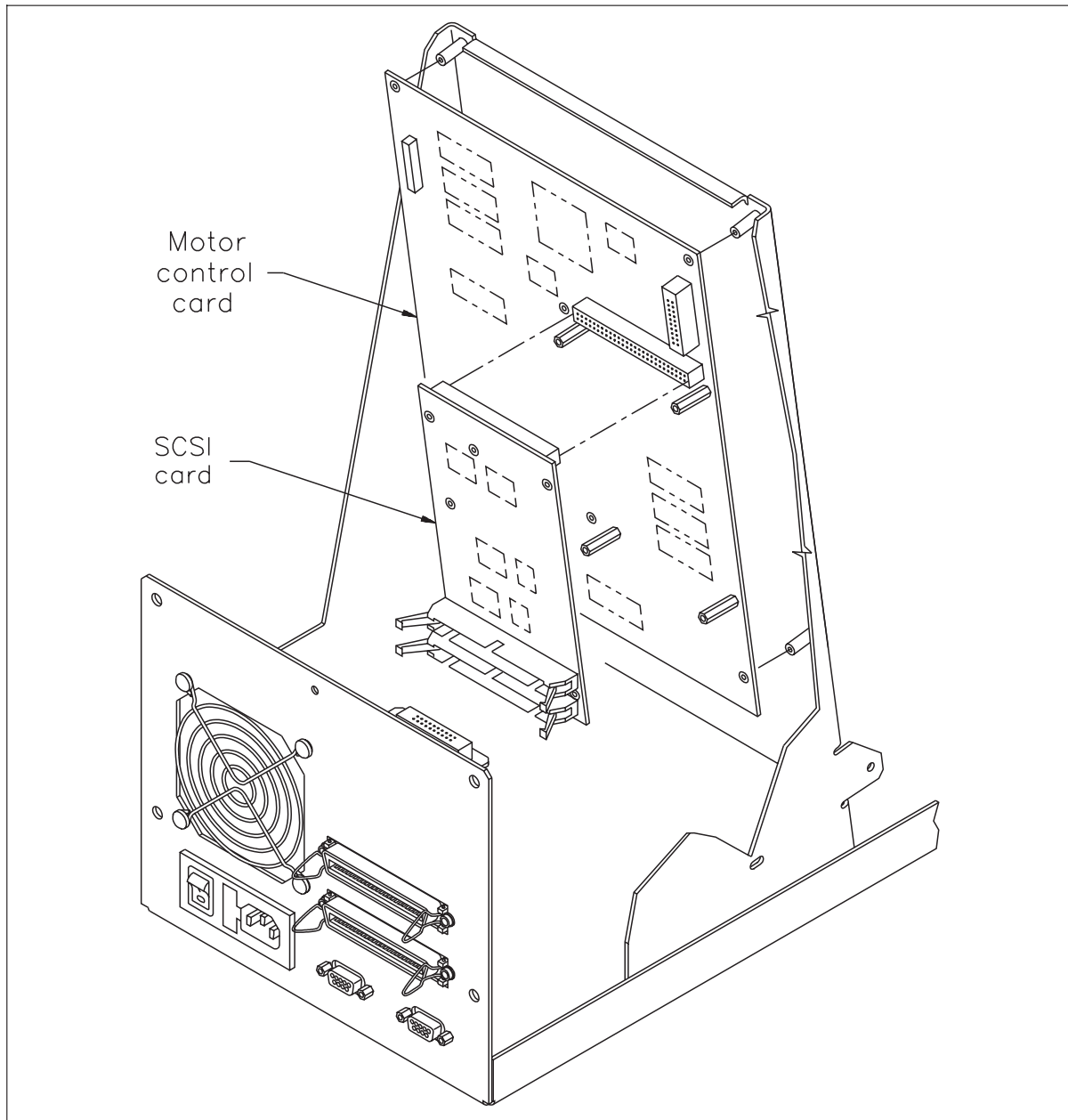


Figure 6-2 Replacing the SCSI card

Installing the SCSI card

1. Align the 50-pin connector on the back of the SCSI card with the connector on the motor control card (see Figure 6-2). Gently push the connectors together.
2. Using a T-15 bit, replace the four screws attaching the SCSI card to the motor control card (see Figure 6-3). First, tighten the lower right screw. Then, tighten the two upper screws, followed by the lower left screw. Tighten all screws to 8.0 inch-pounds (9.2 kg-cm) of torque.

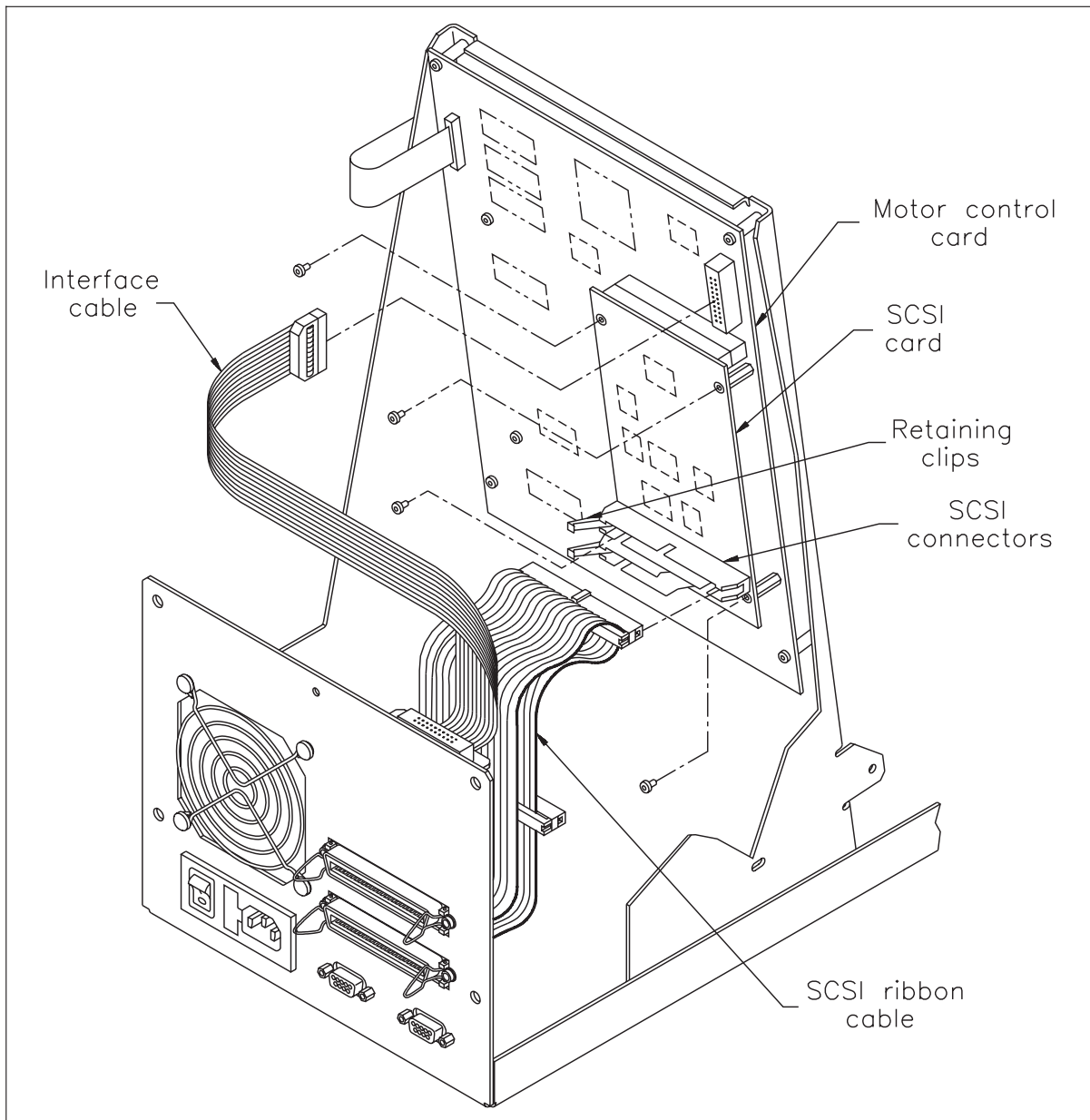


Figure 6-3 Disconnecting the SCSI card

3. Connect the SCSI ribbon cable to the SCSI card (see Figure 6-3). Push the cable in until it seats firmly in the connector. Secure the retaining clips around the cable connector.

► **Important** If you have a differential SCSI configuration, connect the cable to the “Diff SCSI” connector (the top SCSI connector) on the SCSI card. If you have a single-ended SCSI configuration, connect the cable to the “Sing SCSI” connector (the bottom connector) on the SCSI card.

4. Connect the interface cable to the motor control card (see Figure 6-3).

After replacing the SCSI card

1. Replace the cover assembly (see Section 2.6).
2. Reconnect the SCSI cable(s) and power cord.
3. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.
4. Make sure that the library and tape drive respond by using Diagnostics to issue several SCSI commands (see Appendix C).

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the power cord inserted correctly? ✓ Are the SCSI cables connected? ✓ Is the SCSI bus terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library? See Figure 2-7. ✓ Are all connections to the motor control card and the SCSI card secure? Refer to Section 6.3. ✓ Is the operator panel ribbon cable properly connected to the display card? ✓ Are all connections to the tape drive secure?

6.3 Replacing the motor control card

After following the maintenance preparation instructions in Section 6.1, follow these instructions to replace the motor control card.

Do this first

- ✓ Obtain these tools:
 - Torque limiting screwdriver
 - T-15 bit
- ✓ Place a sheet of paper over the top of the tape drive. This may help prevent you from accidentally dropping the screws down into the chassis and tape drive.
- ✓ Remove the SCSI card (see Section 6.2). The SCSI card is not included with the replacement motor control card.

Removing the motor control card

1. Disconnect the cables listed in the following table from the motor control card. Refer to Figure 6-4 for the location of each connection. You do not have to disconnect the cables in any particular order.

Note: Early models of the library have a grounding cable attached to the CHM shield. Use a T-15 bit to disconnect the grounding cable, if present, from the CHM shield.

Disconnect the...	From the...
Vertical flex cable	ZIF connector (J3)
Interface cable	Interface connector (J2)
DC harness cable	Power supply (J1)
Vertical encoder cable	Y-encoder connector (J12)
Vertical motor power cable	Y-power connector (J11)
SCSI ID select cable	CTS ID connector (J10)
CHS Monitor port	Diagnostic port connector (J7)
Drive sensor cable	Drive door connector (J6)

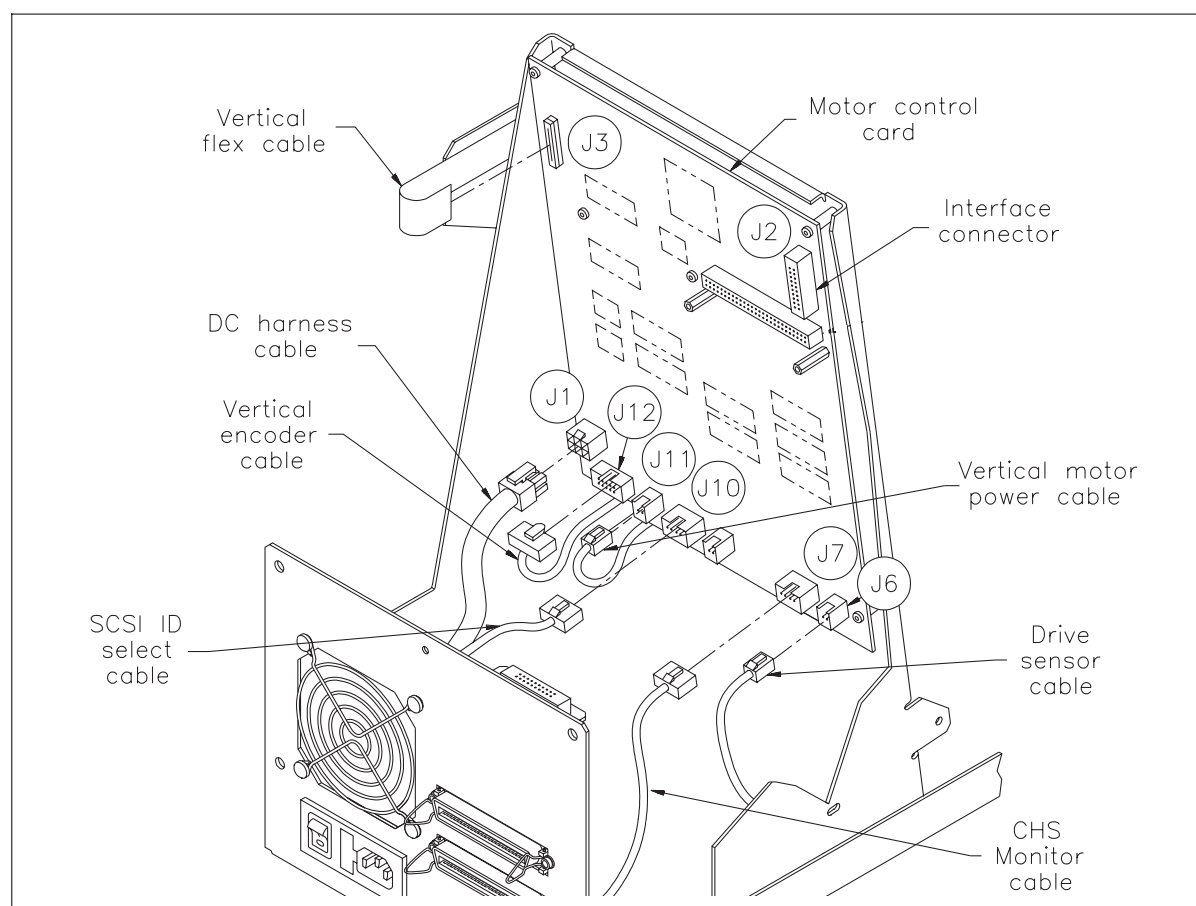


Figure 6-4 Cable connections to the motor control card

2. Use a T-15 bit to remove the six screws that hold the motor control card in place, then remove the card (see Figure 6-5).

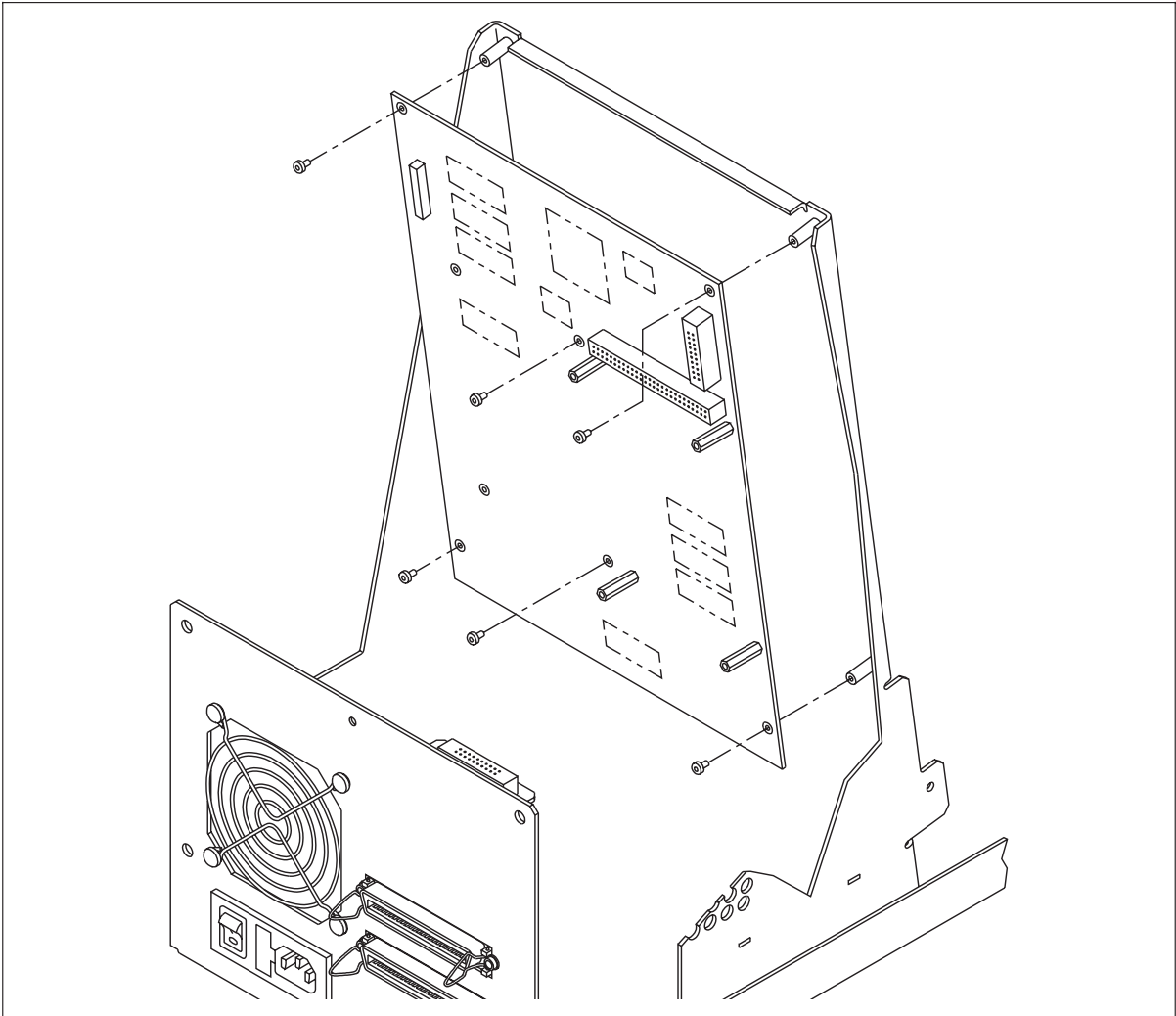


Figure 6-5 Replacing the motor control card

Installing the motor control card

1. Position the motor control card against the chassis wall, then use a T-15 bit, to install the six screws that attach the card to the chassis (see Figure 6-5). Tighten all screws to 8.0 inch-pounds (9.2 kg-cm) of torque.

► **Important** Use only the screws included with the new motor control card. Do not use the old screws.

2. Connect the cables listed in the following table to the controller card. Refer to Figure 6-6 for the location of each connection. You do not have to connect the cables in any particular order.

Note: If necessary, use a T-15 bit to reconnect the grounding cable to the CHM shield.

Connect the...	To the...
Vertical flex cable	ZIF connector (J3)
Interface cable	Interface connector (J2)
DC harness cable	Power supply (J1)
Vertical encoder cable	Y-encoder connector (J12)
Vertical motor power cable	Y-power connector (J11)
SCSI ID select cable	CTS ID connector (J10)
CHS Monitor cable	Diagnostic port connector (J7)
Drive sensor cable	Drive door connector (J6)

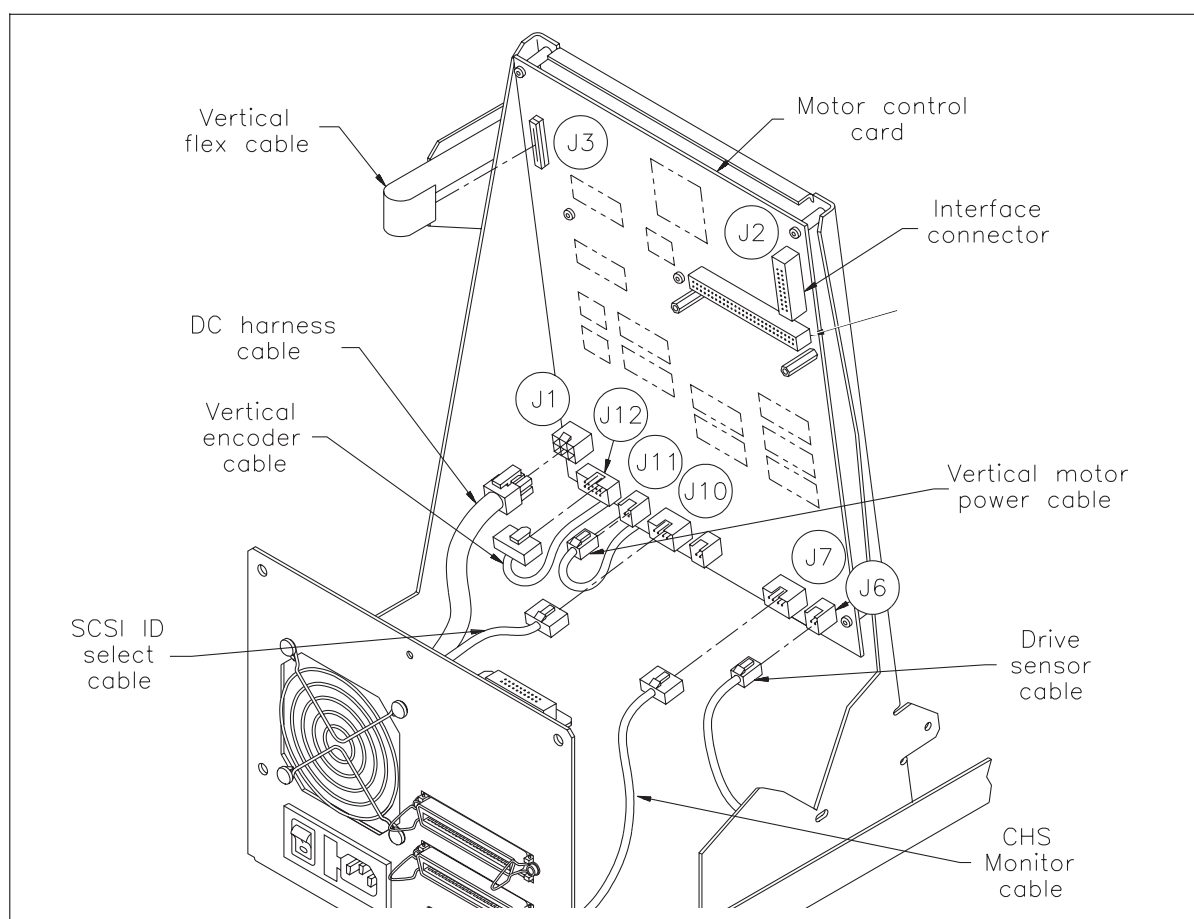


Figure 6-6 Cable connections to the motor control card

After replacing the motor control card

1. Install the SCSI card onto the new motor control card (see Section 6.2).
2. Reconnect the SCSI ribbon cable to the SCSI card (see Section 6.2).
3. Replace the cover assembly (see Section 2.6).
4. Reconnect the SCSI cable(s) and power cord.
5. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.
6. Calibrate the cartridge sensor position and the eject position (see Appendix B).
7. Optionally, use Diagnostics or the LCD menu to move the CHM along the horizontal and vertical axes, cycle the solenoid, and perform picks, places, and moves (see Appendix A).

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the power cord inserted correctly? ✓ Are the SCSI cables connected? ✓ Is the SCSI bus terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library? See Figure 2-7. ✓ Are all connections to the motor control card and the SCSI card secure? Refer to Section 6.3. ✓ Is the operator panel ribbon cable properly connected to the display card? ✓ Are all connections to the tape drive secure?

6.4 Replacing the power supply

After following the maintenance preparation instructions in Section 6.1, follow these instructions to replace the library power supply.

Do this first

- ✓ Obtain these tools:
 - Torque limiting screwdriver
 - T-10 bit
 - T-15 bit
- ✓ Detach the tape drive from the chassis and slide it forward out of the chassis to provide access to the power supply (see Section 5.2). It is not necessary to completely remove the tape drive.
- ✓ Disconnect the SCSI ribbon cable from the SCSI card to improve access.

Removing the power supply

1. Disconnect the DC harness cable from the 10-pin connector on the power supply (see Figure 6-7).

Note: The fan is omitted from Figure 6-7 for clarity; you do not need to remove the fan to remove the power supply.

2. Using a T-10 bit, remove the two screws and lock washers that hold the power supply onto the left side of the chassis (as viewed from the back).

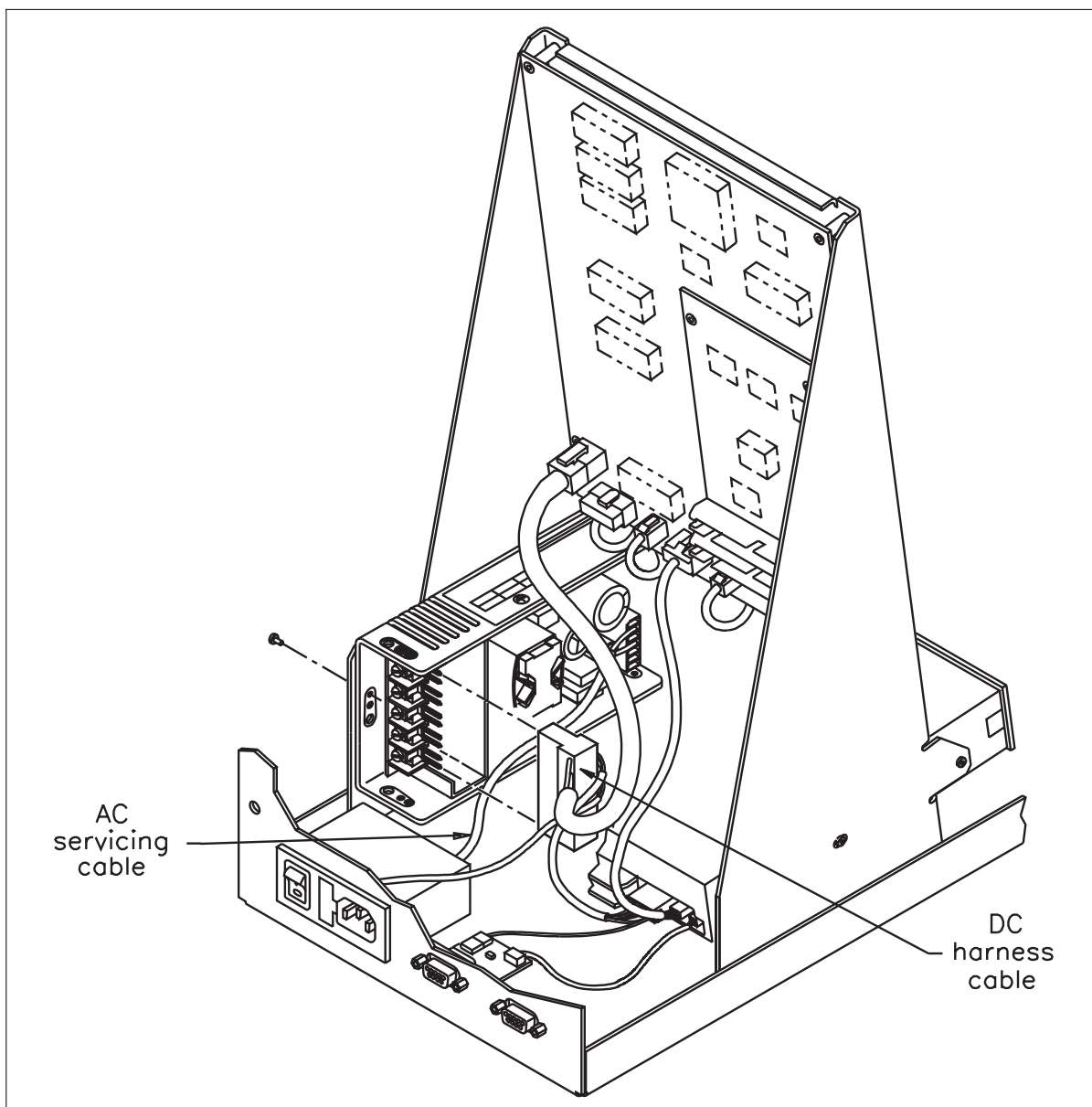


Figure 6-7 Disconnecting the DC harness cable from the power supply

3. Lift the power supply and attached AC servicing cable and carefully rotate the assembly out of the chassis (see Figure 6-8).
4. Disconnect the AC servicing cable (4-pin) from the power supply (see Figure 6-8) and set it aside. This cable is not included with the replacement power supply.

► **Important** Do not disconnect the AC servicing cable from the power entry module.

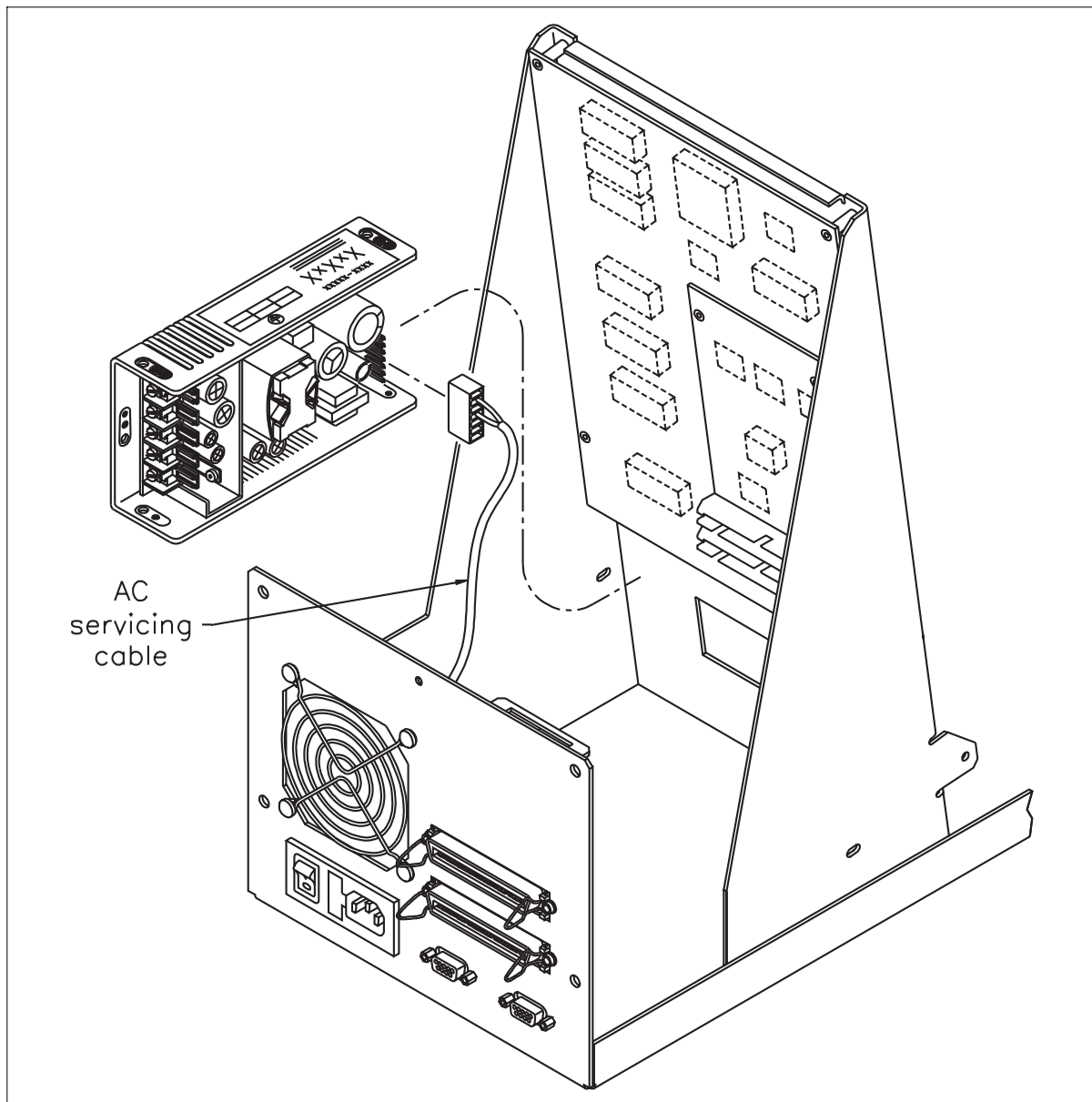


Figure 6-8 Replacing the power supply

Installing the power supply

1. Orient the AC servicing cable with the brown wire at the top, then plug the connector on to the power supply assembly (see Figure 6-8).
2. Position the power supply assembly so that the AC servicing cable is toward the front of the library (see Figure 6-9). Route the AC servicing cable under the bottom edge of the power supply and then toward the back panel.
3. Using a T-10 bit, install the two screws and lock washers that secure the power supply to the left side of the chassis. Tighten the screws to 8.0 inch-pounds (9.2 kg-cm) of torque.
4. Push the keyed connector on the DC harness cable on to the DC power connector on the power supply (see Figure 6-9).

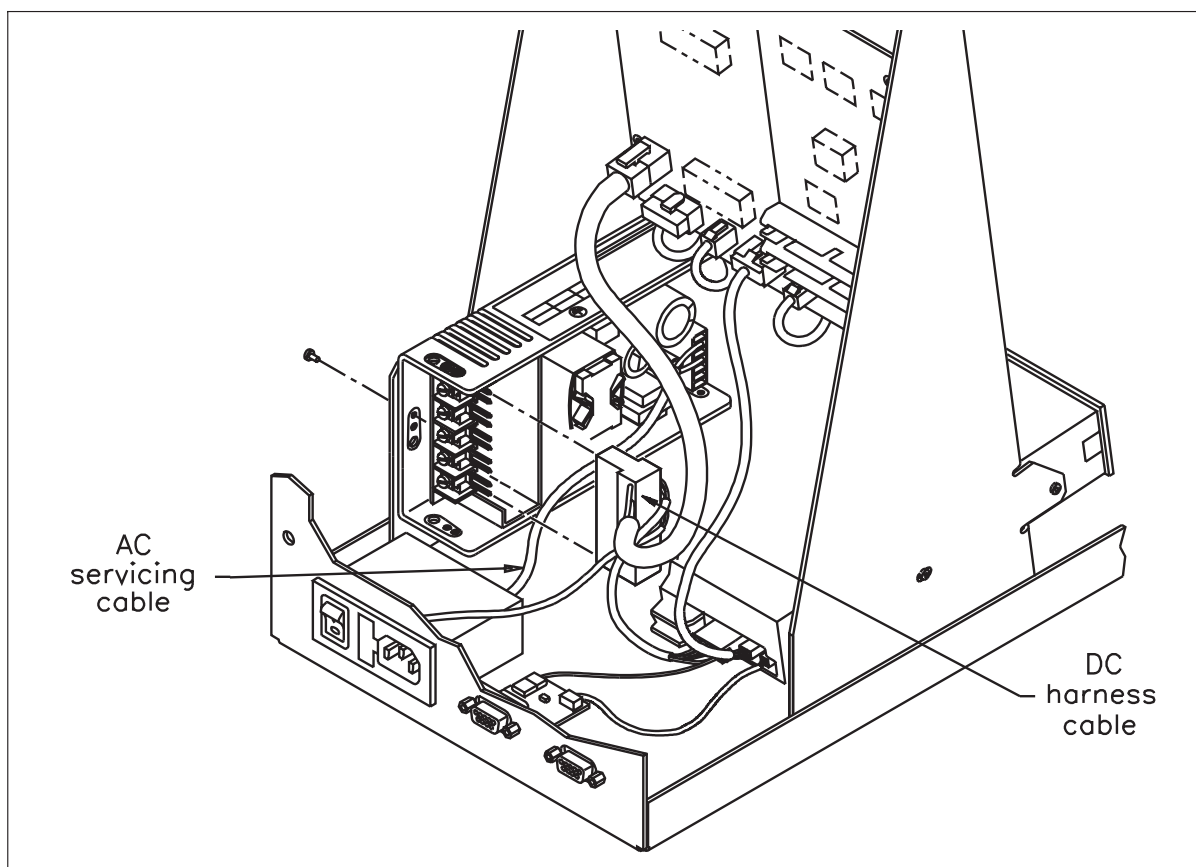


Figure 6-9 Connecting the DC harness cable to the power supply

After replacing the power supply

1. Reconnect the SCSI ribbon cable to the SCSI card (see Section 6.2).
2. Replace the cover assembly (see Section 2.6).
3. Reconnect the SCSI cable(s) and power cord.
4. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the power cable properly connected? ✓ Are the SCSI cables connected? ✓ Is the SCSI bus terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library? See Figure 2-7. ✓ Are all connections to the motor control card and the SCSI interface card secure? Refer to Section 6.3. ✓ Is the operator panel ribbon cable properly connected to the display card? ✓ Are all connections to the tape drive secure? ✓ Are all connections to the power supply secure?

7 Replacing Rear Panel Components

This chapter describes how to replace the rear panel components:

- Fan
- Power entry module
- Fuse

7.1 Maintenance preparation

Before accessing rear panel components, follow these maintenance preparation procedures.

WARNING !

Before performing any maintenance procedure, be sure that the library power switch is in the off position and that the power cord is disconnected from the library and the outlet.

- ✓ Follow the static protection precautions and maintenance guidelines in Section 2.2.
- ✓ Shut down the library (see Section 2.5).
- ✓ Remove the cover (see Section 2.6).

7.2 Replacing the fan

After following the maintenance preparation instructions in Section 7.1, follow these instructions to replace the fan.

Do this first

- ✓ Obtain a flat-blade screwdriver.

Removing the fan

1. Using the tip of a flat-blade screwdriver, carefully pry out the four rivets that hold the fan in place (see Figure 7-1). Throw away the old rivets.
2. Lift the fan guard away from the rear panel and the fan out of the chassis. Be careful not to damage the power supply connector that is still attached to the fan.
3. Disconnect the fan power cable at the connector *between* the fan and the power supply. Do not disconnect the DC harness cable from the power supply.

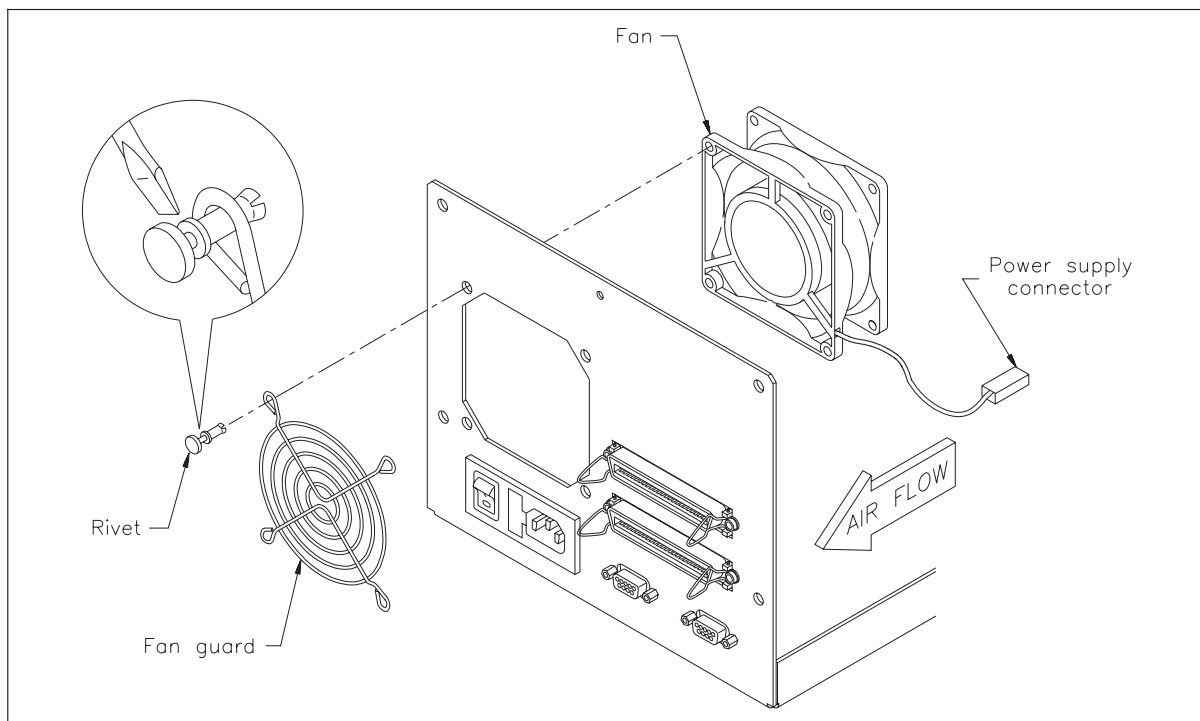


Figure 7-1 Replacing the fan

Installing the fan

1. Position the fan inside the chassis, so that the air flow is in the direction shown in Figure 7-1 and the power cable is at the bottom.
2. Position the fan guard on the outside of the chassis, and align the corner slots with the holes in the chassis.
3. From the back of the library, insert the four new rivets through the corner slots in the fan guard. For each rivet, pull out the base halfway from the head, then use your finger to push the rivet into the slot.

Note: You may find it easier to separate the rivet base from the head, push the base through the slot first, then push the rivet head into the base.

4. Connect the fan power cable to the 2-pin connector between the fan and the power supply.

After replacing the fan

1. Replace the cover assembly (see Section 2.6).
2. Reconnect the SCSI cable(s) and power cord.
3. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the power cord inserted correctly? ✓ Are the SCSI cables connected? ✓ Is the SCSI bus terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library? See Figure 2-7. ✓ Are all connections to the motor control card and the SCSI interface card secure? Refer to Section 6.3. ✓ Is the operator panel ribbon cable properly connected to the display card? ✓ Are all connections to the tape drive secure?

7.3 Replacing the power entry module

Note: The power entry module assembly includes an AC servicing cable, the grounding wire, and a fuse.

After following the maintenance preparation instructions in Section 7.1, follow these instructions to replace the power entry module.

Do this first

✓ Obtain these tools:

- $\frac{5}{16}$ -inch nut driver
- Flat-blade screwdriver

Removing the power entry module

1. While pushing on the back of the power entry module, use a flat-blade screwdriver to press in on the metal clips on one side of the module until you can push that side of the module out of the back panel (see Figure 7-2). Repeat with the other clip.

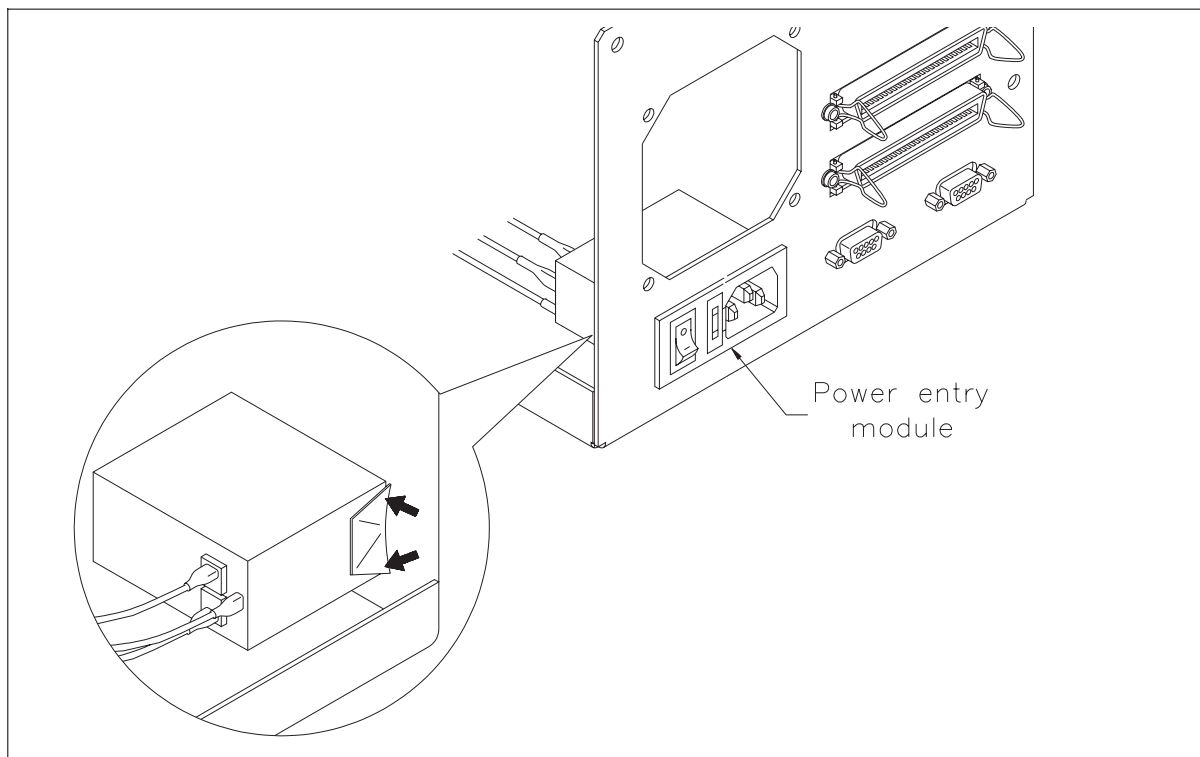


Figure 7-2 Removing the power entry module

2. As shown in Figure 7-3, pull the power entry module and attached cables away from the back panel.
3. Disconnect the AC servicing cable (4-pin) at the connector located between the module and the power supply.

Note: If you need to replace the AC servicing cable, remove the power supply and disconnect the cable from the power supply instead (see Section 6.4 for instructions).

4. Use the $\frac{5}{16}$ -inch nut driver to remove the nut from the grounding stud on the base of the chassis. Lift the ground cable off the stud.

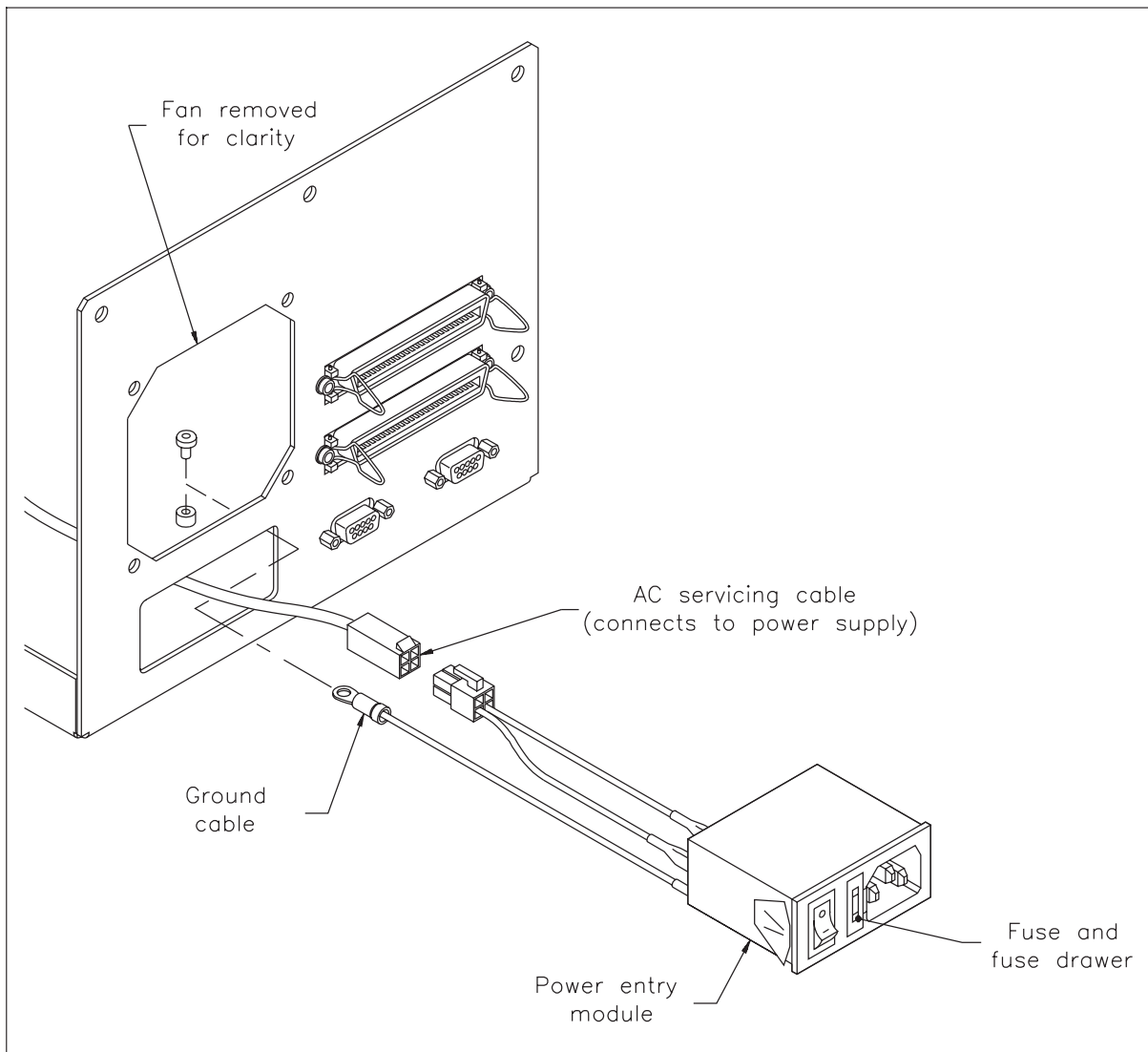


Figure 7-3 Removing the power entry module

Installing the power entry module

1. Separate the cable attached to the power entry module at the 4-pin connector located near the middle of the cable (see Figure 7-3). Discard the piece of cable that is not attached to the power entry module.
2. Connect the free end of the original AC servicing cable to the 4-pin connector on the AC servicing cable attached to the power entry module (see Figure 7-3).
3. Orient the power entry module so that the power switch is to the left, then push it into the hole in the back panel until it snaps into place (see Figure 7-3).
4. Place the ground cable lug over the grounding stud on the bottom of the chassis. Place the nut over the stud and use the $\frac{5}{16}$ -inch nut driver to tighten.

After replacing the power entry module

1. Replace the cover assembly (see Section 2.6).
2. Reconnect the SCSI cable(s) and power cord.
3. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Are the SCSI cables connected? ✓ Is the SCSI bus terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library? See Figure 2-7. ✓ Are all connections to the controller card and the SCSI interface card secure? Refer to Section 6.3. ✓ Is the operator panel ribbon cable properly connected to the display card? ✓ Are all connections to the tape drive secure? ✓ Is the fuse is good?

7.4 Replacing the fuse

Do this first

- ✓ Follow the static protection precautions and maintenance guidelines in Section 2.2.
- ✓ Turn off the library power and disconnect the power cord (see Section 2.5).
- ✓ Obtain a 2.0A slow-blow fuse (a spare fuse is provided in the fuse holder).
- ✓ Obtain a small, flat-blade screwdriver.

Removing the fuse

1. Insert the blade of a small, flat-blade screwdriver at the edge of the fuse drawer next to the power connector and carefully pry the fuse drawer out of the power entry module (see Figure 7-4).
2. Remove the old fuse from the fuse drawer.

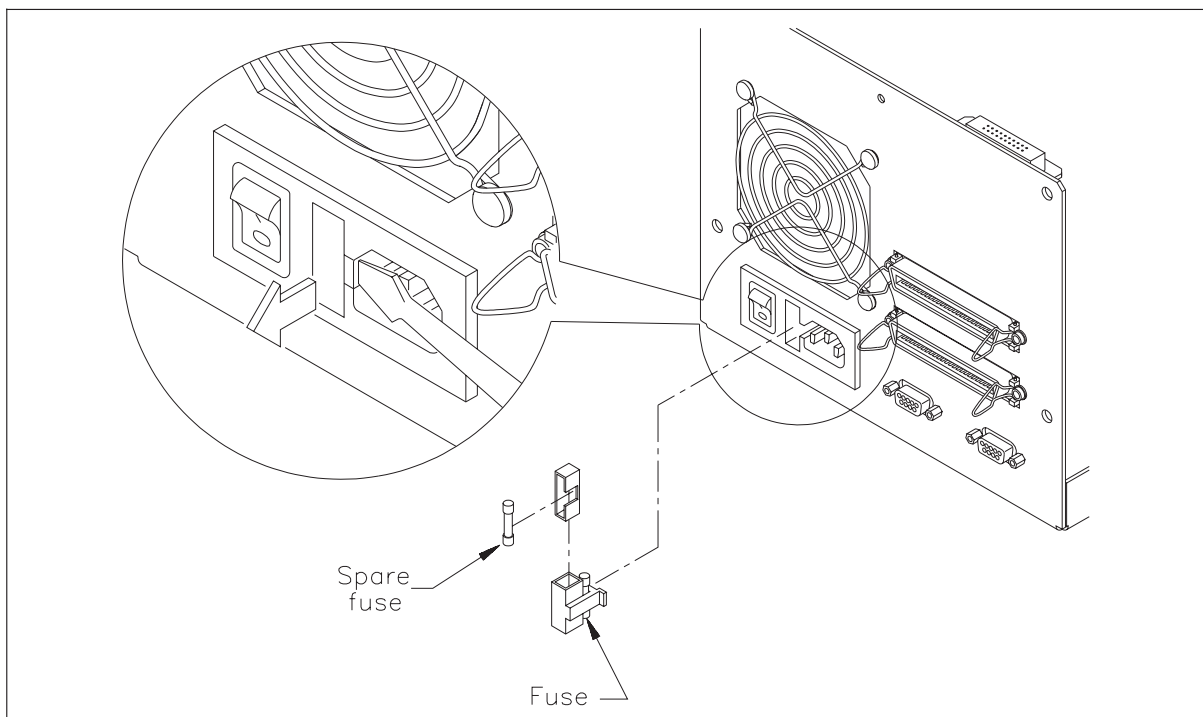


Figure 7-4 Replacing the fuse

Installing the fuse

1. Install a new 2.0A slow-blow fuse in the fuse drawer (see Figure 7-4).

Note: If you used the spare fuse from the fuse drawer, make sure you replace it with a new 2.0 A slow-blow fuse.

2. Insert the fuse drawer into the power entry module until it snaps into place.

After replacing the fuse

1. Reconnect the power cord.
2. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.

If problems occur . . .

If the library does not power on as described, make sure that the replacement fuse you installed is good.

8 Replacing Cables

This chapter describes how to remove and replace the following cables:

- Operator panel cable
- Interface cable
- SCSI cable
- Drive sensor cable
- CHS Monitor port
- CTS Monitor port
- SCSI ID select cable
- DC harness cable
- Vertical flex cable

8.1 Maintenance preparation

Before accessing internal cables, follow these maintenance preparation procedures.

WARNING !

Before performing any maintenance procedure, be sure that library the power switch is in the off position and that the power cord is disconnected from the library and the outlet.

- ✓ Follow the static protection precautions and maintenance guidelines in Section 2.2.
- ✓ Shut down the library (see Section 2.5).
- ✓ Remove the cover (see Section 2.6).

8.2 Replacing the operator panel cable

After following the maintenance preparation instructions in Section 8.1, follow these instructions to replace the operator panel cable.

Removing the operator panel cable

1. Lay the cover assembly face down on a protected surface.
2. Disconnect the operator panel cable from the display card by pushing the clips down, then inserting your finger through the plastic loop connected to the cable and pulling up.
3. Peel the cable off the inside of the cover.

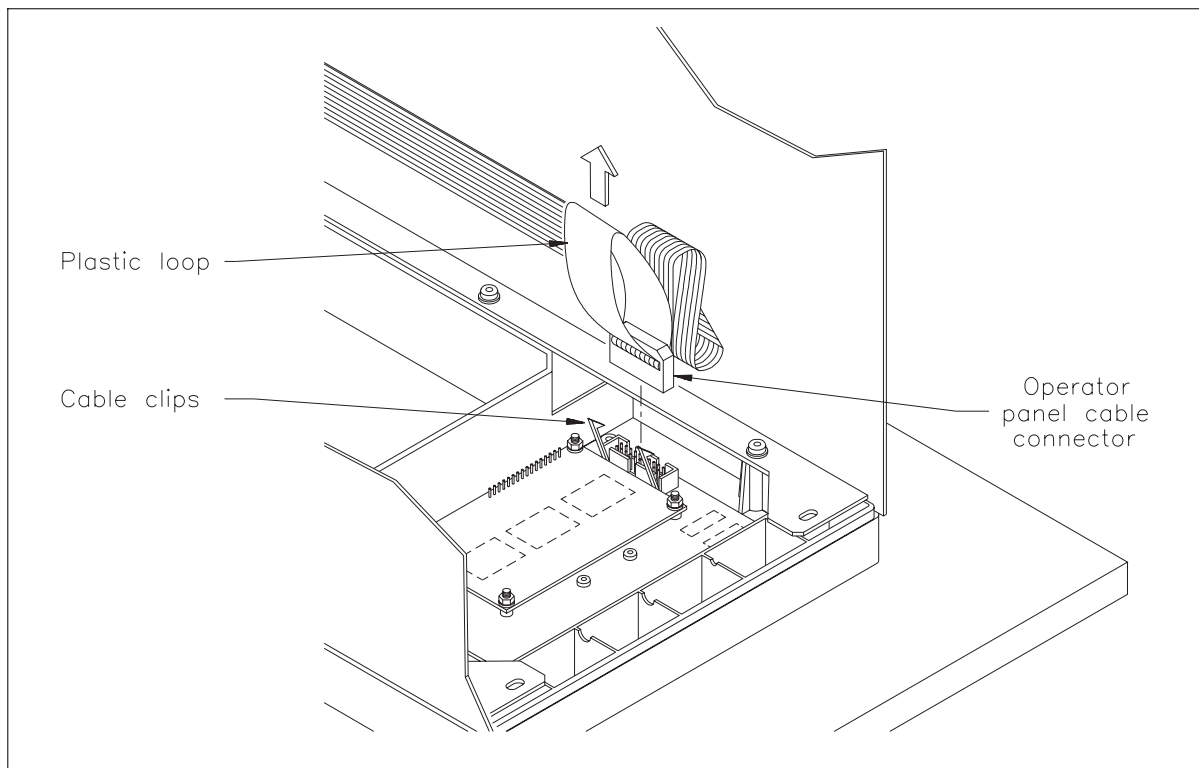


Figure 8-1 Operator panel cable and connections

Installing the operator panel cable

1. Peel the adhesive off the new cable and align it along the inside of the cover (see Figure 8-2). Scribed lines are provided on the inside of the cover for guidance.
2. Connect the cable to the 20-pin connector on the display card. Make sure the clips are secured.

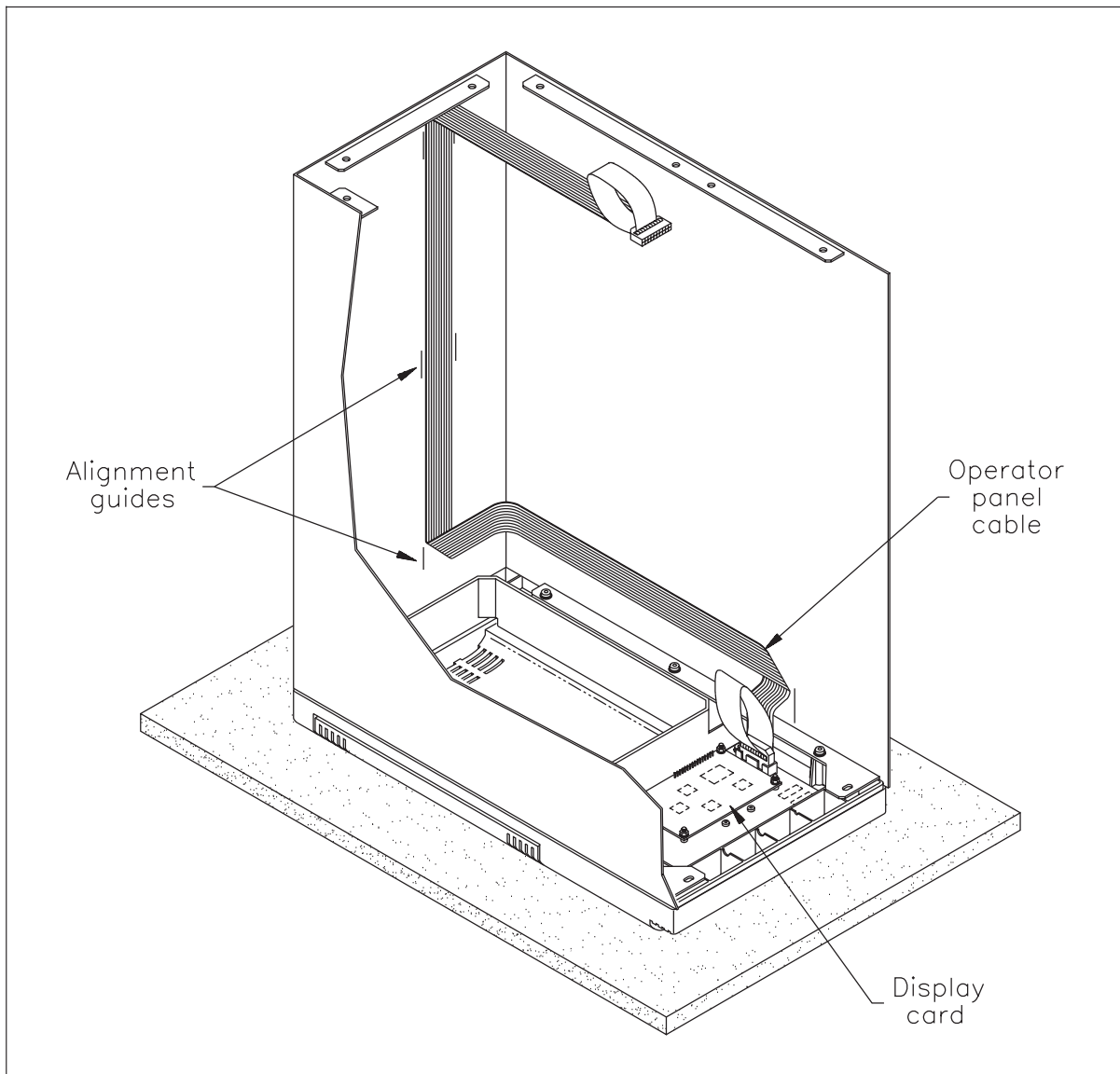


Figure 8-2 Positioning the operator panel cable

After replacing the operator panel cable

1. Replace the cover assembly and connect the operator panel cable to the back panel (see Section 2.6).
2. Reconnect the SCSI cable(s) and power cord.
3. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the power cord inserted correctly? ✓ Are the SCSI cables connected? ✓ Is the SCSI bus terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library? See Figure 2-7. ✓ Are all connections to the motor control card and the SCSI card secure? Refer to Section 6.3. ✓ Is the operator panel ribbon cable properly connected to the display card? ✓ Are all connections to the tape drive secure?

8.3 Replacing the interface cable

After following the maintenance preparation instructions in Section 8.1, follow these instructions to replace the interface cable.

Do this first

✓ Obtain the following tools:

- Torque limiting screwdriver
- T-10 bit

Removing the interface cable

1. Disconnect the interface cable from the 20-pin connector J2 on the motor control card (see Figure 8-3).
2. Use a T-10 bit to remove the two screws that hold the interface cable to the bracket on the inside of the rear panel (see Figure 8-3).

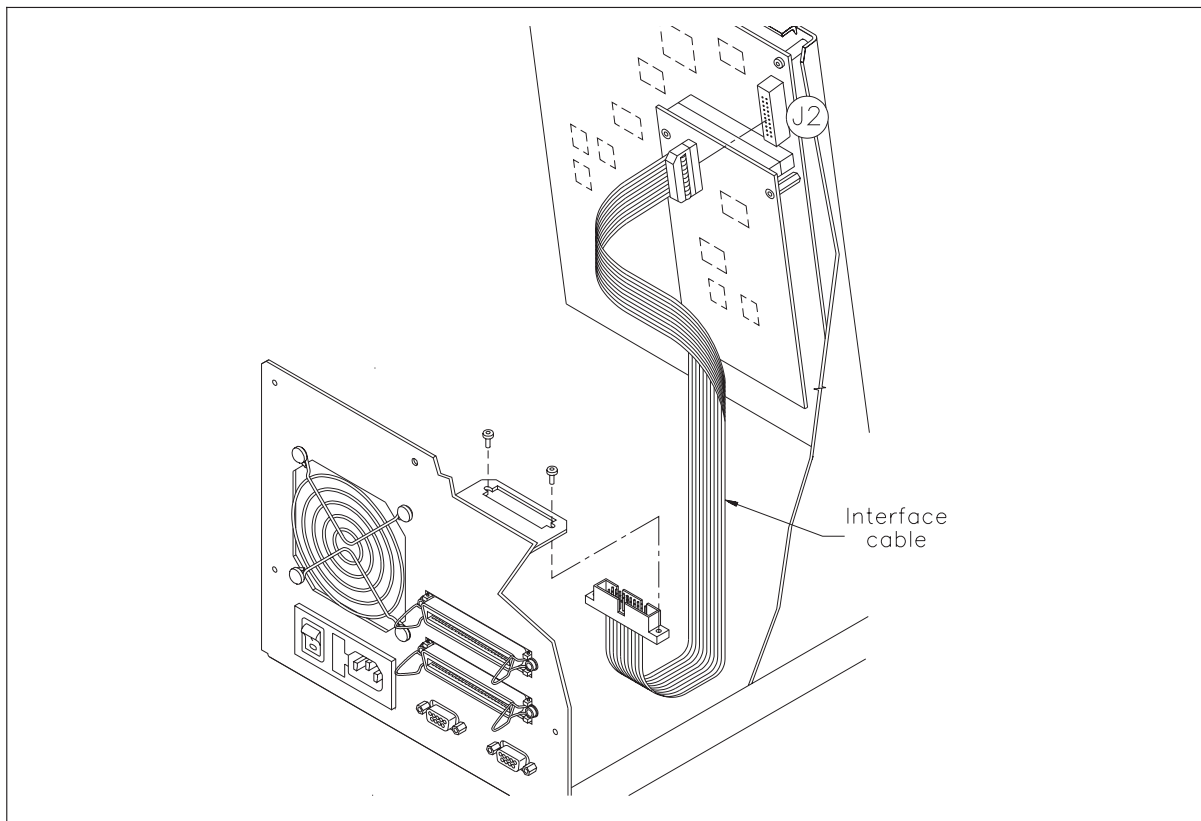


Figure 8-3 Interface cable and connections

Installing the interface cable

1. Connect the interface cable to the 20-pin connector J2 on the motor control card. Close the connector clips to hold the cable in place.
2. Insert the connector on the other end of the cable through the slot in the mounting bracket on the inside of the back panel (see Figure 8-3).
3. Use a T-10 bit to replace the two screws that secure the cable into the slot. Tighten the screws to 3.0 inch-pounds (3.4 kg-cm) of torque.
4. Connect the interface cable to the operator panel cable.

After replacing the interface cable

1. Replace the cover assembly (see Section 2.6).
2. Reconnect the SCSI cable(s) and power cord.
3. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.

If problems occur . . .

Problem	Corrective action
The library does not power on as described.'	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the power cord inserted correctly? ✓ Are the SCSI cables connected? ✓ Is the SCSI bus terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library? See Figure 2-7. ✓ Are all connections to the motor control card and the SCSI card secure? Refer to Section 6.3. ✓ Is the operator panel ribbon cable properly connected to the display card? ✓ Are all connections to the tape drive secure?

8.4 Replacing the SCSI cable

After following the maintenance preparation instructions in Section 8.1, follow these instructions to replace the SCSI cable.

Do this first

✓ Obtain the following tools:

- Torque limiting screwdriver
- T-10 bit

Removing the SCSI cable

1. Disconnect the SCSI ribbon cable from the SCSI card by releasing the retaining clips on the connector (see Figure 8-4).
2. Disconnect the cable from the back of the tape drive.
3. From the outside of the lower rear panel, use a T-10 bit to remove the two screws holding each SCSI connector to the rear panel (see Figure 8-4). Remove the cable.

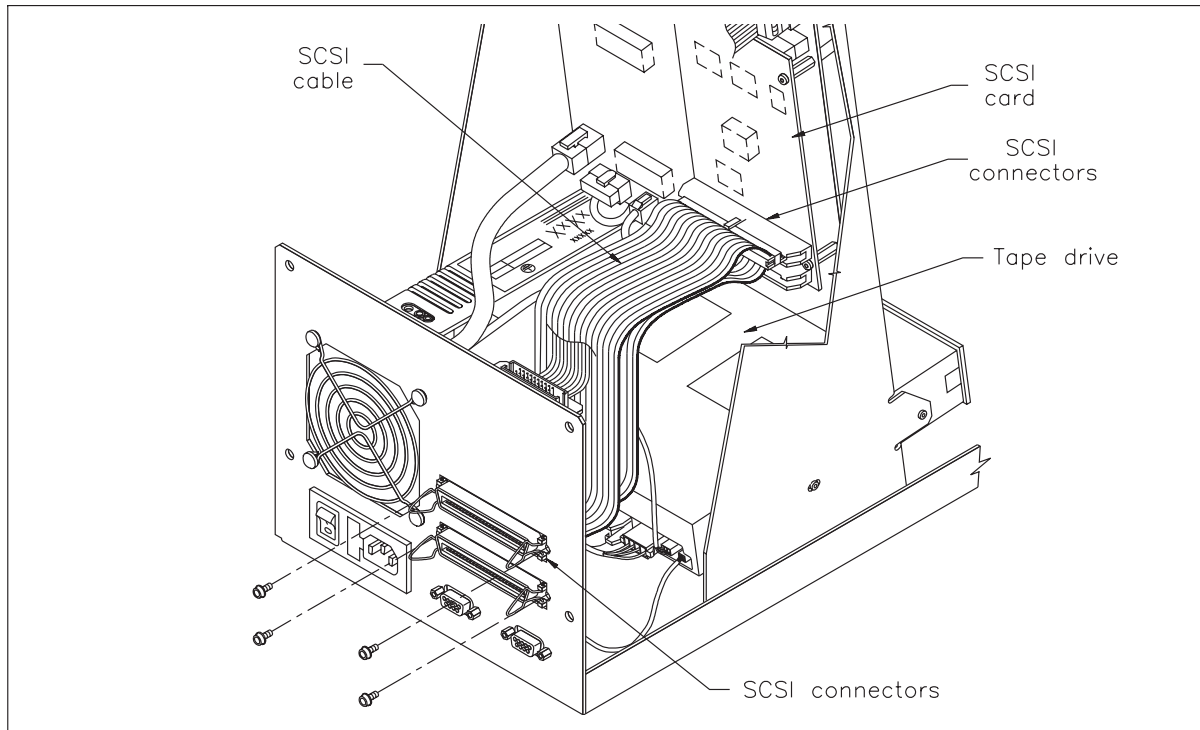


Figure 8-4 Removing the SCSI cable

Installing the SCSI cable

1. From the inside of the back panel, insert the two SCSI connectors into the slots (see Figure 8-5).
2. Use two screws to attach each connector to the rear panel. Use a T-10 bit to tighten the screws to 5.0 inch-pounds (5.8 kg-cm) of torque.
3. From inside the library, attach the ribbon cable from the lower SCSI connector to the tape drive.
4. Connect the SCSI ribbon cable to the SCSI card. Push the cable in until it seats firmly in the connector. Secure the retaining clips around the cable connector.

► **Important** If you have a differential SCSI configuration, connect the cable to the “Diff SCSI” connector (the top SCSI connector) on the SCSI card. If you have a single-ended SCSI configuration, connect the cable to the “Sing SCSI” connector (the bottom SCSI connector) on the SCSI card.

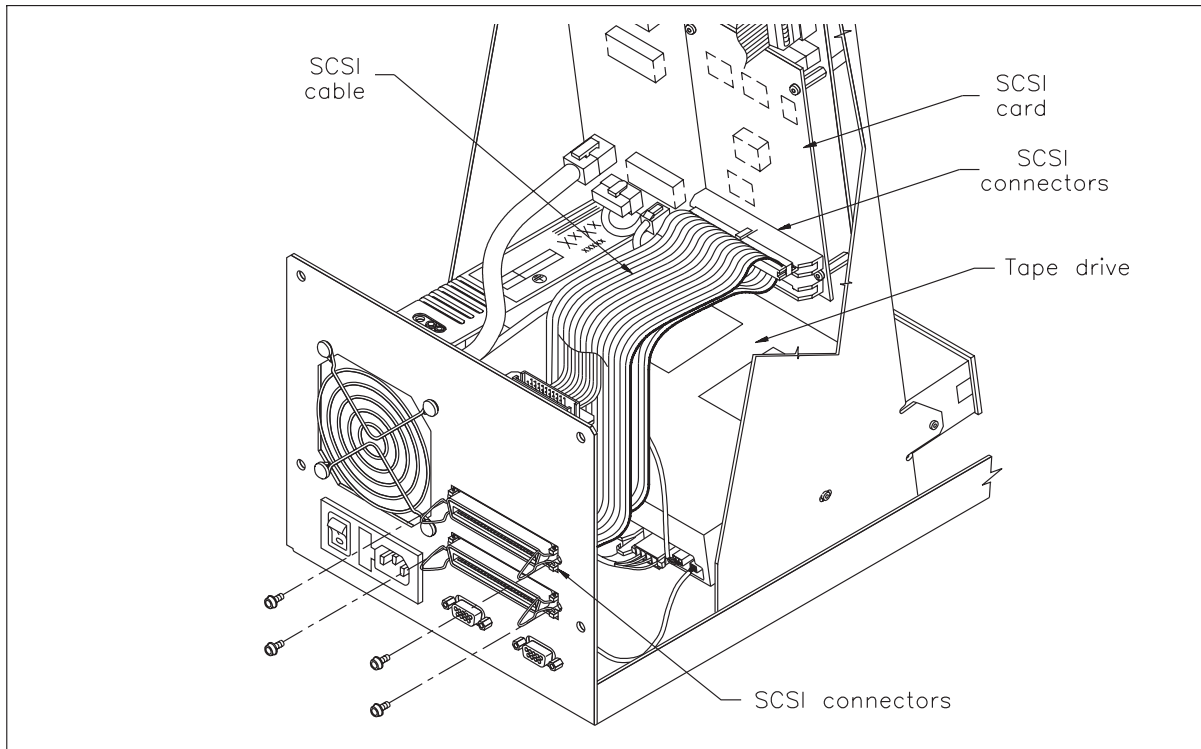


Figure 8-5 Installing the SCSI cable

After replacing the SCSI cable

1. Replace the cover assembly (see Section 2.6).
2. Reconnect the SCSI cable(s) and power cord.
3. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.
4. Make sure that the library and tape drive respond by using Diagnostics to issue several SCSI commands (see Appendix C).

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the power cord inserted correctly? ✓ Are the SCSI cables connected? ✓ Is the SCSI bus terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library? See Figure 2-7. ✓ Are all connections to the motor control card and the SCSI card secure? Refer to Section 6.3. ✓ Are all connections to the tape drive secure? ✓ Is the operator panel ribbon cable properly connected to the display card?

8.5 Replacing the drive sensor cable

After following the maintenance preparation instructions in Section 8.1, follow these instructions to replace the drive sensor cable.

Do this first

✓ Obtain the following tools:

- Torque limiting screwdriver
- T-10 bit
- T-15 bit

Removing the drive sensor cable

1. Disconnect the drive sensor cable from the tape drive faceplate (see Figure 8-6).
2. Remove the tape drive from the library (see Section 5.2).
3. Disconnect the SCSI ribbon cable from the SCSI card by releasing the retaining clips on the connector (see Figure 8-7).
4. Disconnect the drive sensor cable from connector J6 on the motor control card (see Figure 8-7).

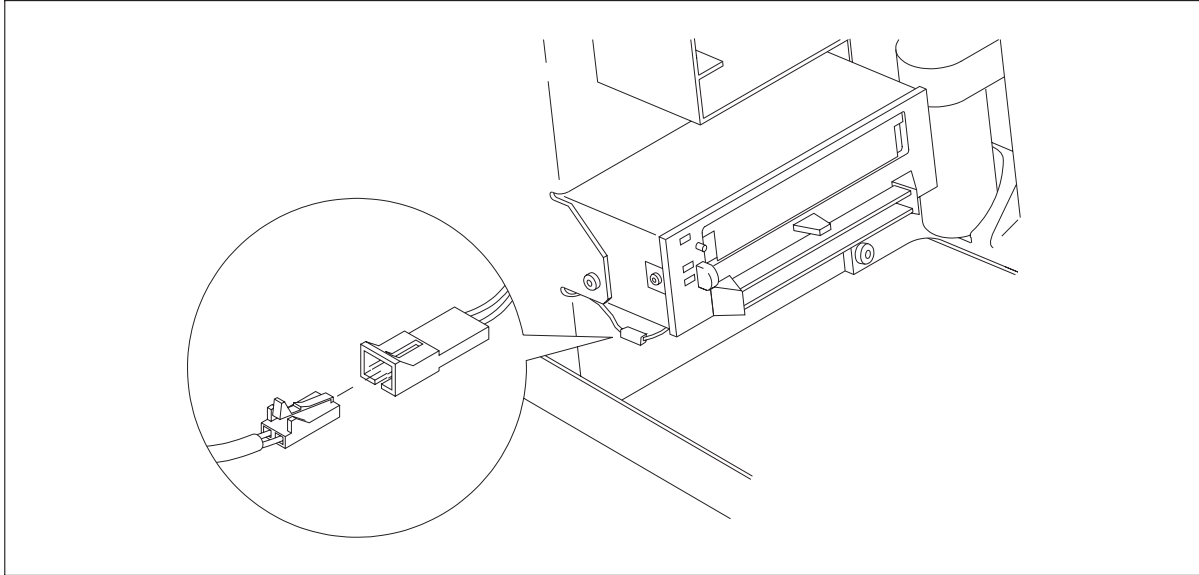


Figure 8-6 Disconnecting the drive sensor cable

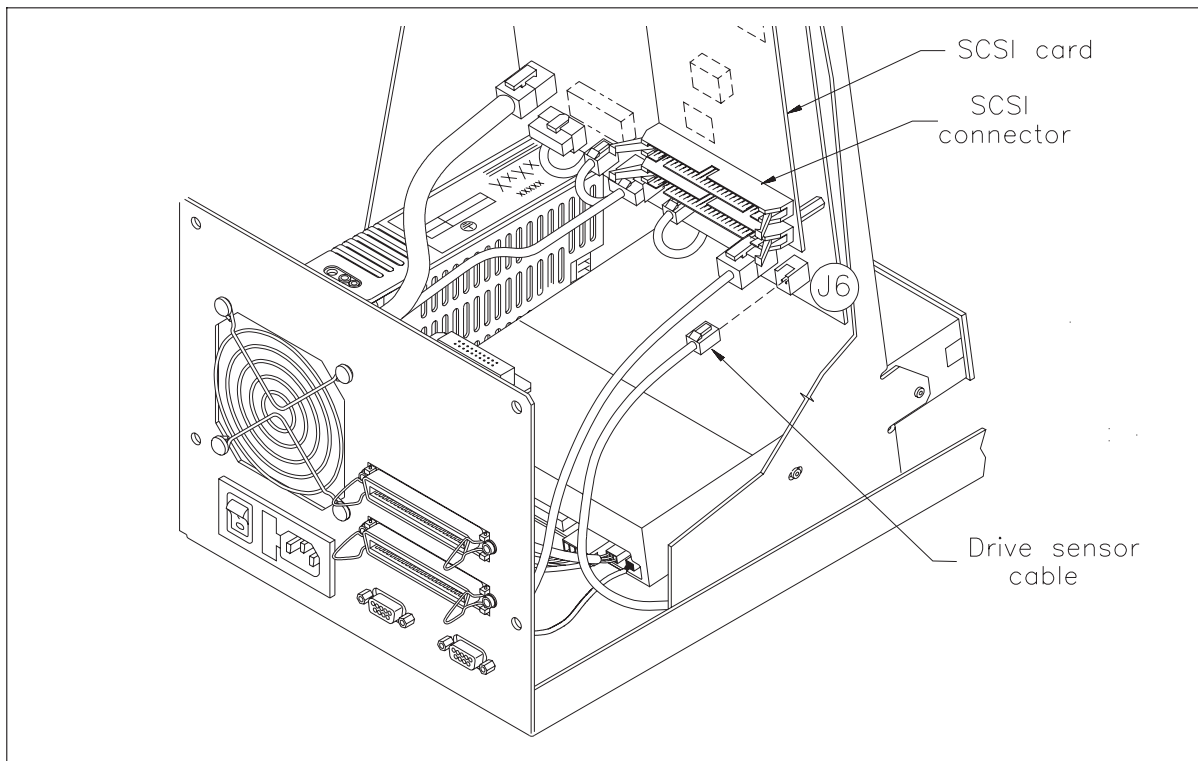


Figure 8-7 Drive sensor cable connection to the motor control card

Installing the drive sensor cable

1. Connect the drive sensor cable to connector J6 on the motor control card (see Figure 8-7).
2. Route the free end of the cable through the slot for the tape drive.
3. Install the tape drive in the library (see Section 5.2).
4. Connect the drive sensor cable to the faceplate (see Figure 8-6)
5. Reconnect the SCSI cable to the SCSI card (see Figure 8-7).

► **Important** If you have a differential SCSI configuration, connect the cable to the “Diff SCSI” connector (the top SCSI connector) on the SCSI card. If you have a single-ended SCSI configuration, connect the cable to the “Sing SCSI” connector (the bottom SCSI connector) on the SCSI card.

After replacing the drive sensor cable

1. Replace the cover assembly (see Section 2.6).
2. Reconnect the SCSI cable(s) and power cord.
3. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.
4. Calibrate the cartridge sensor position and the eject position (see Appendix B).
5. Optionally, use the LCD menu to move the CHM along the horizontal and vertical axes, cycle the solenoid, and perform picks, places, and moves (see Appendix A).

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the power cord inserted correctly? ✓ Are the SCSI cables connected? ✓ Is the SCSI bus terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library? See Figure 2-7. ✓ Are all connections to the motor control card and the SCSI interface card secure? Refer to Section 6.3. ✓ Are all connections to the tape drive secure? ✓ Is the operator panel ribbon cable properly connected to the display card?

8.6 Replacing the CHS Monitor port

After following the maintenance preparation instructions in Section 8.1, follow these instructions to replace the CHS Monitor port.

Do this first

✓ Obtain the following tools:

- $\frac{3}{16}$ -inch hex driver
- Wire cutters
- Plastic wire tie

Removing the CHS Monitor port

1. Disconnect the CHS Monitor cable from the DiagPort connector (J7) on the motor control card (see Figure 8-8).

Note: For easier access to the connection, disconnect the SCSI cable from the SCSI card.

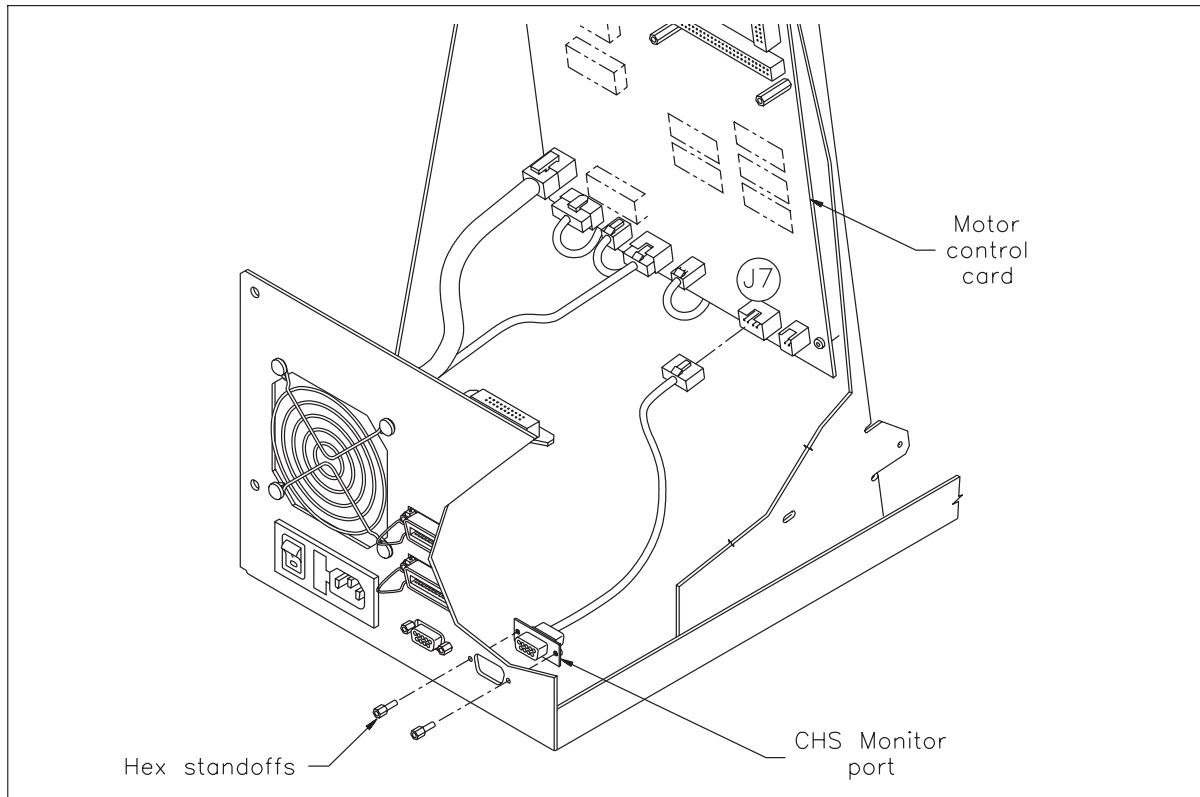


Figure 8-8 CHS Monitor port connections

2. Using wire cutters, cut the plastic wire tie that holds the CHS Monitor cable to the drive sensor cable.
3. Use a $\frac{3}{16}$ -inch hex driver to remove the two hex standoffs that hold the CHS Monitor port to the back of the library (see Figure 8-9) and pull the port out of the library.

Installing the CHS Monitor port

1. From inside the library, push the 9-pin CHS Monitor port connector into the hole in the lower back panel.
2. Use a $\frac{3}{16}$ -inch hex driver to replace the two hex standoffs (see Figure 8-9) on the outside of the rear panel and tighten them to 3.4 inch-pounds (3.9 kg-cm) of torque.
3. Connect the free end of the CHS Monitor cable to the DiagPort connector (J7) on the motor control card.
4. Use a plastic wire tie to attach the CHS Monitor cable to the drive sensor cable.

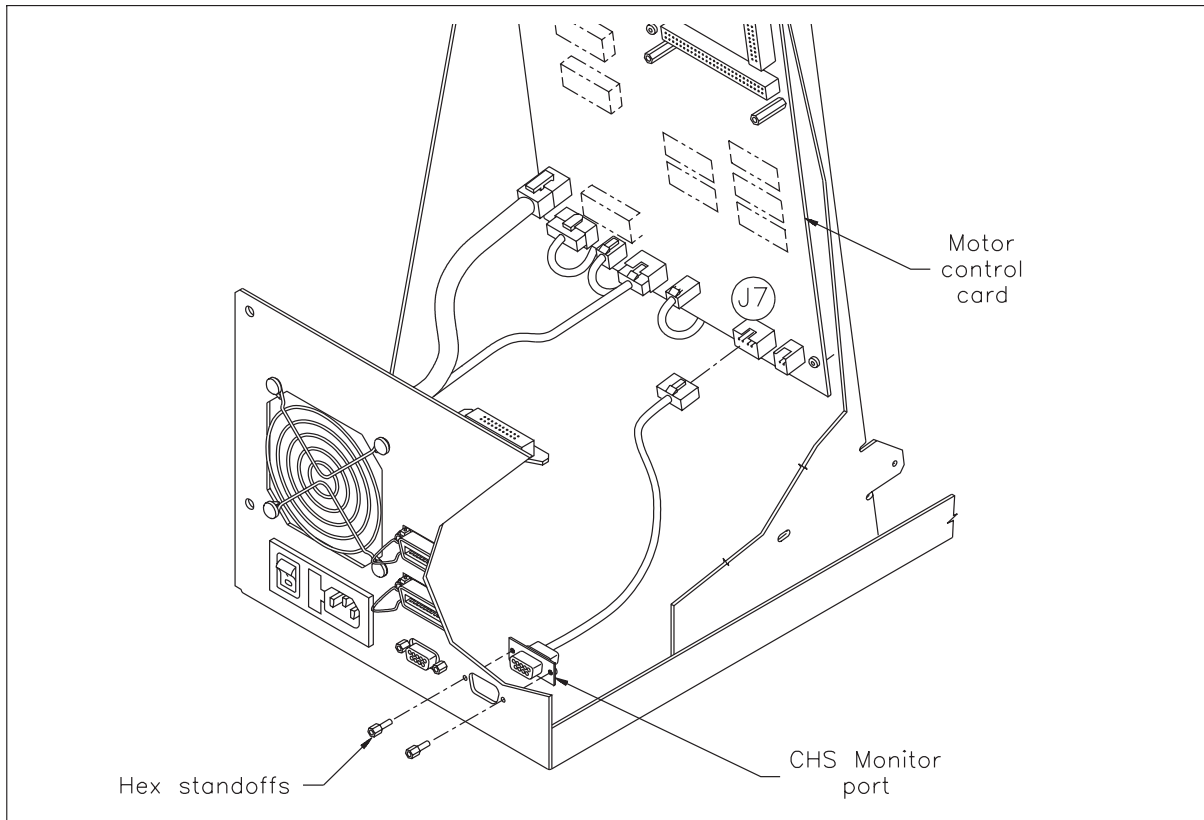


Figure 8-9 CHS Monitor port connections

5. Reconnect the SCSI cable to the SCSI card, if you disconnected it.

► **Important** If you have a differential SCSI configuration, connect the cable to the "Diff SCSI" connector (the top SCSI connector) on the SCSI card. If you have a single-ended SCSI configuration, connect the cable to the "Sing SCSI" connector (the bottom SCSI connector) on the SCSI card.

After replacing the CHS Monitor port

1. Replace the cover assembly (see Section 2.6).
2. Reconnect the SCSI cable(s) and power cord.
3. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.
4. Using a Monitor cable, connect the CHS Monitor port to the serial port on an IBM AT or compatible system. Use the Exabyte CHS Monitor program to access the library's internal diagnostics to verify that the port is operating correctly.

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the power cord inserted correctly? ✓ Are the SCSI cables connected? ✓ Is the SCSI bus terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library? See Figure 2-7. ✓ Are all connections to the motor control card and the SCSI card secure? Refer to Section 6.3. ✓ Is the operator panel ribbon cable properly connected to the display card? ✓ Are connections to the tape drive secure?
The CHS Monitor port does not function properly.	Check that the CHS Monitor cable connection to connector J7 on the motor control card is secure.

8.7 Replacing the CTS Monitor port

After following the maintenance preparation instructions in Section 8.1, follow these instructions to replace the CTS Monitor port.

Do this first

- ✓ Obtain the following tools:
 - $\frac{3}{16}$ -inch hex driver
 - Wire cutters
 - Plastic wire tie
 - ✓ Make sure you have the correct CTS Monitor data cable. The correct cable has a 6-pin connector on one end. This end plugs into the CTS Monitor port assembly. The other end of the cable splits into two cables, one with a 3-pin connector and one with a 4-pin connector.
 - ✓ Make sure you have the correct DC harness assembly. The correct assembly includes a power cable that attaches to the CTS Monitor port assembly.
-
- **Important** When replacing the CTS Monitor cable, you may also need to replace the DC harness assembly if it does not include a power cable connection to the CTS Monitor port assembly. In addition, you may also need to replace the CTS Monitor data cable if the existing one is soldered to the CTS Monitor port you are replacing.
-

Removing the CTS Monitor port

1. If necessary, remove the DC harness assembly (see Section 8.9).

► **Important** If the DC harness assembly includes a power cable between the back of the tape drive and the CTS Monitor port card, it is not necessary to replace the DC harness cable. Instead, disconnect the power cable from the CTS Monitor port card.

2. Reach under the SCSI cabling and disconnect the CTS Monitor data cable from the back of the tape drive (see Figure 8-10).

Note: For easier access to the connection, disconnect the SCSI cable from the SCSI card.

3. Use a $\frac{3}{16}$ -inch hex driver to remove the two hex standoffs that hold the CTS Monitor port to the back of the library. Pull the cable out of the library (see Figure 8-10).

4. Disconnect the CTS Monitor data cable from the CTS Monitor port card and set it aside.

Note: If the data cable is soldered to the card, you must replace the data cable.

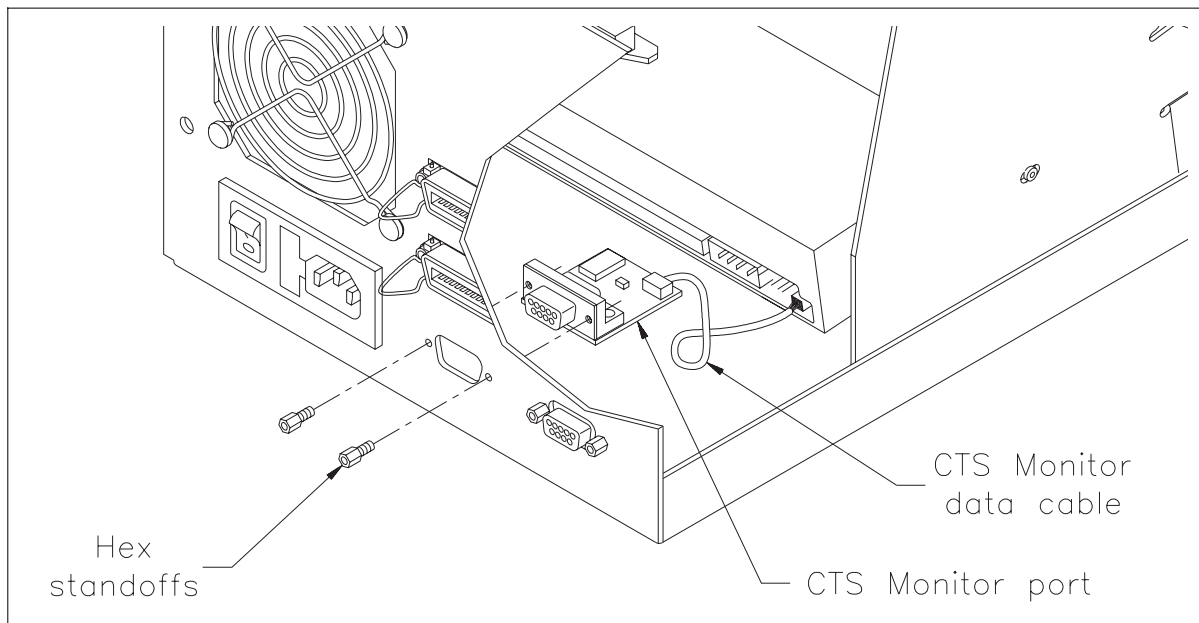


Figure 8-10 Removing the CTS Monitor port (the printed circuit card may be slightly different on your library)

Installing the CTS Monitor port

1. If necessary, install the new DC harness assembly (see Section 8.9).
2. Push the 6-pin connector on the data cable over the corresponding connector on the new CTS Monitor port card.
3. Examine the Monitor port on the back of the tape drive to determine whether it requires a 3-pin or 4-pin connector, then attach the appropriate connector from the new data cable.
4. Connect the small 2-pin power cable (part of the DC harness assembly) extending from the back of the tape drive power cable to the power connector on the CTS Monitor port card.
5. From inside the unit, push the 9-pin CTS Monitor cable connector into the hole in the lower back panel.
6. Using a $\frac{3}{16}$ -inch hex driver, replace the two hex standoffs on the outside of the rear panel, and tighten them to 3.4 inch-pounds (3.9 kg-cm) of torque.

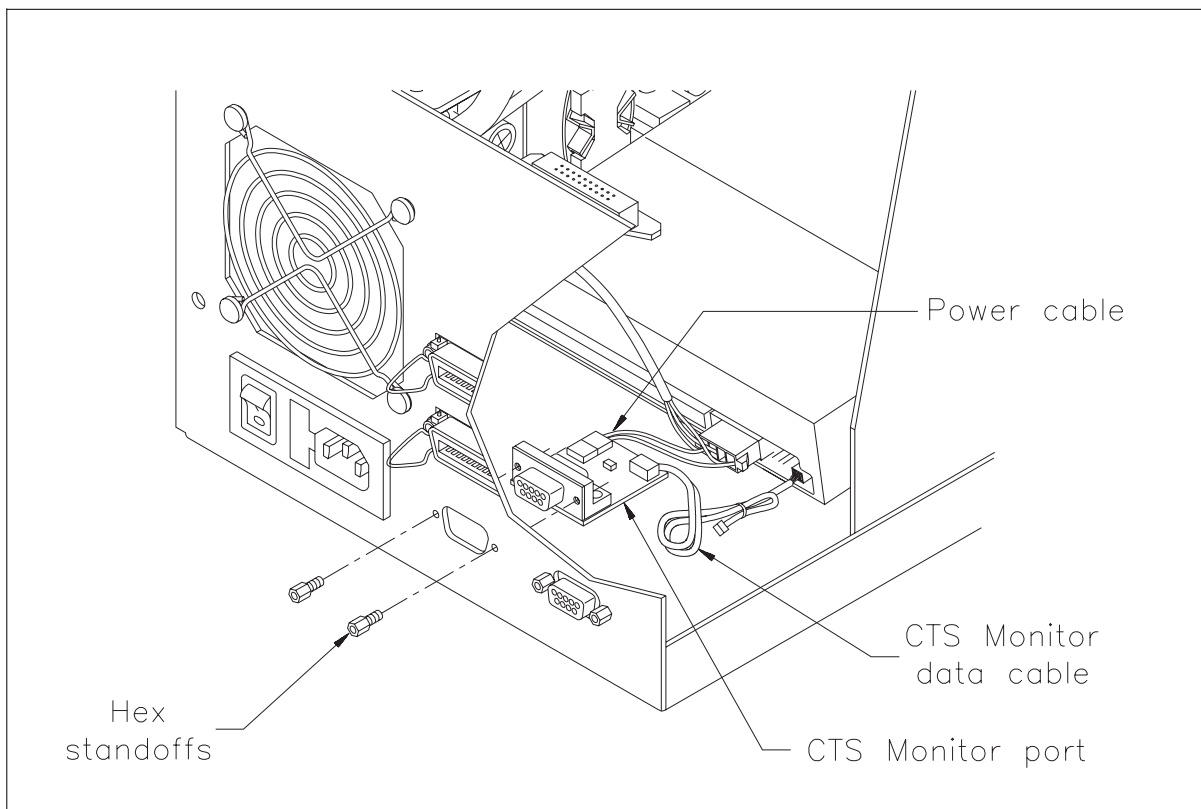


Figure 8-11 Installing the CTS Monitor port

After replacing the CTS Monitor port

1. Reconnect the SCSI cable to the SCSI card, if you disconnected it.

► **Important** If you have a differential SCSI configuration, connect the cable to the "Diff SCSI" connector (the top SCSI connector) on the SCSI card. If you have a single-ended SCSI configuration, connect the cable to the "Sing SCSI" connector (the bottom SCSI connector) on the SCSI card.

2. Replace the cover assembly (see Section 2.6).
3. Reconnect the SCSI cable(s) and power cord.
4. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.
5. Using a Monitor cable, connect the CTS Monitor port to the serial port on an IBM AT or compatible system. Use the Exabyte CTS Monitor program to access the tape drive's internal diagnostics to verify that the port is operating correctly.

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the power cord inserted correctly? ✓ Are the SCSI cables connected? ✓ Is the SCSI bus terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library? See Figure 2-7. ✓ Are all connections to the motor control card and the SCSI card secure? Refer to Section 6.3. ✓ Is the DC harness assembly securely attached to the power supply? ✓ Is the power cable securely attached to the back of the tape drive? ✓ Is the operator panel ribbon cable properly connected to the display card?
The CTS Monitor port does not function properly.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the CTS Monitor cable connection to the tape drive secure? ✓ Is the CTS Monitor power cable connection to the CTS Monitor port card secure?

8.8 Replacing the SCSI ID select cable

After following the maintenance preparation instructions in Section 8.1, follow these instructions to replace the SCSI ID select cable.

Do this first

- ✓ Obtain the following tools:
 - Wire cutters
 - Plastic wire tie

Removing the SCSI ID select cable

1. Use wire cutters to cut the plastic wire tie that attaches the SCSI ID select cable to the DC harness cable (see Figure 8-12).
2. Disconnect the SCSI ID select cable from the back of the tape drive and from the CTS ID connector (J10) on the motor control card.

Note: For easier access to the connector, disconnect the SCSI cable from the motor control card.

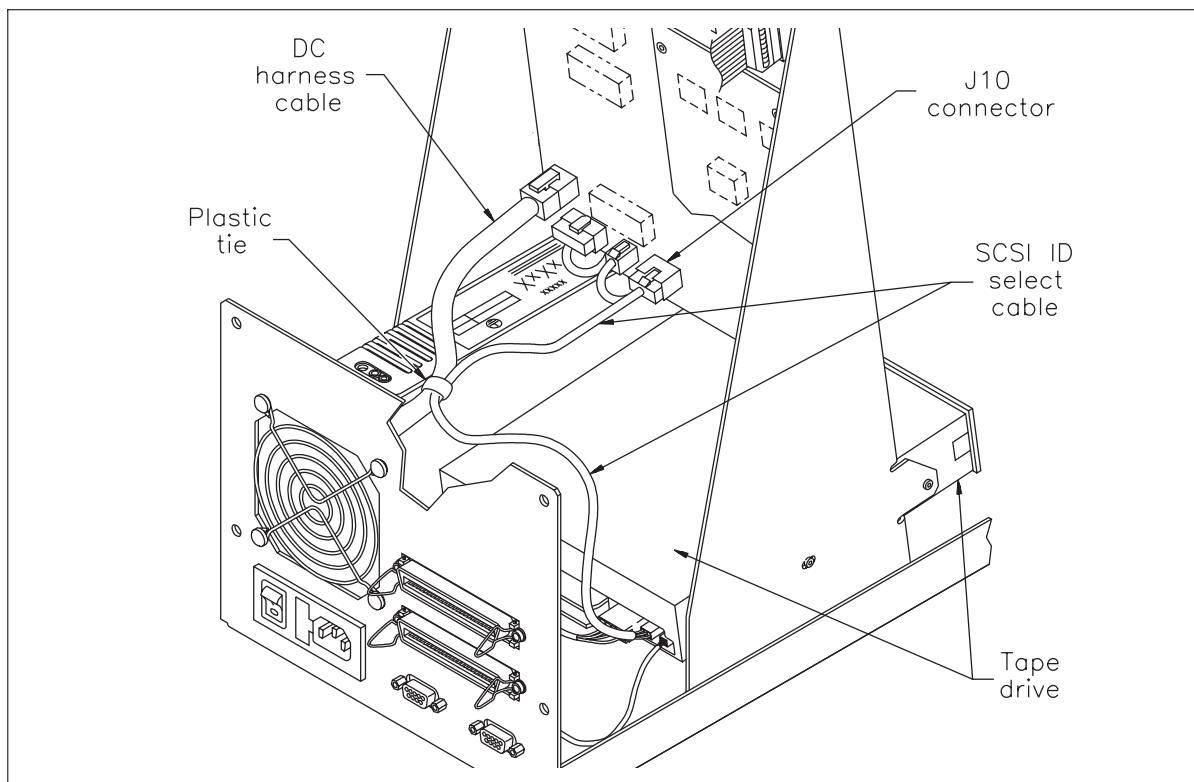


Figure 8-12 SCSI ID select cable and connections

Installing the SCSI ID select cable

1. Connect the 4-pin connector on the SCSI ID select cable to the CTS ID connector (J10) on the motor control card (see Figure 8-12).
2. Orient the 6-pin connector on the other end of the cable so that the "1" printed on the connector is at the upper left, then plug the connector into the SCSI ID connector on the back of the tape drive (see Figure 8-12).
3. Use a plastic wire tie to attach the SCSI ID select cable to the DC harness cable.

After replacing the SCSI ID select cable

1. Reconnect the SCSI cable to the SCSI card, if you disconnected it.

► **Important** If you have a differential SCSI configuration, connect the cable to the "Diff SCSI" connector (the top SCSI connector) on the SCSI card. If you have a single-ended SCSI configuration, connect the cable to the "Sing SCSI" connector (bottom SCSI connector) on the SCSI card.

2. Replace the cover assembly (see Section 2.6).
3. Reconnect the SCSI cable(s) and power cord.
4. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.
5. If desired, verify that the SCSI ID select cable is functioning correctly by changing the tape drive SCSI ID using the operator panel. Refer to *EXB-10h 8mm Library Installation and Operation* for instructions.

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the power cord inserted correctly? ✓ Are the SCSI cables connected? ✓ Is the SCSI bus terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library? See Figure 2-7. ✓ Are all connections to the motor control card and the SCSI card secure? Refer to Section 6.3. ✓ Is the operator panel ribbon cable properly connected to the display card?
The tape drive SCSI ID cannot be changed from the library operator panel.	Check that the SCSI ID select cable is securely attached to the back of the tape drive and to the CTS ID connector (J10) on the motor control board.

8.9 Replacing the DC harness cable

After following the maintenance preparation instructions in Section 8.1, follow these instructions to replace the DC harness cable.

Do this first

✓ Obtain the following tools:

- Wire cutters
- Plastic wire tie

Removing the DC harness cable

1. Use wire cutters to cut the plastic wire tie that attaches the SCSI ID select cable to the DC harness cable (see Figure 8-13).

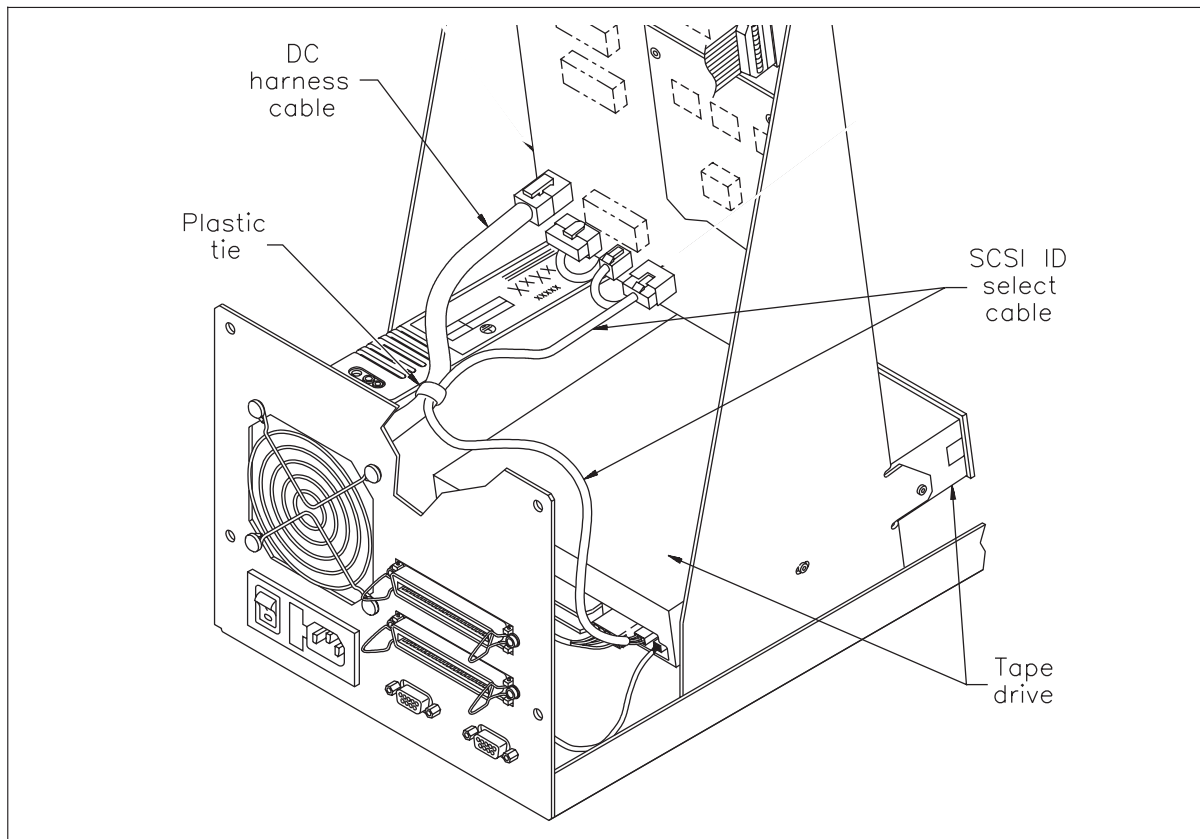


Figure 8-13 Detaching the DC harness cable from the SCSI ID select cable

2. Disconnect the DC harness cable from connector J1 on the motor control card (see Figure 8-14). Do not disconnect the AC servicing cable from the power supply. This cable is not part of the DC harness cable assembly.
3. Disconnect the power cable from the back of the tape drive.
4. If present, disconnect the 2-pin power connector between the tape drive power cable and the CTS Monitor port card.

Note: Early models of the library do not include a power connection to the CTS Monitor port card.

5. Disconnect the fan power cable from the connector between the fan and the power supply (see Figure 8-14).
6. Disconnect the DC harness cable assembly's 10-pin connector from the power supply (see Figure 8-14).
7. Remove the DC harness cable.

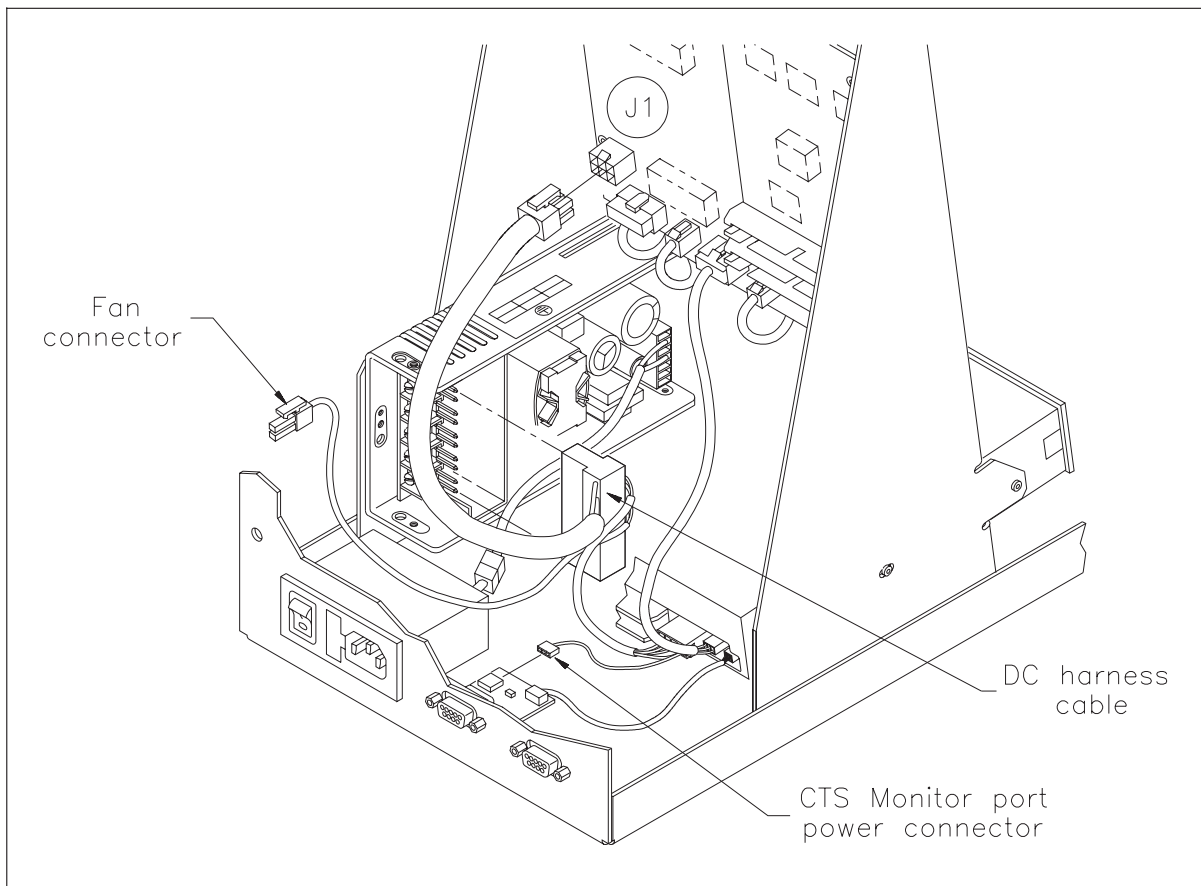


Figure 8-14

Installing the DC harness cable

1. Push the DC harness cable connector over the DC power connector on the power supply.
2. Connect the DC harness cable to connector J1 on the motor control card (see Figure 8-14).
3. Connect the tape drive power cable to the back of the tape drive.
4. Connect the small 2-pin power cable extending from the back of the tape drive power cable to the power connector on the CTS Monitor port card (see Figure 8-14).

Note: This small power cable is unused if the card on the back of the CTS Monitor port does not include a 2-pin power connector.

5. Connect the fan power cable to the connector *between* the fan and the power supply.
6. Use a plastic wire tie to attach the SCSI ID select cable and the AC servicing cable to the DC harness cable.

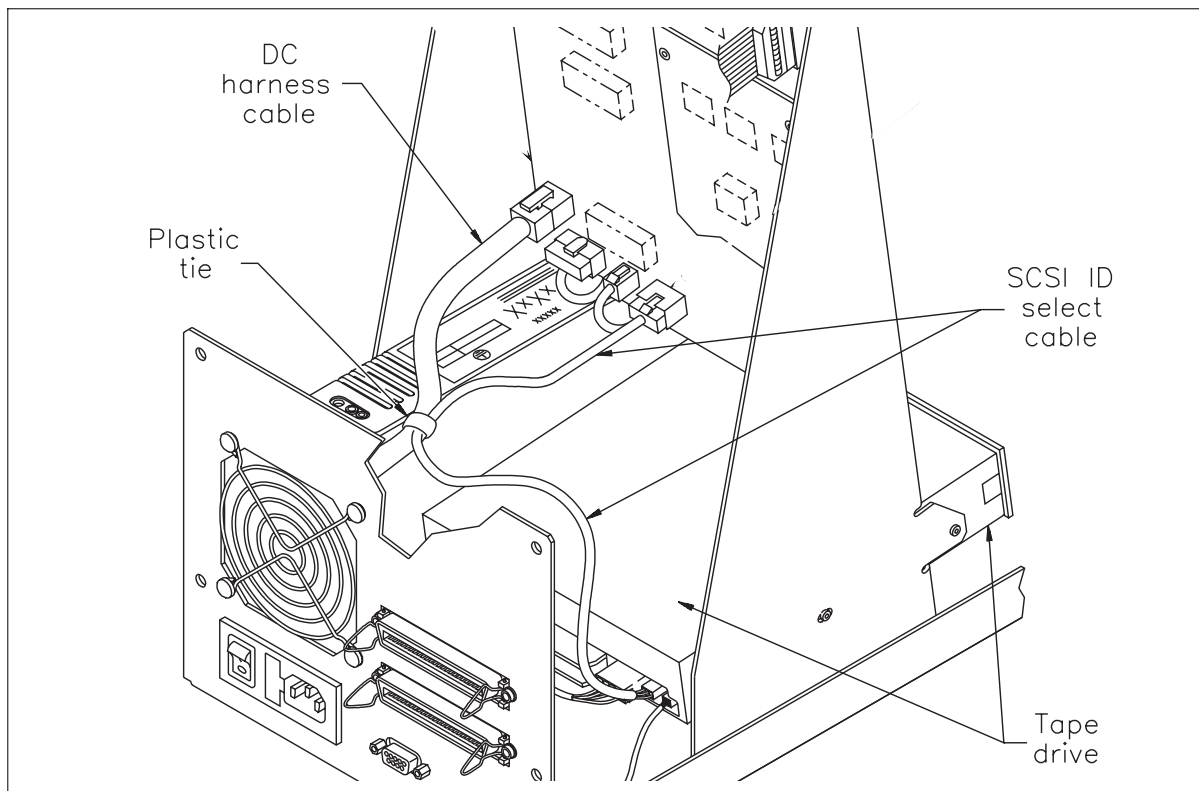


Figure 8-15 Attaching the DC harness cable to the SCSI ID select cable

After replacing the DC harness cable

1. Replace the cover assembly (see Section 2.6).
2. Reconnect the SCSI cable(s) and power cord.
3. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none"> ✓ Is the power cord inserted correctly? ✓ Are the SCSI cables connected? ✓ Is the SCSI bus terminated? ✓ Is the operator panel ribbon cable properly connected to the back of the library? See Figure 2-7. ✓ Are all connections to the motor control card and the SCSI card secure? Refer to Section 6.3. ✓ Is the operator panel ribbon cable properly connected to the display card? ✓ Are the connections to the tape drive secure?

8.10 Replacing the vertical flex cable

After following the maintenance preparation instructions in Section 8.1, follow these instructions to replace the vertical flex cable.

Do this first

- ✓ Obtain the following tools:
 - Torque limiting screwdriver
 - T-8 bit
 - T-15 bit
- ✓ Remove the CHM shield (see Section 4.2).

Removing the vertical flex cable

1. Gently pull out on both sides of the ZIF connector (J3) on the motor control card to disconnect the vertical flex cable (see Figure 8-16).

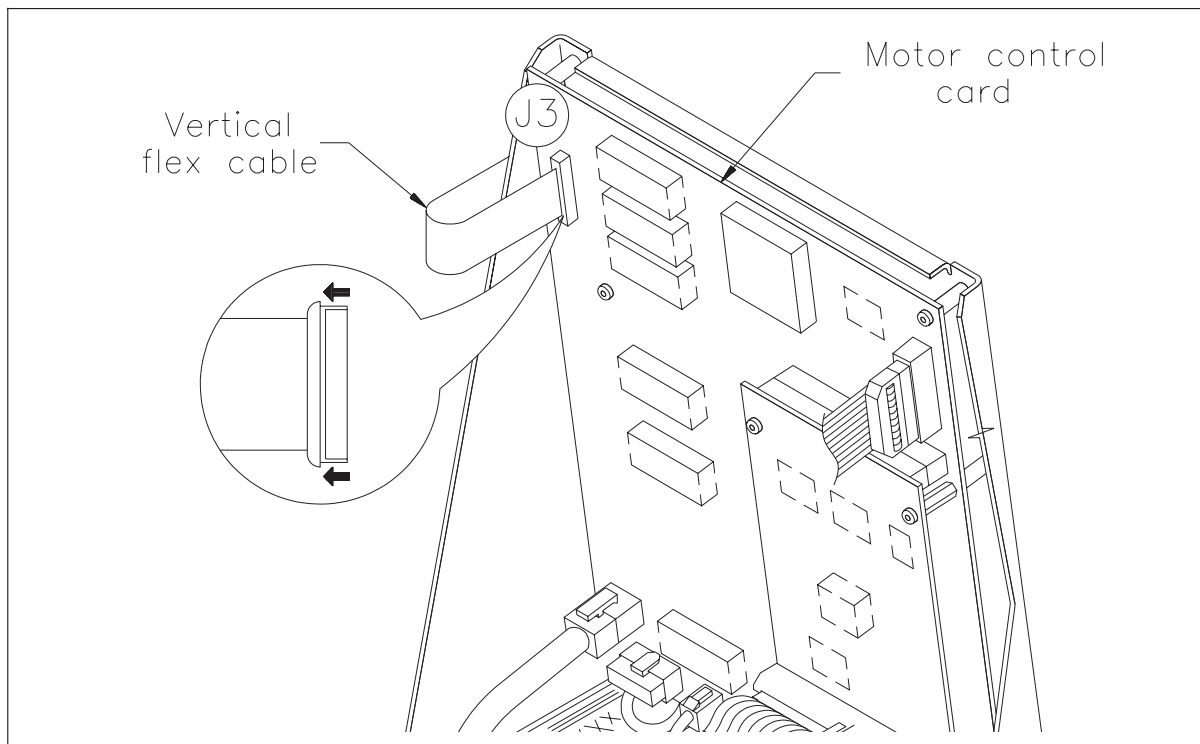


Figure 8-16 Disconnecting the vertical flex cable from the motor control card

2. Using a T-8 bit, remove the screw holding the vertical flex cable ground connection to the horizontal motor assembly (see Figure 8-17).
3. Push down gently on both sides of the ZIF connector (J1 on the ECHM card), then pivot the connector upward to open it (see Figure 8-17). Slide the vertical flex cable out of the connector.

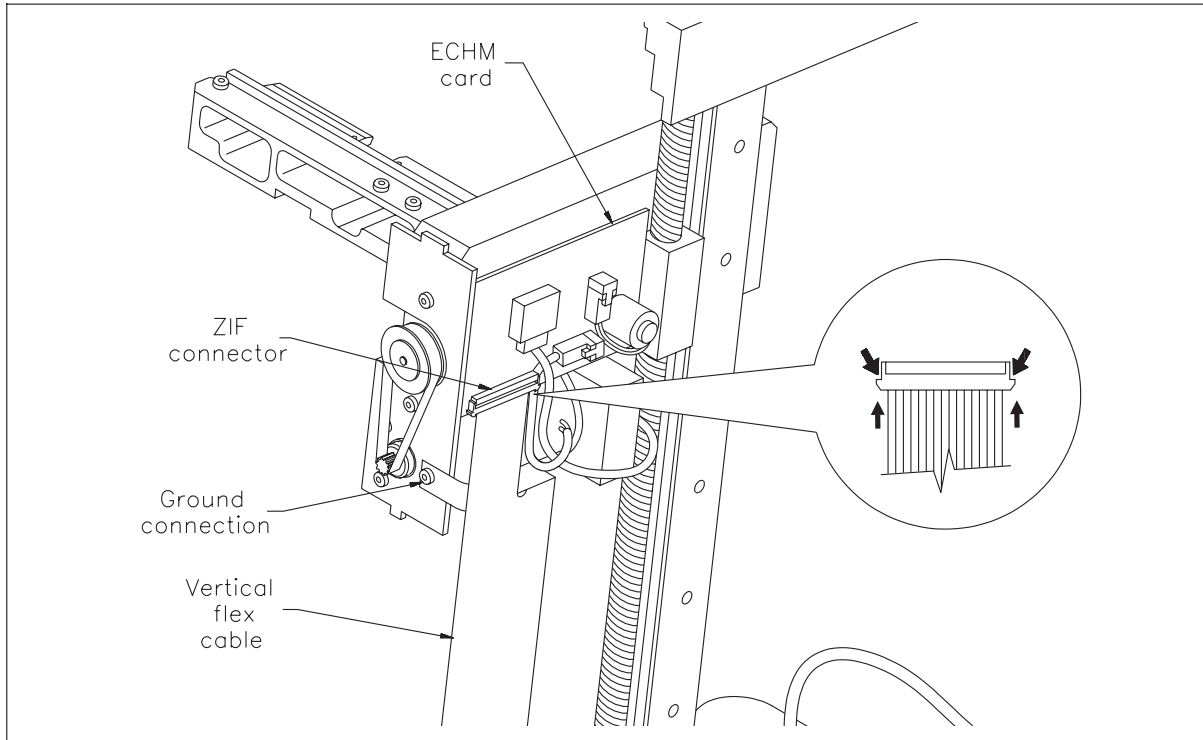


Figure 8-17 Replacing the vertical flex cable

Installing the vertical flex cable

1. Carefully slide the vertical flex cable into the ZIF connector (J1) on the ECHM card (see Figure 8-17). Push up on both sides of the connector to close it.
2. Using a T-8 bit, replace the screw that holds the ground connection to the side of the horizontal motor assembly (see Figure 8-17). Tighten the screw to 2.0 inch-pounds (2.2 kg-cm) of torque.

3. Install the CHM shield (see Section 4.2).

► **Important** Make sure that the vertical flex cable and the vertical motor cables are not caught between the long axis and the shield.

4. Align the vertical flex cable along the inside edge of the CHM shield, then carefully slide it into the ZIF connector (J3) on the motor control card (see Figure 8-18). Gently push in on both sides of the connector to close it.

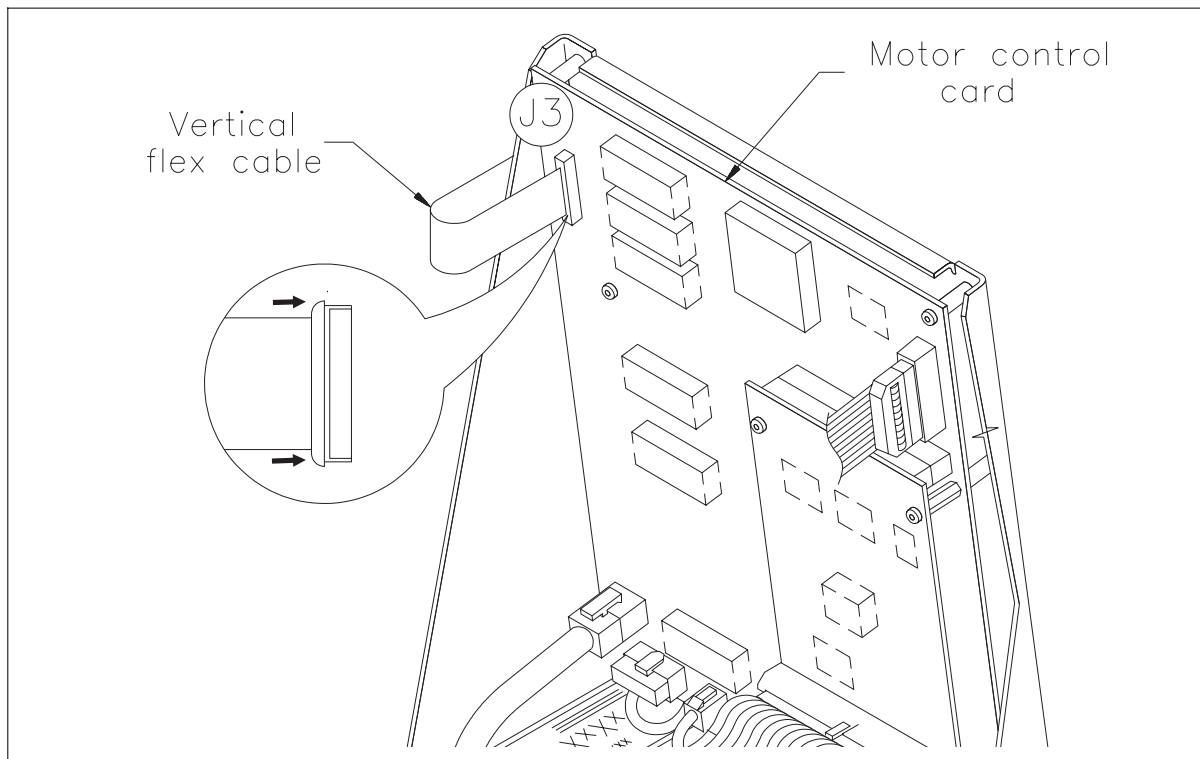


Figure 8-18 Connecting the vertical flex cable to the motor control card

After replacing the vertical flex cable

1. Reinstall the data cartridge magazine (see Section 2.4).
2. Replace the cover assembly (see Section 2.6).
3. Reconnect the SCSI cable(s) and power cord.
4. Turn on the library power. The library and tape drive perform their power-on self-tests, then the Main Screen appears on the LCD.

If problems occur . . .

Problem	Corrective action
The library does not power on as described.	<p>Check the following:</p> <ul style="list-style-type: none">✓ Is the power cord inserted correctly?✓ Are the SCSI cables connected?✓ Is the SCSI bus terminated?✓ Is the operator panel ribbon cable properly connected to the back of the library?✓ Are all connections to the motor control card and the SCSI card secure? Refer to Section 6.3.✓ Is the operator panel ribbon cable properly connected to the display card?✓ Is the vertical flex cable securely attached to the ECHM card and the motor control card?

A LCD Menu Quick Reference

This appendix provides a quick reference to the LCD-based operations required to perform some of the procedures in this manual. These operations include:

- Viewing system sensors
- Using library diagnostic commands to do the following:
 - Position to element
 - Position to park
 - Position to Y Home or Z Home
 - Test CHM positioning and function
- Resuming normal operation

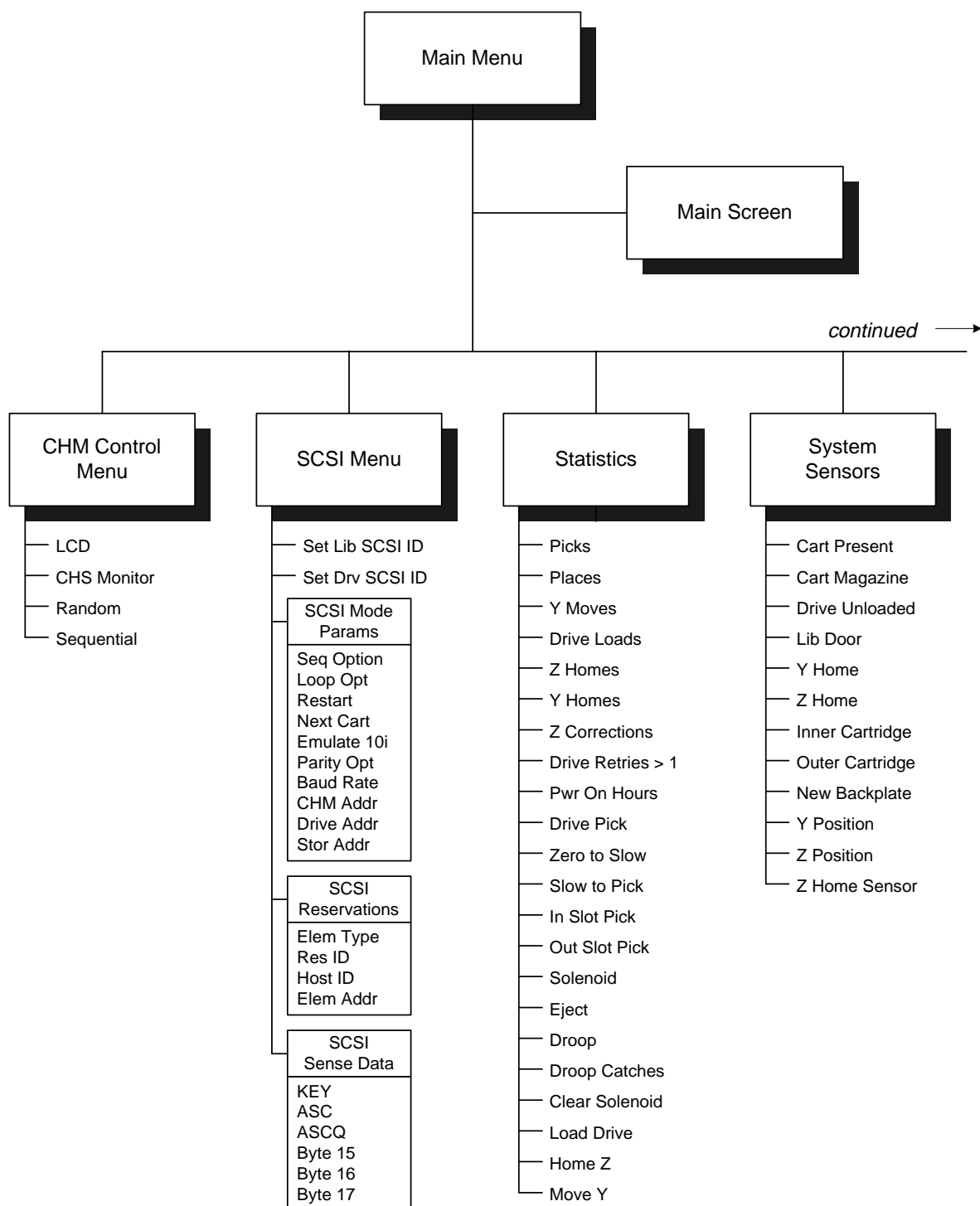
For detailed instructions for performing operations from the LCD, including changing the library SCSI ID, refer to *EXB-10h 8mm Library Installation and Operation*.

A.1 Main Menu overview

You can use the Main Menu to access all of the library LCD options and functions. To access the Main Menu, press **MENU** or **ESC** on the operator panel.

→		M	a	i	n		S	c	r	e	e	n							
		C	H	M		C	o	n	t	r	o	l		M	e	n	u		
		S	C	S	I		M	e	n	u									
		S	t	a	t	i	s	t	i	c	s								↓

The menu structure is shown on the next two pages. Table A-1 provides a general description of the options available under the Main Menu.



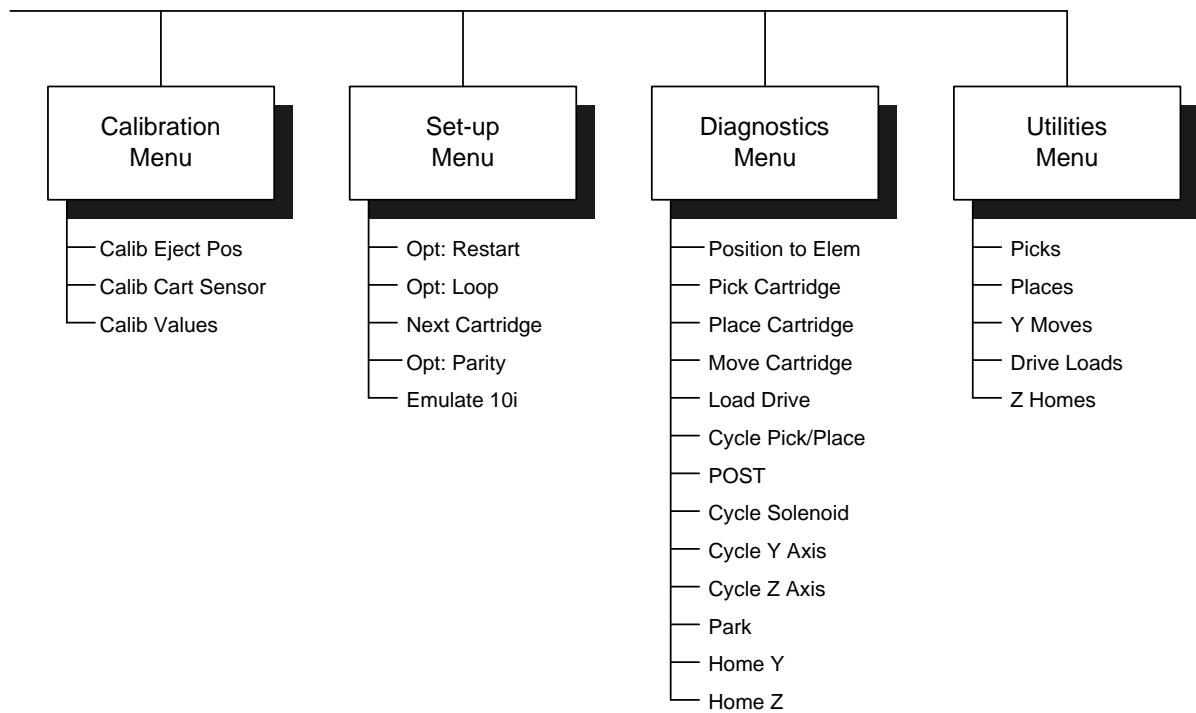


Table A-1 Description of LCD Main Menu options

Menu Selection	Description
Main Screen	Returns to the Main Screen.
CHM Control Menu	Allows you to specify how CHM motion is controlled.
SCSI Menu	Allows you to view or set SCSI IDs for the library and tape drive and view SCSI information for the library.
Statistics	Accesses a submenu with options for viewing current information about EXB-10h operations.
System Sensors	Accesses a submenu with options for viewing the status of the library's internal sensors.
Calibration Menu	Allows you to calibrate the positions of the library's cartridge sensor and the solenoid used for ejecting cartridges from the CHM.
Set-up Menu	Allows you to specify various parameters that affect library operation.
Diagnostics Menu	Allows you to perform diagnostic tests.
Utilities Menu	Allows you to specify the library's internal date and time and the appearance of the LCD.

A.2 Viewing system sensors

The System Sensors screen allows you to troubleshoot hardware problems by checking the current status of the library's internal sensors.

To view the sensor status, select System Sensors from the Main Menu.

1. From the Main Menu, press **↓** to select System Sensors and press **Enter**. The System Sensors screen displays:

S	y	s	t	e	m	S	e	n	s	o	r	s	:						
	C	a	r	t		P	r	e	s	e	n	t						0	
	C	a	r	t		M	a	g	a	z	i	n	e					1	
	D	r	i	v	e		U	n	l	o	a	d	e	d				1	↓

The information shown on the System Sensors screen is described in Table A-2.

Table A-2 System Sensors information

Item	Description
Cart Present	0 – No cartridge in gripper (CHM at Z Home position) 1 – Cartridge in gripper (CHM at Z Home position)
Cart Magazine	0 – No magazine installed 1 – Magazine installed 2 – Unknown
Drive Unloaded	0 – Cartridge loaded in tape drive 1 – Cartridge not loaded in tape drive
Library Door	0 – Library door not open 1 – Library door open
Y Home	0 – CHM not at the vertical home position 1 – CHM at the vertical home position
Z Home	0 – CHM not at the horizontal home position 1 – CHM at the horizontal home position
Inner Cartridge Outer Cartridge	Indicates the status of the inner and outer cartridge sensors on the ECHM card (nearest the magazine) 0 – Flag in sensor 1 – No flag in sensor
New Backplate	Indicates which backplate is installed (detected at power-up). 0 – Old backplate 1 – New backplate
Y Position	Indicates the number of <i>counts</i> (the library's internal unit of measurement) the CHM is away from the vertical home position.
Z Position	Indicates the number of counts the CHM is away from the horizontal home position (the position closest to the library door). This number is usually positive.
Z Home Sensor	Indicates the physical position of the Z home sensor on the horizontal axis. This number, which should be between –500 and –1,000, can be used to determine whether the horizontal axis position information is valid.

A.3 Using the library diagnostic commands




The LCD Diagnostics Menu allows you to manually control selected CHM operations necessary to perform diagnostic tests.


1. From the Main Menu, press  to select the CHM Control Menu and press . The CHM Control Menu displays:

C	H	M		C	o	n	t	r	o	l		M	e	n	u					
→				L	C	D											O	f	f	
				C	H	S			M	o	n	i	t	o	r			O	f	f
				R	a	n	d	o	m									O	n	↓

2. Select LCD and press . The following message displays:

C	h	a	n	g	i	n	g		C	H	M		C	o	n	t	r	o	l
F	r	o	m		R	A	N	D		t	o		L	C	D				
S	y	s	t	e	m		S	t	a	t	u	s	:						
				C	o	m	p	l	e	t	e								

3. Press  to return to the Main Menu.
4. Press  to select the Diagnostics Menu and press . The Diagnostics Menu displays:

D	i	a	g	n	o	s	t	i	c	s		M	e	n	u				
→				P	o	s	i	t	i	o	n		T	o		E	l	e	m
				P	i	c	k		C	a	r	t	r	i	d	g	e		
				P	l	a	c	e		C	a	r	t	r	i	d	g	e	

Position to Element

The Position to Element function moves the CHM to a specified position (element) along the vertical axis. Positions are 0 through 10, as follows:

0 – Tape drive position

1 – The bottom slot in the cartridge magazine

up to

10 – The top slot in the data cartridge magazine



► **Important** When this manual calls for a Position to Element test, be sure to perform the following steps before performing any other steps in the maintenance procedure.

1. From the Diagnostics Menu, select Position to Elem.
2. Use the arrow keys to select the element number specified in the maintenance procedure.
3. Press **Enter** on the operator panel. The CHM moves to the element you selected. When the move is finished, the LCD displays “Complete” status.
4. Return to the maintenance procedure and continue with those instructions.

Position to Park

The Park function moves the CHM to the park position at the bottom of the long axis.



► **Important** When this manual calls for a Park test, be sure to perform the following steps before performing any other steps in the maintenance procedure.

1. From the Diagnostics Menu, press  to select Park.
2. Press . The CHM moves to the park position. When the move is finished, the LCD displays the status of “Complete.”
3. Return to the maintenance procedure and continue with those instructions.

Position to Home Y or Home Z

The Home Y function moves the CHM to the Y Home position at the top of the long axis. The Home Z function moves the CHM to the Z Home position on the short axis.




► **Important** When a maintenance procedure in this manual calls for you to move the CHM to Y Home or Z Home, be sure to perform the following steps before performing any other steps in the maintenance procedure.

1. From the Diagnostics Menu, press  to select Home Y or Home Z.
2. Press . The CHM moves to the selected home position. When the move is finished, the LCD displays “Complete” status.
3. Return to the maintenance procedure and continue with those instructions.

Testing CHM positioning and function

The Diagnostics menu provides several functions that test the proper positioning and function of the CHM. You may choose to perform any or all of these tests after some maintenance procedures (as indicated in that procedure). These include:

- Pick and place cartridge
- Cycle pick/place
- Cycle solenoid, Y axis, Z axis


To perform any of these tests, press  to select the desired test from the Diagnostics menu and press . Where prompted, make your selection, then press  again.

A.4 Resuming normal operation

After completing the desired diagnostic tests, you must reset the library to its previous operating mode (either random or sequential) before you can resume normal operation.

1. From the Main Menu, press  to select the CHM Control Menu and press . The CHM Control Menu displays:

C	H	M		C	o	n	t	r	o	l		M	e	n	u				
→			L	C	D											O	f	f	
			C	H	S		M	o	n	i	t	o	r				O	f	f
			R	a	n	d	o	m								O	n		↓

2. Select the control mode you used during normal operation and press . A message similar to the one shown displays:

C	h	a	n	g	i	n	g		C	H	M		C	o	n	t	r	o	l
F	r	o	m		L	C	D		t	o		R	a	n	d	o	m		
S	y	s	t	e	m		S	t	a	t	u	s	:						
			C	o	m	p	l	e	t	e									

3. Press  to return to the Main Menu.

Notes

B Calibration Procedures

This appendix describes the following calibration procedures:

- Calibrating the cartridge sensor position
- Calibrating the eject position

These procedures are performed from the operator panel on the front of the library. You can also use the library diagnostics to perform the calibration procedures (see Appendix C).

Use these procedures when directed to do so in the error codes and diagnostics sections of this manual, and after replacing certain library components (also described in this manual).

B.1 Calibrating the cartridge sensor position

The cartridge sensors enable the library to determine whether there is a data cartridge in the gripper. The sensors are located in the CHM. You should calibrate the cartridge sensor position when:

- The CHM has been replaced
- The motor control card has been replaced
- The library's firmware has been upgraded
- You receive one or more 1Ch error codes (cartridge not fully seated in gripper) within 10 pick-and-place cycles

To calibrate the data cartridge sensor position:

1. Turn on the library.
2. On the operator panel, press **Menu**. The Main Menu displays:

→	M	a	i	n	S	c	r	e	e	n						
	C	H	M	C	o	n	t	r	o	l	M	e	n	u		
	S	C	S	I	M	e	n	u								
	S	t	a	t	i	s	t	i	c	s						↓

3. Press **↓** on the operator panel to select the CHM Control Menu, then press **Enter**. The CHM Control Menu displays:

C	H	M	C	o	n	t	r	o	l	M	e	n	u			
→	L	C	D									O	f	f		
	C	H	S	M	o	n	i	t	o	r		O	f	f		
	R	a	n	d	o	m						O	n		↓	

4. Select LCD and press **Enter**. The following message displays:

C	h	a	n	g	i	n	g	C	H	M	C	o	n	t	r	o	l
F	r	o	m	R	A	N	D	t	o	L	C	D	,				
S	y	s	t	e	m	S	t	a	t	u	s	:					
	C	o	m	p	l	e	t	e									

5. Press **Menu** to return to the Main Menu.
6. Press **↓** on the operator panel to select the Calibration Menu. Press **Enter**. The Calibration Menu displays:

C	a	l	i	b	r	a	t	i	o	n	M	e	n	u		
→	C	a	l	i	b	E	j	e	c	t	P	o	s			
	C	a	l	i	b	C	a	r	t	S	e	n	s	o	r	
	C	a	l	i	b	C	T	S	P	o	s					↓

7. From the Calibration Menu, select Calib Cart Sensor. The display prompts you to install the calibration block.

- 8.** Open the library door by pressing the door latch.
- 9.** Place the cartridge sensor calibration block securely in the gripper. Make sure that the circular indentation in the calibration block faces toward the gripper plunger (see Figure B-1).

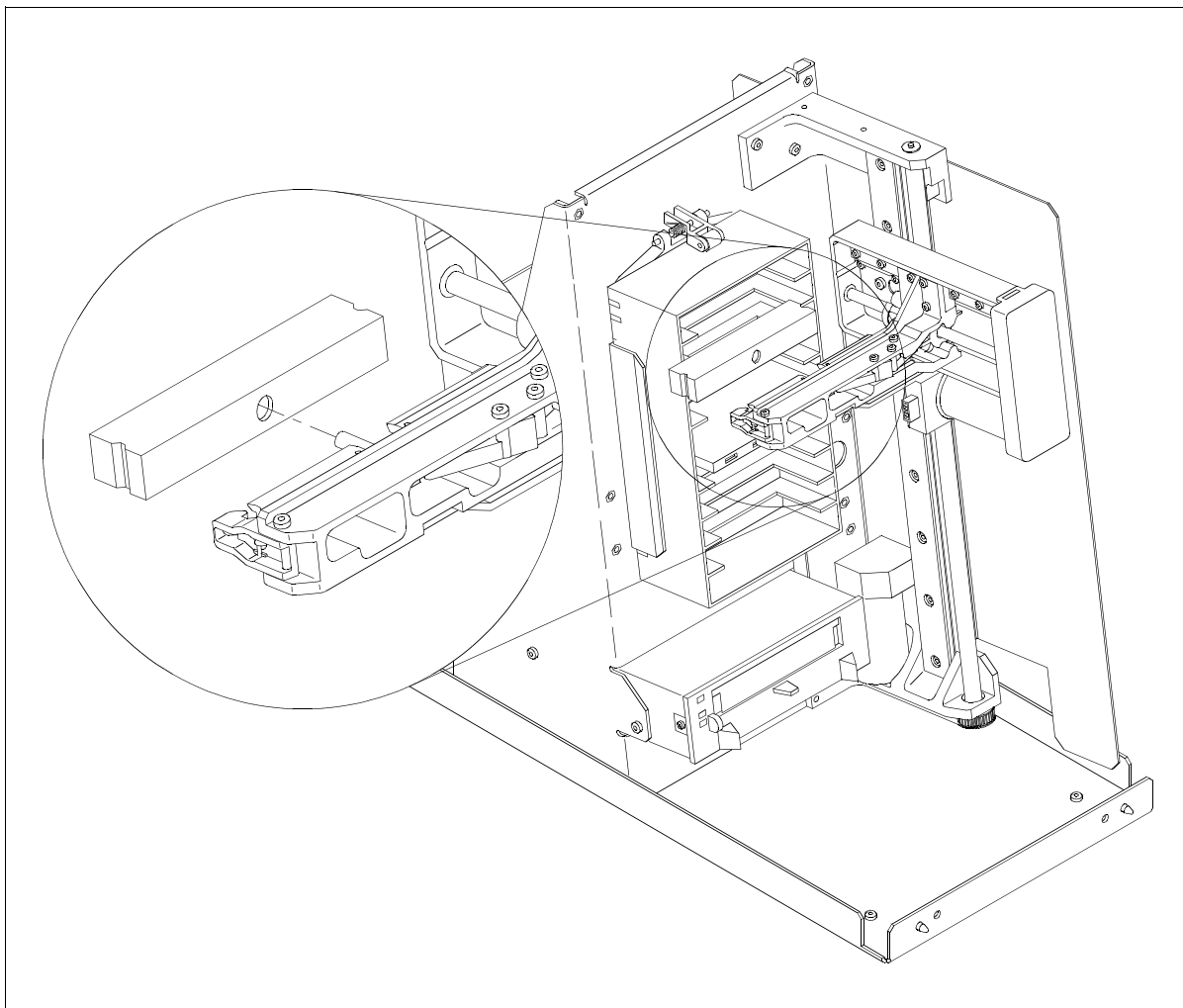


Figure B-1 Placing the calibration block in the gripper

- 10.** Close the library door to start the calibration process. During the calibration process, the library moves the CHM past the cartridge and Z Home sensors and saves the locations of these sensors. The library uses these values to determine whether a cartridge is seated, not seated, or not present during normal operation.

If an error occurs, the library displays an error message on the LCD. To find out more about the error, access the Error Status display and press **Enter**, or look up the error code in Appendix D.



11. When the calibration is finished, you are prompted to remove the calibration block from the gripper. Open the library door, remove the calibration block, and close the library door. The LCD indicates that the calibration is complete.
12. Return the library to its normal operating mode as described in Section A.4.


B.2 Calibrating the eject position

The library uses the solenoid activated plunger to eject a cartridge from the gripper. The eject position calibration determines where the CHM must be positioned on the horizontal axis in order to successfully eject a cartridge from the gripper. You should calibrate the eject position when:

- The CHM has been replaced
- The motor control card has been replaced
- The library's firmware has been upgraded
- You receive one or more 27h error codes (cannot move to eject position) within 10 pick-and-place cycles

To calibrate the eject position:

1. Make sure that a data cartridge magazine is installed in the library.
2. From the Main Menu, press  on the operator panel to select CHM Control Menu and press . The CHM Control Menu displays:

C	H	M		C	o	n	t	r	o	l		M	e	n	u				
→			L	C	D											O	f	f	
			C	H	S		M	o	n	i	t	o	r			O	f	f	
			R	a	n	d	o	m								O	n		

3. Select LCD and press **Enter**. The following message displays:

C	h	a	n	g	i	n	g		C	H	M		C	o	n	t	r	o	l
F	r	o	m		R	A	N	D		t	o		L	C	D				
S	y	s	t	e	m		S	t	a	t	u	s	:						
		C	o	m	p	l	e	e											

4. Press **Menu** to return to the Main Menu.
5. Press **↓** on the operator panel to select the Calibration Menu and press **Enter**. The Calibration Menu displays:

C	a	l	i	b	r	a	t	i	o	n		M	e	n	u				
→		C	a	l	i	b		E	j	e	c	t		P	o	s			
		C	a	l	i	b		C	a	r	t		S	e	n	s	o	r	
		C	a	l	i	b		C	T	S		P	o	s				↓	

6. From the Calibration Menu, select Calib Eject Pos and press **Enter** to start the calibration process. During the calibration process, the CHM moves to slot 1 of the data cartridge magazine, moves toward the magazine, then backs away from it until the CHM stalls against the solenoid.

If an error occurs, the library displays an error message on the LCD. To find out more about the error, access the Error Status display and press **Enter**, or look up the error code in Appendix D.

7. When the calibration is finished, the LCD indicates that the calibration is complete.
8. Return the library to its normal operating mode as described in Section A.4.

Notes

C Diagnostics

This appendix describes how to use the library's internal diagnostics firmware to perform calibration and setup functions, help determine operational problems with the library, gather system statistics, upgrade to new firmware, and examine the results of SCSI commands.

The Diagnostics firmware resides in the library's flash EPROM. You can access the firmware from any hardware and software environment that supports the protocols listed in Section C.1.

Note: A PC-based program, CHSTERM, is available from Exabyte. This program supports the required protocols. The screens shown in the Diagnostics chapters were captured from CHSTERM; if you are using other software to communicate with the library, the screens you see may differ slightly.

C.1 Required hardware and software

You can access the Diagnostics firmware from any host computer that supports the following:

- An RS232 serial port that is hardware compatible with the IBM PC. The serial port may be set up as COM1 through COM4; if you have an IBM PS/2, you can select Serial 1 through Serial 8.

Make sure the baud rate on your host is the same as the baud rate set from the library LCD.

- A 9-pin to 9-pin serial cable. If your serial port has a 25-pin connector, you will need a 9-pin to 25-pin adapter (available from most computer stores).

► **Important** Pins 2 and 3 on the serial cable must be straight through, not “nulled.”

- MDA, EGA, or VGA monitor (monochrome or color). CGA is not recommended because it may cause problems with the serial port and “snow” on the screen.
- The ANSI 3.64 terminal protocol used by the terminal emulation software (for example, CHSTERM or ProComm).

In addition, to upgrade firmware you must use software that supports the XMODEM data transfer protocol. New versions of firmware are distributed on diskettes, the Exabyte Bulletin Board Services (BBSs), and the World Wide Web (see page xiii for information about contacting Exabyte).

C.2 Prepare the library

1. Attach one end of the serial cable to the serial port on your computer.
2. Attach the 9-pin connector on the other end of the serial cable to the CHS Monitor diagnostic port on the library (see Figure C-1).

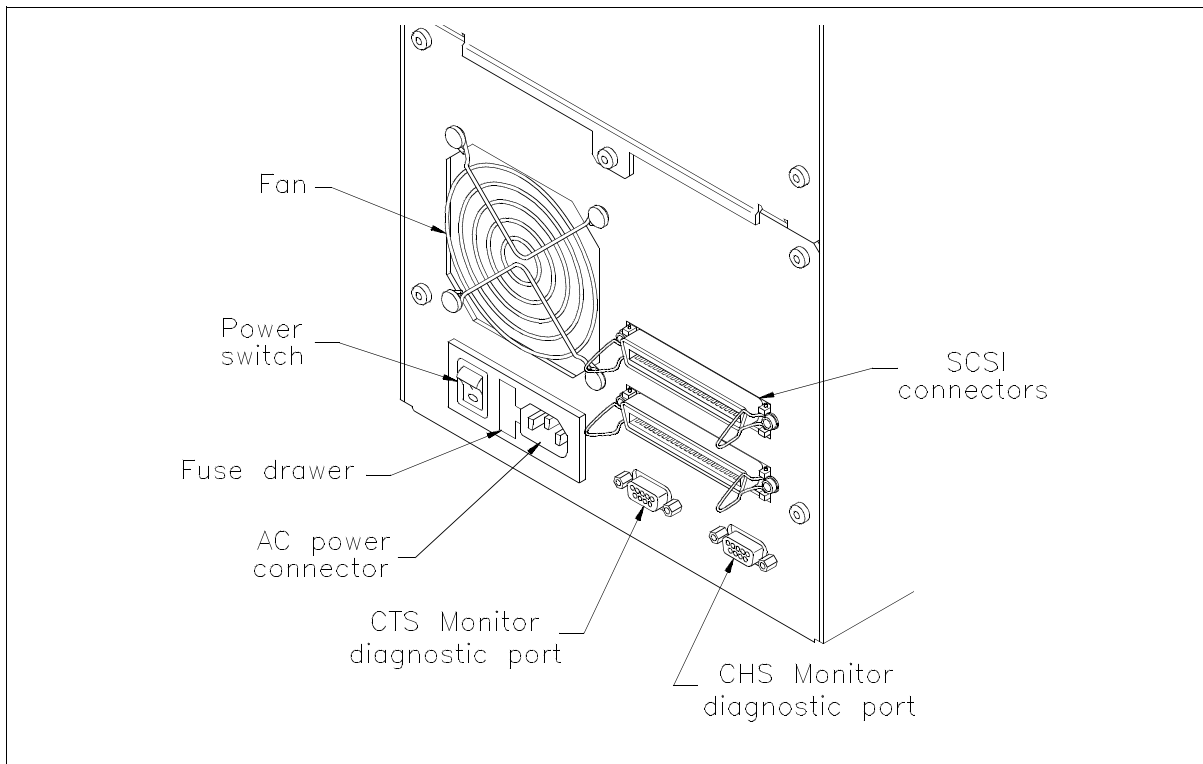
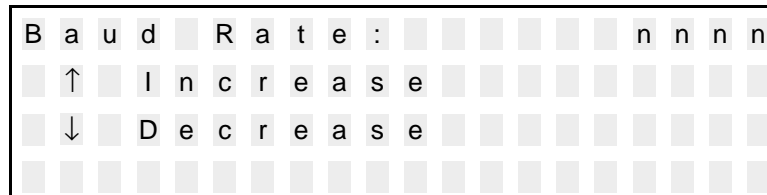


Figure C-1 CHS Monitor port (rear view of the EXB-10h)

C.3 Set up and start diagnostics

To set up and start Diagnostics, follow these steps:

1. Select Utilities from the LCD Main Menu
2. Select Baud Rate from the Utilities Menu.

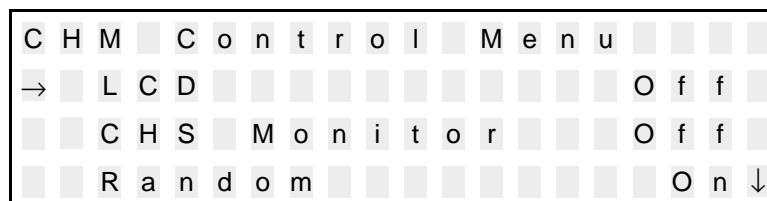


3. Using the arrow keys, select the baud rate used by the host computer.

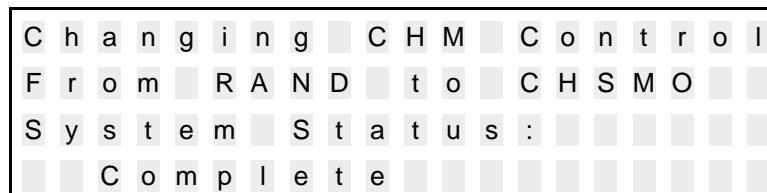
The available baud rates are:

- 300
- 1200
- 2400
- 4800
- 9600
- 19200

4. Press **Menu** to return to the Main Menu, then select the CHM Control Menu. The CHM Control Menu displays:



5. Press **↓** to select CHS Monitor, then press **Enter**. The LCD displays a message similar to the following (the previous mode may be different):



6. From your host, start the software you will using to communicate with the library. The Diagnostic Main Menu displays.

Note: If nothing displays on your screen, press **Ⓡ** to redraw the screen. If garbled characters appear on your screen, make sure you set the same baud rate for the host and the library.

C.4 Diagnostic Main Menu overview

The Diagnostic Main Menu, shown in Figure C-2, contains a title bar and the following windows:

- The Diagnostic Main Menu title bar showing the version number of the firmware and the date this firmware version was generated
- Commands
- System Sensors/Mechanism Position
- Error Codes

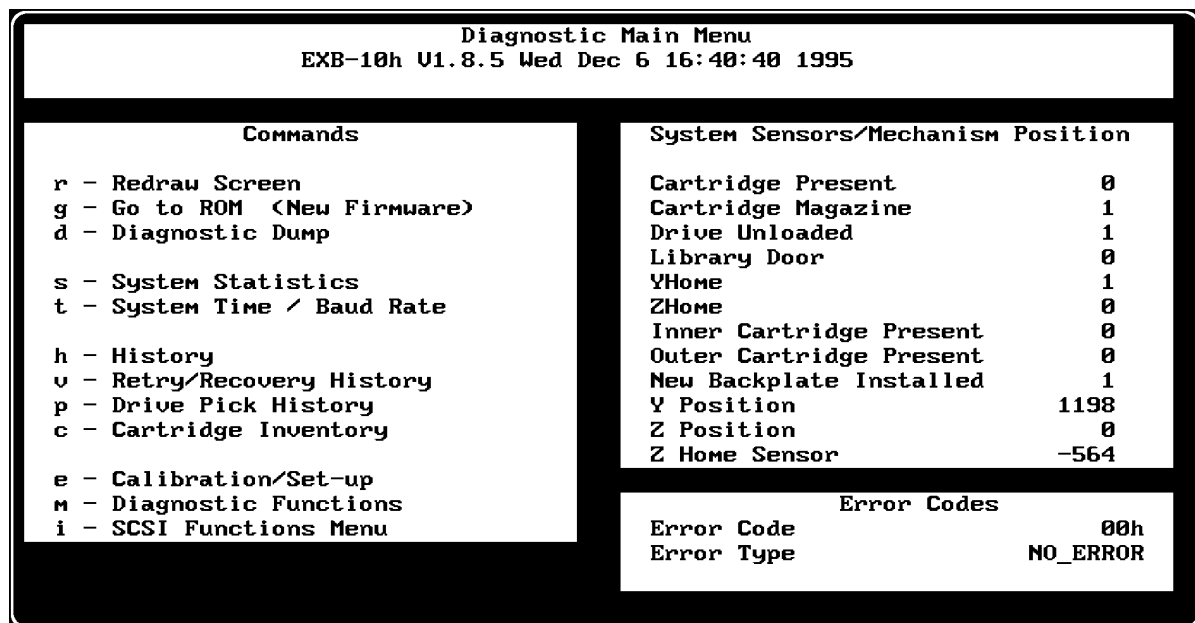


Figure C-2 Diagnostic Main Menu

Commands

The options in the Commands window allow you to perform the tasks described in Table C-1.

Table C-1 Diagnostic Main Menu: Commands window

Menu Selection	Function
r - Redraw Screen	Clears the screen of jumbled characters and redisplay the current menu.
g - Go To ROM (New Firmware)	Exits to ROM, so you can upgrade to new firmware (see Section C.5).
d - Diagnostic Dump	Allows you to perform a diagnostic dump (see Section C.6).
s - System Statistics	Displays operational information about the library (see Section C.7).
t - System Time/ Baud Rate	Allows you to view and set the real-time clock that is kept in the library and set the serial port baud rate (see Section C.8).
h - History	Displays a list of recent events that occurred in the library (see Section C.9).
v - Retry/Recovery History	Displays library attempts to recover from potential errors and automatic recalibrations (see Section C.10).
p - Drive Pick History	Displays information about the CHM picking from the tape drive, including calibration locations and the number of picks (see Section C.11).
c - Cartridge Inventory	Displays the cartridge inventory and the information returned in a READ ELEMENT STATUS command (see Section C.12).
e - Calibration/ Set-up	Allows you to set up the library, perform calibrations, and place the library in test mode (see Section C.13).
m - Diagnostic Functions	Displays a menu of options for exercising the CHM (see Section C.14).
i - SCSI Functions Menu	Displays a menu of options for viewing element reservation status, mode parameters, and sense data (see Section C.15).

System sensors and mechanism position

The System Sensors/Mechanism Position window displays the status of the library's mechanical sensors and shows the CHM's current coordinates in counts. (A *count* is a unit of measurement the system uses.) The library firmware uses the system sensor information to determine the position of various components.

Table C-2 describes the information in the System Sensors/Mechanism Position window.

Table C-2 Diagnostic Main Menu: System Sensors/Mechanism Position window

Line	Description
Cartridge Present	0 – No cartridge is in the CHM. 1 – A cartridge is in the CHM. Note: The Cartridge Present sensor is accurate only when the CHM is near the horizontal zero position (outermost position).
Cartridge Magazine	0 – No cartridge magazine is in the library. 1 – A cartridge magazine is in the library.
Drive Unloaded	0 – A cartridge is loaded in the tape drive. 1 – No cartridge is loaded in the tape drive.
Library Door	0 – The library door is closed. 1 – The library door is open.
YHome	0 – The CHM is not at the vertical home position. 1 – The CHM is at the vertical home position.
ZHome	0 – The CHM is not at the outermost horizontal position (toward the library door). 1 – The CHM is at the outermost horizontal position.
Inner Cartridge Present and Outer Cartridge Present	Indicates the status of the inner and outer cartridge sensors on the ECHM card. 0 – A cartridge is not present in the gripper or a cartridge is only partially seated. 1 – A cartridge is present in the gripper. Note: These sensors are only accurate when the CHM is near the magazine.
New Backplate Installed	0 – An old backplate (magazine mounting plate) is installed. 1 – A new backplate is installed.
Y Position	Indicates the number of counts the CHM is away from the vertical home position. Because the CHM is usually below the top position, this number is usually negative.
Z Position	Indicates the number of counts the CHM is away from the horizontal home position, the position closest to the library door. This number is usually positive.
Z Home Sensor	Indicates the physical position of the Z Home sensor on the short axis. The number can be used to determine whether the short axis position information is valid. The number should be between –300 and –900.

Error codes

The Error Codes window displays information specific to any error that occurs. See Appendix D for a description of the information provided in the Error Codes window.

Table C-3 Diagnostic Main Menu: Error Codes window

Line	Description
Error Code	Displays the hexadecimal number of the error code currently displayed on the operator panel.
Error Type	Displays the type of error and a brief explanation of the error code. See Appendix D for a complete list of error codes and corrective actions.

C.5 Upgrading to new firmware

When you receive a new library firmware release, use the Go To ROM (New Firmware) option from the Commands window to transfer the new code to the library's flash EPROM. The new release file might be contained on floppy diskettes, or you might download it from a bulletin board service (BBS) or the internet onto your computer disk drive.

To upgrade the firmware, follow these steps:

1. Insert the disk containing the new firmware in your computer floppy disk drive or copy the new firmware to a location accessible by your terminal emulation software.
2. Start your terminal emulation software.
3. From the library Diagnostic Main Menu, press **ⓐ** to select Go to ROM (New Firmware).

The ROM Console Main Menu appears, as shown in Figure C-3.

Note: To escape ROM and return to the Diagnostics Main Menu, select TRANSFER TO FLASH EPROM.

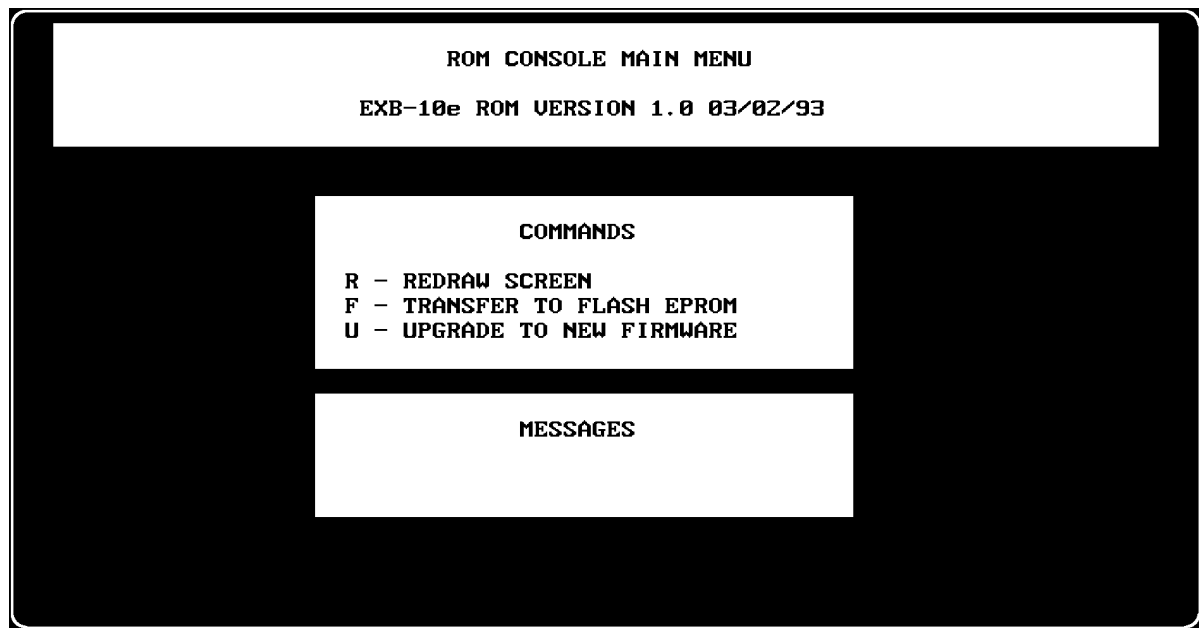


Figure C-3 ROM Console Menu

4. From the ROM Console Main Menu, press **U** to upgrade to the new firmware.

The program prompts:

```
ARE YOU SURE YOU WANT TO ERASE AND PROGRAM THE FLASH  
EPROM (Y/N)?
```

5. Press **Y** to erase the old library firmware or **N** to cancel the upgrade function.

If you press **Y**, the program erases the old firmware and displays the following message:

```
PREPARE XMODEM TRANSFER
```


6. Use your terminal emulation software to prepare a transfer of the firmware to the library.

If you are using CHSTERM, press **[Alt] [S]**, then type `a:[path]*.*`, where `a:` is the letter of the drive containing the upgrade firmware, to search for the file name of the firmware. Use **[↑]** and **[↓]** to select the file name and press **[Enter]**.

The new firmware begins transferring. The CHS Terminal program shows the bytes and blocks transferred, the percentage complete, and the minutes left. When the firmware is transferred, the ROM Console Menu redisplay.

When the firmware has been successfully transferred, **Successful** displays in the MESSAGES window. If any error codes display, you need to perform the upgrade procedure again. If the procedure is still unsuccessful, contact your vendor.

7. Press **[F]** for TRANSFER TO FLASH EPROM. This transfers library control to flash EPROM and executes the new firmware.
8. Test the library by using the library's Diagnostic Functions Menu to perform picks, places, and moves. When you are satisfied that the library is operating correctly, use the LCD to return it to its normal operating mode.
9. Disconnect the serial cable from the library CHS Monitor port.

C.6 Obtaining a diagnostic dump

The Diagnostic Dump option on the Diagnostic Main Menu allows you to transfer diagnostic data from the library over the serial port to a file on your host. This diagnostic listing includes the following information:

- Mode parameters and sense data
- System statistics and options
- Cartridge inventory
- Pick history
- Event history
- Recovery history

Note: If you are operating a slow receiving device, set the baud rate on the host and the library to a slower rate while you are transferring a diagnostic listing. (See Section C.8 for more information about setting baud rates.)

To obtain a diagnostic listing, follow these steps:

1. Press **D** to select Diagnostic Dump from the Commands window.

The firmware prompts you for a file name for the listing.

2. Set up your terminal emulation software to receive an ASCII transfer of the diagnostic dump to a file. Using your terminal emulation software, type a file name where you want the diagnostic data to be written and press **Enter** on your computer keyboard.

If you are using CHSTERM, press **Alt L**. The default file name CHSTERM.LOG appears on the screen. If the log already exists, the program prompts you to replace or append to the current .LOG file. To change the name, type over the existing name and press **Enter**.

3. Press **Enter** twice again.

The diagnostic data displays on the screen as it is written to the file you specified.

C.7 Displaying system statistics

Selecting the System Statistics option from the Diagnostic Main Menu displays useful information about the library. This information can be used for the following purposes:

- Checking statistics. The system statistics provide information about how many picks, places, moves, door closes, and home operations have been successfully executed since the library's first power up.
- Determining library retries.

To view system statistics, press **[S]** to select System Statistics from the Diagnostic Main Menu. The screen shown in Figure C-4 displays.

EXB-10h System Statistics		
Commands		Retries
r - Redraw Screen		Pick: Drive 0
q - Quit		Zero to SLOWDOWN 0
		SLOWDOWN to PICK 0
		Inner Slot 0
		Outer Slot 0
System Statistics		Place: Solenoid 0
Number of Picks	4519	Eject 0
Number of Places	4505	Droop 0
Number of Y Moves	9257	Droop Catches 0
Number of Loads	1978	Clear Solenoid 0
Number of Z Homes	2155	Load: Load Drive 0
Number of Y Homes	157	Home Z: 0
Retried Drive Picks	0	Move Y: 0
Power On Hours	1673	Z Axis Corrections 0

Figure C-4 System Statistics screen

Commands

Table C-4 describes the commands used with the System Statistics screen.

Table C-4 System Statistics Screen: Commands window

Command	Function
r - Redraw Screen	Clears the screen, then and redisplay it.
q - Quit System Statistics	Exits to the Diagnostic Main Menu.

Retries

When the library fails to complete some motion commands, it counts the number of times it attempted to retry the motion. These retry counts are displayed in the System Statistics Retries window. The counts are reset to zero every time the processor restarts. If the library fails during a motion command, you can view this screen to see if the library displays an attempted number of pick or place retries. This screen can help you isolate where the problem occurred.

Table C-5 describes the Retries information shown on the System Statistics screen (see Figure C-4).

Table C-5 System Statistics screen: Retries window

Line	Description
Pick: Drive	Displays the number of times the CHM attempted to pick a cartridge from the tape drive. The CHM retries two times per pick before displaying an error.
Pick: Zero to SLOWDOWN	Displays the number of times the CHM retried moving to a location between Z home and just in front of the cartridge. A number here may indicate problems on the Z-axis. The CHM retries two times per pick before displaying an error.
Pick: SLOWDOWN to PICK	Displays the number of times the CHM retried moving to a location between just in front of the cartridge and the indentations on the cartridge where the gripper takes hold. A number here may indicate problems on the Z-axis. The CHM retries two times per pick before displaying an error.
Pick: Inner Slot	Displays the number of times the inner sensors detected no cartridge in the gripper. The CHM retries two times per pick before displaying an error.
Pick: Outer Slot	Displays the number of times the outer sensors detected no cartridge in the gripper. The CHM retries two times per pick before displaying an error.

Line	Description
Place: Solenoid	Displays the number of times the library has retried the entire place procedure because of a weak solenoid. If the library has a weak solenoid, you should replace the CHM. The CHM retries two times per place before displaying an error.
Place: Eject	Displays the number of times the library has retried a move to the eject position during a place procedure. The CHM retries two times per place before displaying an error.
Place: Droop	Displays the number of times the CHM could not place a cartridge because the cartridge drooped while seated in the grab base. A high number here may indicate that the CHM needs to be replaced. The CHM retries eight times per place before displaying an error.
Place: Droop Catches	Displays the number of times the cartridge hit against the cartridge holder slot because the cartridge drooped while seated in the grab base. A number here may indicate that the CHM needs to be replaced.
Place: Clear Solenoid	Displays the number of times the CHM retried to place a cartridge because of a slow or stuck solenoid. A number here may indicate that the CHM needs to be replaced. The CHM retries two times per place before displaying an error.
Load: Load Drive	Displays the number of times the CHM attempted to load a cartridge in the tape drive. A number here may indicate that there is a servo error in the tape drive. The CHM retries two times per attempt before displaying an error.
Home Z:	Displays the number of times the CHM retried moving to the home position on the horizontal axis. A number here may indicate a problem with the horizontal axis.
Home Y:	Displays the number of times the CHM retried moving to the home position on the vertical axis. A number here may indicate a problem with the vertical axis.
Z Axis Corrections	Displays the number of times the horizontal home sensor was found outside a window that is defined during the power-on self-test process. This problem may indicate a problem with the horizontal drive motor or motion controller.

System statistics

The System Statistics window in the System Statistics screen shows accumulative tallies of CHM operations, beginning with the time the library was first powered up. Table C-6 describes the information provided in the System Statistics window.

Table C-6 System statistics

Line	Description
Number of Picks	The number of times the CHM has picked a cartridge from the cartridge magazine or tape drive.
Number of Places	The number of times the CHM has placed a cartridge in the cartridge magazine or tape drive.
Number of Y Moves	The number of vertical moves the CHM has performed. A <i>vertical move</i> is either an upward or downward movement along the vertical axis.
Number of Loads	The number of times the CHM has loaded a cartridge into the tape drive.
Number of Z Homes	The number of times the CHM has determined the home position on the horizontal axis.
Number of Y Homes	The number of times the CHM has determined the home position on the vertical axis
Retried Drive Picks	The number of times the CHM retried more than once to pick a cartridge from the tape drive since power up.
Power On Hours	The number of hours the library has been in operation since the first power up.

C.8 Setting the system time and baud rate

The library contains a real-time clock that keeps the correct time even during power-off periods. To view or set the current date and time, select the System Time/Baud Rate option from the Diagnostic Main Menu. The screen shown in Figure C-5 displays.

The Time/Baud Rate Menu contains five windows:

- Commands lists the commands available for setting the time and baud rate (see Table C-7).
- Current Time displays the current time and date.
- Set Time is used to change the time displayed in the Current Time window.
- Current Baud Rate displays the baud rate currently selected for the library's CHS Monitor (or Diagnostics) port.
- Set Baud Rate is used to change the baud rate setting for the library's CHS Monitor (or Diagnostics) port.

EXB-10h Time / Baud Rate Menu	
<p style="text-align: center; margin: 0;">Commands</p> <p> s - Increment Seconds m - Increment Minutes h - Increment Hours d - Increment Days n - Increment Months y - Increment Years w - Increment Weekday b - Increment Baud Rate z - Set Baud Rate <CR> - Set Time r - Redraw Screen q - Quit </p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center; margin: 0;">Current Time</p> <p> Time 09:40:37 Date Friday May 18, 1995 </p> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center; margin: 0;">Set Time</p> <p> Time 09:40:25 Date Friday May 18, 1995 </p> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center; margin: 0;">Current Baud Rate</p> <p> Baud Rate 9600 </p> </div> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; margin: 0;">Set Baud Rate</p> <p> Baud Rate 300 </p> </div>

Figure C-5 Time/Baud Rate Menu

Commands

Table C-7 describes the commands used with the Time/Baud Rate Menu.

Table C-7 Time/Baud Rate Menu: Commands menu

Command	Function
s - Increment Seconds	Increments the seconds setting in the Set Time window.
m - Increment Minutes	Increments the minutes setting in the Set Time window.
h - Increment Hours	Increments the hours setting in the Set Time window. (The library uses a 24-hour clock. For example, 1 p.m. appears as "13:00.")
d - Increment Days	Increments the day of the month setting in the Set Time window.
n - Increment Months	Increments the name of the month setting in the Set Time window.
y - Increment Years	Increments the year setting in the Set Time window.
w - Increment Weekday	Increments the day of the week setting in the Set Time window.
b - Increment Baud Rate	Increments the baud rate to the next available baud rate that the library's CHS Monitor port can use. The baud rate appears in the Change Baud Rate window.
z - Set Baud Rate	Sets the baud rate to the value shown in the Set Baud Rate window.
<CR> - Set Time	Press Enter on your computer keyboard to save the time and date currently displayed in the Set Time window.
r - Redraw Screen	Redraws the screen.
q - Quit	Exits from this menu and returns to the Main Menu without saving any changes.

Setting the date and time

To set the library date and time, follow these steps:

1. Use the commands described in Table C-7 to set the current seconds, minutes, hours, days, and so on.

► **Important** The library does not verify that the date you set corresponds to the specified weekday. For example, it will not check to see if January 1, 1992, is a Wednesday.

2. When finished, press **Enter** on your computer keyboard to save the settings.
3. To return to the Diagnostic Main Menu, type **Q**.

Setting the baud rate

The default baud rate for the library's CHS Monitor port is 9600 baud. If this is too fast or too slow, you can change the baud rate to one of the following rates: 300, 1200, 2400, 4800, 9600, or 19200.

► **Important** The baud rate setting for the CHS Monitor port is stored in nonvolatile memory and is retained over power cycles.

You can change the baud rate setting for the CHS Monitor port from the LCD as described in Section C.3 or you can use the library diagnostic firmware.

To change the baud rate using the diagnostic firmware, follow these steps:

1. From the Time/Baud Rate Menu, press **B** to scroll through the available baud rates.
2. When the desired rate appears in the Set Baud Rate window, press **Z** to set the library baud rate.

► **Important** When you set the new value in this window, the library immediately changes to the new baud rate. When this happens, the Diagnostics screens may no longer function properly. To correct this, you must change the baud rate used by your communications software to the same baud rate that you specified for the library.

Note: If you are using the CHSTERM program, you toggle the baud rate by pressing **Alt B**. Then refresh the screen by typing **R**.

C.9 Displaying the command history

You can use the History option on the Diagnostic Main Menu to view the 100 most recent events of the library operation. The most recent event is displayed first.

To view history records, follow these steps:

1. Press **[H]** to select History from the commands window. The History of Events, similar to the screen shown in Figure C-6, displays.
2. To scroll through this screen, use the commands listed at the top of the screen (T = Top of History, B = Bottom of History, and so on).
3. To return to the Diagnostic Main Menu, type **[Q]**.

EXB-10h History of Events		
r - Redraw Screen	t - Top of History	u/U - Up 1/5 Lines
q - Quit	b - Bottom of History	d/D - Down 1/5 Lines
Index	History Information	Timestamp
0	MOVE TO Y = 1198	12-17-90 15:02:09
-1	MOVE TO Z = 0	12-17-90 15:02:08
-2	MOVE TO Z = 0	12-17-90 15:02:08
-3	MOVE TO Z = 70000	12-17-90 15:02:07
-4	MOVE TO Z = 50000	12-17-90 15:02:06
-5	MOVE TO Y = -121650	12-17-90 15:02:04
-6	MOVE TO Z = 0	12-17-90 15:02:04
-7	DIAG COMPLETE: CYCLE LINK, STATUS = 0x00	12-17-90 15:02:04
-8	CHK FOR CARTRIDGE, NOT FOUND	12-17-90 15:02:04
-9	CHK FOR CARTRIDGE, NOT FOUND	12-17-90 15:02:03
-10	PLACE INTO DRIVE (Y=-324176)	12-17-90 15:02:00
-11	CHK FOR CARTRIDGE, NOT FOUND	12-17-90 15:02:00
-12	PICK FROM DRIVE (Y=-324176)	12-17-90 15:01:55
-13	MOVE TO Z = 0	12-17-90 15:01:55
-14	MOVE TO Y = -324176	12-17-90 15:01:52
-15	MOVE TO Z = 0	12-17-90 15:01:52
-16	DIAGNOSTICS: CYCLE GRIPPER LINKAGE	12-17-90 15:01:52
-17	HOME ON Y	12-17-90 15:01:52
-18	MOVE TO Z = 0	12-17-90 15:01:51

Figure C-6 History of Events screen

C.10 Displaying the retry/recovery history

The Retry/Recovery History option on the Diagnostic Main Menu displays messages resulting from attempts by the library to recover from a potential error.

To display the Retry History of Events screen, follow these steps:

1. Press **[V]** to select Retry/Recover History from the Diagnostic Main Menu. A screen similar to the one shown in Figure C-7 displays.

Note: If the library has not made any recovery attempts, the area below the column heads will be blank.

2. To exit this screen, type **[Q]**.

EXB-10h Retry History of Events			
r - Redraw Screen		q - Quit History	
Index	Type	History Information	Timestamp

Figure C-7 Retry History of Events screen

C.11 Displaying the pick history

The Pick History option on the Diagnostic Main Menu displays a table of information indicating how well the CHM has been picking cartridges from the tape drive since it was last reset.

To display the Pick History screen, follow these steps:

1. Press **P** to select Pick History from the Diagnostic Main Menu. The screen shown in Figure C-8 displays.

Table C-8 describes the information on the Pick History screen.

2. To exit this screen, press **Q**.

EXB-10h Pick History					
POSITION	TOTAL PICKS	R E T R I E S			FAILED PICKS
		0	1	2	
-324000	0	0	0	0	0
TOTALS:	1	1	0	0	0
Last 10 pick retries (most to least recent): 0 0 0 0 0 0 0 0 0 0					
<div> Commands r - Redraw Screen q - Quit </div>					

Figure C-8 Pick History screen

Table C-8 Diagnostic Main Menu: Pick History

Column/ Line	Description
POSITION	Displays the CHM's possible vertical positions in encoder counts.
TOTAL PICKS	Displays the total number of picks the CHM attempted at that vertical position.
RETRIES (0 THROUGH 2)	Displays the number of pick retries (either 0, 1, or 2).
FAILED PICKS	Displays the number of times the CHM could not pick a cartridge after three attempts (one try and two retries).
Last 10 pick retries (most to least recent)	Shows how many retries were needed to pick the last ten cartridges. This information can help determine if the machine needs repair. Normally, this should read all zeroes.

C.12 Displaying the cartridge inventory

The Cartridge Inventory option on the Diagnostic Main Menu displays the cartridge inventory and other information about library elements. This information is obtained by using the READ ELEMENT STATUS command. (An *element* is either a cartridge magazine slot, the CHM, or the tape drive.) This screen is a dynamic display. If any parameter changes, the screen immediately updates to reflect that change.

To display the cartridge inventory, follow these steps:

1. Press **[C]** to select CARTRIDGE INVENTORY from the Diagnostic Main Menu. The screen shown in Figure C-9 displays.

Table C-9 describes the information in the Cartridge Inventory screen.

2. To exit this screen, press **[Q]**.

EXB-10h Cartridge Inventory					
INDEX	OCCUPIED/VALID	SOURCE/VALID	ADDRESS	RESERVED/RES_ID/HOST_ID	
0	0/1	255/0	0	0/	0 /255
1	0/0	255/0	1	0/	0 /255
2	0/0	255/0	2	0/	0 /255
3	0/0	255/0	3	0/	0 /255
4	0/0	255/0	4	0/	0 /255
5	0/0	255/0	5	0/	0 /255
6	0/0	255/0	6	0/	0 /255
7	0/0	255/0	7	0/	0 /255
8	0/0	255/0	8	0/	0 /255
9	0/0	255/0	9	0/	0 /255
10	0/0	255/0	10	0/	0 /255
11	0/1	255/0	11	0/	0 /255

Commands for Index: 0 i - Increment Index o - Toggle Occupied v - Toggle Valid	Commands r - Redraw Screen q - Quit
--	--

Figure C-9 Cartridge Inventory screen

Table C-9 Diagnostic Main Menu: Cartridge Inventory

Column	Description
INDEX	Displays the element index (0= tape drive, 1–10= cartridge magazine slots, 11= CHM).
OCCUPIED/VALID	OCCUPIED displays 1 if there is a cartridge located in that address or 0 if there is not a cartridge in that address. VALID displays 1 if the Occupied flag is accurate or 0 if it is questionable.
SOURCE/VALID	SOURCE shows the address of the last storage element from which the cartridge was moved. VALID displays 1 if the Source Element Address field is accurate or 0 if it is questionable. A source of 255 indicates that the source is unknown.
ADDRESS	Displays the element address.
RESERVED/RES_ID/ HOST_ID	Under RESERVED, displays 1 if the element is reserved by an initiator or 0 if it is not reserved. RES_ID displays the reservation ID as set in the RESERVE command. HOST_ID displays the SCSI ID of the initiator that reserved the element. A HOST_ID of 255 indicates that no HOST_ID is associated with the reservation for this element.

Table C-10 Cartridge Inventory screen: Index commands

Command	Description
i - Increment Index	Increments to the next element index.
o - Toggle Occupied	Toggles the occupied flag between 1 (occupied) and 0 (not occupied).
v - Toggle Valid	Toggles the occupied flag between 1 (valid) or 0 (not valid).

C.13 Performing calibration and set-up functions

The Calibration/Set-up option in the Diagnostic Main Menu allows you to do the following:

- Enable or disable accelerated test mode
- Calibrate the cartridge sensor position
- Calibrate the eject position
- Set any of the library options

Note: Before using the calibration or setup function, you must first switch control to CHS Monitor (see Section C.3). If you do not do so, you will see the following message:

```
PLEASE WAIT
ENABLE CHSMO MODE (ESC TO CANCEL)
```

To perform calibration/set-up operations, follow these steps:

1. Press **[E]** to select Calibration/Set-up from the Diagnostic Main Menu. The screen shown in Figure C-10 displays.
2. To exit this screen, press **[Q]**.

EXB-10h Calibration/Set-up Functions							
<p style="text-align: center; margin: 0;">Commands</p> <p>a - Accelerated Test Mode c - Cartridge Sensor Calibration e - Eject Position Calibration r - Redraw Screen q - Quit</p>	<p style="text-align: center; margin: 0;">Accelerated Test Mode</p> <table style="width: 100%; border: none;"> <tr> <td style="border: none;">Cycles Remaining</td> <td style="border: none; text-align: right;">0</td> </tr> </table>	Cycles Remaining	0				
Cycles Remaining	0						
<p style="text-align: center; margin: 0;">Entry</p>	<p style="text-align: center; margin: 0;">EXB-10h Options</p> <table style="width: 100%; border: none;"> <tr> <td style="border: none;">t - Restart</td> <td style="border: none; text-align: right;">0</td> </tr> <tr> <td style="border: none;">l - Loop</td> <td style="border: none; text-align: right;">1</td> </tr> <tr> <td style="border: none;">p - Parity</td> <td style="border: none; text-align: right;">1</td> </tr> </table>	t - Restart	0	l - Loop	1	p - Parity	1
t - Restart	0						
l - Loop	1						
p - Parity	1						
<p style="text-align: center; margin: 0;">Messages</p>							

Figure C-10 Calibration/Set-up Functions screen

Table C-11 describes the options in the Commands, Entry, and Messages windows of the Calibrations/Setup screen. Table C-12 describes the commands in the Options window. For more information about the calibration/setup options, refer to *EXB-10h 8mm Library Installation and Operation*.

Table C-11 Calibration/Set-up Functions screen: Commands, Entry, Messages, and Accelerated Test Mode windows

Menu selection	Description
a - Accelerated Test Mode	Places the library into a special sequential mode in which the CHM does not insert the cartridge completely into the tape drive during the pick-and-place cycle. Note: Before beginning this test, you must set the library to operate in the Sequential mode. This function allows you to quickly accumulate cycles on the library for testing purposes. When you press [A] , the Entry window prompts you to enter the number of cycles the library will complete in the accelerated test mode. To stop accelerated test, power cycle the library or set the number to zero. (You cannot stop accelerated test by resetting the SCSI bus.)
c - Cartridge Sensor Calibration	Performs a cartridge sensor calibration (see Appendix B.1).
e - Eject Position Calibration	Perform an eject position calibration (see Appendix B).
r - Redraw Screen	Redraws the screen.
q - Quit	Returns to the Diagnostic Main Menu
Entry	Type the number of cycles for the Accelerated Test in this window.
Messages	Displays the status and error messages during the Accelerated Test.
Accelerated Test Mode	Displays the number of cycles remaining in the Accelerated Test.

Table C-12 Calibration/Setup Functions Menu: EXB-10h options

Menu Selection	Description
t - Restart	Toggles the Restart option on (1) or off (0).
l - Loop	Toggles the Loop option on (1) or off (0).
p - Parity	Toggles the Parity option on (1) or off (0).

C.14 Using diagnostic functions

You can use the Diagnostic Functions option from the Diagnostic Main Menu to determine and isolate possible problems with the library. This option displays a menu from which you can manually perform various CHM motions and observe the library for correct operation.

Note: Before using this function, you must first switch control to CHS Monitor (see Section C.3). If you do not do so, you will see the following message:

```
PLEASE WAIT
ENABLE CHSMO MODE (ESC TO CANCEL)
```

To use Diagnostic Functions, press **[M]** from the Diagnostic Main Menu. The Diagnostic Functions Menu screen, shown in Figure C-11, displays. This screen contains four windows:

- Diagnostic Functions lists the diagnostic commands available for troubleshooting the CHM (see Table C-13).
- A *location map* in the middle of the screen displays the numbers 0 through 10. Each number corresponds to an element address (0 = tape drive, 1 through 10 = slots in the cartridge holder, from bottom to top). To cycle through the addresses, press **[J]** to go up or **[K]** to go down. The highlighted address is used as the target location during the position to element, pick cartridge, and place cartridge functions.
- System Sensors/Mechanism Position dynamically displays the current status and position of various library components and sensors.
- Messages displays information about the current CHM function. If the requested CHM function was executed properly, the Messages window displays **0h**. If the function did not complete successfully, an error code displays (see Appendix D for a description of error codes).

EXB-10h Diagnostic Functions Menu		
---Diagnostic Functions--- e - Position to Element g - Pick Cartridge p - Place Cartridge m - Move Cartridge c - Load Drive t - Cycle Pick/Place o - POST l - Cycle Solenoid y - Cycle Y Axis z - Cycle Z Axis a - Park u - Home Y b - Home Z x - Cycle Gripper Linkage r - Redraw Screen q - Quit	<div style="border: 1px solid black; width: 30px; margin: 0 auto; padding: 2px;">10</div> <div style="border: 1px solid black; width: 30px; margin: 0 auto; padding: 2px;">9</div> <div style="border: 1px solid black; width: 30px; margin: 0 auto; padding: 2px;">8</div> <div style="border: 1px solid black; width: 30px; margin: 0 auto; padding: 2px;">7</div> <div style="border: 1px solid black; width: 30px; margin: 0 auto; padding: 2px;">6</div> <div style="border: 1px solid black; width: 30px; margin: 0 auto; padding: 2px;">5</div> <div style="border: 1px solid black; width: 30px; margin: 0 auto; padding: 2px;">4</div> <div style="border: 1px solid black; width: 30px; margin: 0 auto; padding: 2px;">3</div> <div style="border: 1px solid black; width: 30px; margin: 0 auto; padding: 2px;">2</div> <div style="border: 1px solid black; width: 30px; margin: 0 auto; padding: 2px;">1</div> <div style="border: 1px solid black; width: 30px; margin: 0 auto; padding: 2px;">0</div> <div style="margin-top: 10px;"> <div style="border: 1px solid black; width: 30px; margin: 0 auto; padding: 2px;">j-Up</div> <div style="border: 1px solid black; width: 30px; margin: 0 auto; padding: 2px;">k-Down</div> </div>	System Sensors/Mechanism Position Cartridge Present 0 Cartridge Magazine 1 Drive Unloaded 1 Library Door 0 YHome 1 ZHome 0 Inner Cartridge Present 0 Outer Cartridge Present 0 New Backplate Installed 1 Y Position 1198 Z Position 0 Z Home Sensor -596 <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> -----Messages----- </div>

Figure C-11 Diagnostic Functions Menu

Table C-13 Diagnostic Functions Menu: Diagnostic Functions commands

Command	Function
e - Position To Element	Moves the CHM to the location highlighted on the location map.
g - Pick Cartridge	Moves the CHM to the element address highlighted on the location map and picks the cartridge.
p - Place Cartridge	Moves the CHM to the element address highlighted on the location map and places the cartridge.
m - Move Cartridge	Causes the CHM to move a cartridge from one location to another. To move a cartridge: 1. Press [M] . A window appears at the bottom of the screen. 2. Type the element address of the source (for example, type 0 for the tape drive). 3. Press [Enter] . 4. Type the element address for the destination (for example, type 1 for bottom slot in the cartridge magazine). 5. Press [Enter] .
c - Load Drive	Causes the CHM to push the cartridge into the tape drive.
t - Cycle Pick/Place	Causes the CHM to pick and place a cartridge at the highlighted element address for a specified number of cycles. To pick and place a cartridge: 1. Press [T] . A window appears at the bottom of the screen. 2. Type the number of cycles you want. 3. Press [Enter] .

Command	Function
o - POST	Causes the CHM to perform a power-on self-test.
l - Cycle Solenoid	Causes the CHM to move to slot 1, and turn the solenoid on and off a specified number of times. To cycle the solenoid: 1. Select [L] . A window appears at the bottom of the screen. 2. Type the number of cycles you want. 3. Press [Enter] . To determine whether the solenoid is turning on and off, listen for a clicking noise.
y - Cycle Y Axis	Cycles the CHM up and down on the long axis a specified number of cycles. To vertically cycle the CHM: 1. Press [Y] . A window appears at the bottom of the screen. 2. Type the number of cycles you want. 3. Press [Enter] .
z - Cycle Z Axis	Moves to slot 1, then cycles the CHM in and out on the short axis a specified number of cycles. To horizontally cycle the CHM: 1. Press [Z] . A window appears at the bottom of the screen. 2. Type the number of cycles you want. 3. Press [Enter] .
a - Park	Causes the CHM to move to the park position.
u - Home Y	Causes the CHM to recalculate the vertical home position.
b - Home Z	Causes the CHM to recalculate the horizontal home position.
x - Cycle Gripper Linkage	Causes the CHM to cock and uncock the gripper fingers.
r - Redraw Screen	Clears the screen and redisplay the menu.
q - Quit	Returns to the Diagnostics Main Menu.

C.15 Using the SCSI functions submenu

The SCSI Functions menu option on the Diagnostic Main Menu allows you to view element reservation status, mode parameters, and sense data for the library. If you are developing SCSI drivers, these diagnostic screens can be extremely helpful in verifying that your commands worked.

Press **U** to select SCSI Functions Menu from the Diagnostic Main Menu.

The SCSI Functions Submenu, shown in Figure C-12, displays. This screen has two windows:

- The Commands window contains a menu of options for accessing specific information about the library. Table C-14 describes the commands in the Commands window.
- The SCSI Parameters window displays the SCSI addresses for the library and the tape drive, as set from the SCSI Menu on the operator panel. You cannot change the address from this screen.

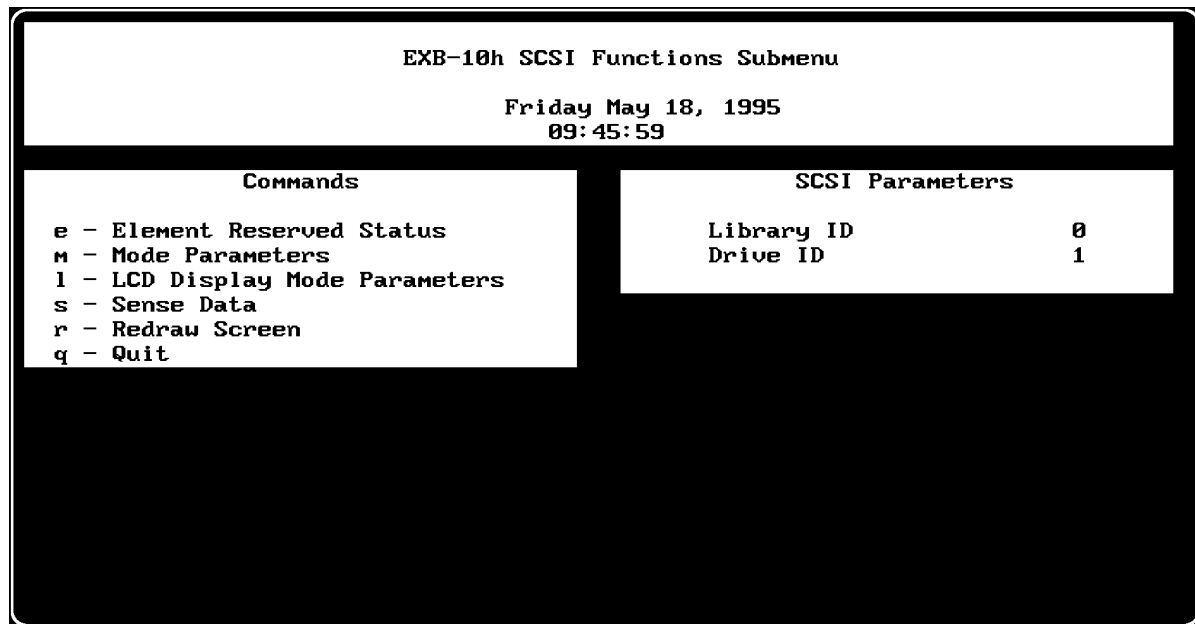


Figure C-12 SCSI Functions Submenu

Table C-14 SCSI Functions Submenu: Commands window

Menu Selection	Function
e - Element Reserved Status	Displays the elements that are presently reserved, the reserving host, and the reservation ID.
m - Mode Parameters	Displays the default, current, and saved parity, baud rate, and element address mode parameters.
l - LCD Display Mode Parameters	Allows you to change the contents of the LCD Main Screen, and displays current, saved, and default Main Screen text.
s - Sense Data	Displays the sense data for all initiators.
r - Redraw Screen	Clears the screen of jumbled characters and redisplay the current menu.
q - Quit	Returns to the previous menu.

Displaying the element reservation status

Selecting the Element Reserved Status option from the SCSI Functions Submenu displays a screen that shows the address of each element, which elements have been reserved, the reserving host, and the reservation ID. It also displays unit reservation information.

This screen is a dynamic display. If any parameter changes, the screen immediately updates to reflect that change.

To display the element reservation status, follow these steps:

1. Press **⏏** to select Element Reserved Status from the SCSI Functions Submenu. The screen shown in Figure C-13 displays.

Table C-15 describes the information contained in the Element Reserved Status screen.

2. To exit the Element Reserved Status screen, press **⏏**.

Element Reserved Status				Cartridge Holder			
Commands				Location	Status	Host	Res ID
q - Quit				10			
r - Redraw Screen				9			
				8			
				7			
				6			
				5			
				4			
				3			
				2			
				1			
Location	Status	Host	Res ID				
Library							
CHM							
11							
Drive							
0							

Figure C-13 Element Reserved Status

Table C-15 Element Reserved Status screen

Window	Description
Commands	Pressing [Q] exits this screen and returns to the SCSI Functions menu. Pressing [R] clears the screen of jumbled characters.
Location Status Host Res ID	Shows element reservation information about the library, the CHM, and the tape drive. <ul style="list-style-type: none"> The <i>Location</i> column shows the element address of the CHM and the tape drive. The <i>Status</i> column displays RESERVED if the library, CHM, or tape drive is reserved. The <i>Host</i> column displays the SCSI ID of the reserving host. The <i>Res ID</i> column displays the reservation ID.
Cartridge Holder Location Status Host Res ID	Shows element reservation information for the data cartridge magazine slots. <ul style="list-style-type: none"> The <i>Location</i> column displays the element address of the cartridge magazine slot. The <i>Status</i> column displays RESERVED if the slot is reserved. The <i>Host</i> column displays the SCSI ID of the reserving host. The <i>Res ID</i> column displays the reservation ID.

Displaying SCSI mode parameters

The Mode Parameters option on the SCSI Functions Submenu displays the SCSI Mode Parameters. This screen is a dynamic display of parameters set using the MODE SELECT command. When any parameter changes, the screen immediately updates to reflect that change.

To display the SCSI Mode Parameters screen, follow these steps:

1. Press **[M]** to select Mode Parameters from the Commands menu. The screen shown in Figure C-14 displays.

Table C-16 describes the information contained in the SCSI Mode Select Parameters screen.

2. To exit this screen, press **[Q]**.

EXB-10h SCSI Mode Parameters			
Commands			
q - Quit			
r - Redraw Screen			
Parameter	Current	Saved	Default
CHM	11	NONE	11
First Storage	1	NONE	1
Drive	0	NONE	0
Parity	1	NONE	1
Baud Rate	9600	9600	9600
Sequential	OFF	OFF	OFF
Loop	ON	ON	OFF
Restart	OFF	OFF	OFF
Next Cart.	NONE	NONE	NONE
10i Emulation	OFF	OFF	OFF

Figure C-14 SCSI Mode Parameters screen

Table C-16 SCSI Mode Parameters screen

Window	Description
Commands	Pressing [Q] exits this screen and returns to the SCSI Functions submenu. Pressing [R] clears the screen of jumbled characters.
Parameters Current Saved Default	<p>The top portion of the window displays the current, saved, and factory set (default) values for the element addresses (including the tape drive element address, the CHM element address, and the starting storage element address), the parity setting, and the baud rate set by the MODE SELECT command.</p> <p>The lower portion of the window displays the current, saved, and factory set (default) values for operation parameters set by the MODE SELECT command.</p>

Displaying LCD display mode parameters

Selecting the LCD Display Mode Select Parameters option from the SCSI Functions submenu allows you to change the product information text that appears on the Main Screen of the operator panel LCD (the items that appear on the LCD menus cannot be changed).

The LCD Main Screen Mode Select Parameters screen has four windows:

- Commands lists options for modifying the LCD display parameters.
- Current LCD Display Parameters shows the text currently displayed on the LCD Main Screen. This text was either created using the a/b/c/d commands from the Commands window or set using the MODE SELECT command.
- Default LCD Display Parameters shows the default text for the LCD Main Screen. This text is displayed at reset or power up (if there are no saved LCD Display parameters).
- Saved LCD Display Parameters shows saved text. This text was either created using the e/f/g/h command from the Commands window or set using the MODE SELECT command with Saved Page option.

To display LCD Main Screen Mode Select Parameters, follow these steps:

1. Press **[L]** to select LCD Display Mode Parameters from the SCSI Functions Submenu. The screen shown in Figure C-15 displays.

Table C-17 describes the commands available through the Commands window.

2. To exit this screen, press **[Q]**.

EXB-10h LCD Main Screen Mode Select Parameters			
Commands: r - Redraw Screen q - Quit a/b/c/d - New Current Msg On Line 1/2/3/4 e/f/g/h - New Saved Msg On Line 1/2/3/4 x - Set Current Params To Defaults y - Set Saved Params To Defaults z - Clear Saved Parameters		Default LCD Display Parameters Messages Line 1: " Exabyte EXB-10h " Line 2: "UER 1.6.124 9:43:11" Line 3: "Status: CHSMO Mode " Line 4: "	
Current LCD Display Parameters Message Modes 1/2/3/4: DEF /DEF /DEF /DEF Messages Line 1: " Exabyte EXB-10h " Line 2: "UER 1.6.124 9:43:11" Line 3: "Status: CHSMO Mode " Line 4: "		Saved LCD Display Parameters Message Modes 1/2/3/4: / / / Messages Line 1: " " Line 2: " " Line 3: " " Line 4: " "	

Figure C-15 LCD Main Screen Mode Select Parameters

Table C-17 LCD Main Screen Mode Select Parameters commands window

Command	Description
r - Redraw Screen	Clears and redraws the current screen.
q - Quit	Exits to the SCSI Functions submenu.
a/b/c/d - New Current Msg On Line 1/2/3/4	Allows you to change text in the Current LCD Display Parameters window. For example, to change the current line 1, select A and type in the new text.
e/f/g/h - New Saved Msg On Line 1/2/3/4	Allows you to change text in the Saved LCD Display Parameters window. For example, to change the saved line 1, press [E] and type in the new text.
x - Set Current Params To Defaults	Replaces the current text with the default text.
y - Set Saved Params To Defaults	Replaces saved and current parameters with default parameters.
z - Clear Saved Parameters	Erases saved LCD Display parameters and sets current parameters to the defaults.

Displaying SCSI sense data

Selecting the Sense Data option from the SCSI Functions Submenu displays the SCSI Sense Data. This screen is a dynamic display of the current sense data for each initiator. If any parameter changes, the screen immediately updates to reflect that change.

Note: Sense data for an unidentified initiator is shown under the library's ID.

For more information about sense data, refer to the REQUEST SENSE command description in the *EXB-10h and EXB-10e 8mm Libraries SCSI Reference*.

To display sense data, follow these steps:

1. Press **[S]** to select Sense Data from the SCSI Functions Submenu. The SCSI Sense Data screen, shown in Figure C-16, displays.

Table C-18 describes the information in the SCSI Sense Data screen.

2. To exit the SCSI Sense Data screen, press **[Q]**.

EXB-10h SCSI Sense Data									
Commands									
q - Quit									
r - Redraw Screen									

Table C-18 SCSI Sense Data screen

Window	Description
Commands	Press Q exit this screen and returns to the SCSI Functions menu. Pressing R clears the screen of jumbled characters.
Pending Unit Attention Codes	Lists the possible values and meaning of the value displayed in the P UA line
INIT	Shows each initiator ID.
SNSKEY	Displays the Sense Key value for each initiator.
ASC	Displays the Additional Sense Code (ASC) value for each initiator.
ASCQ	Displays the Additional Sense Code Qualifier (ASCQ) value for each initiator.
SKSV	Displays the Sense Key Specific Valid (SKSV) value for each initiator.
BPV	Displays the Bit Pointer Valid (BPV) value for each initiator.
BP	Displays the Bit Pointer (BP) value for each initiator.
FP	Displays the Field Pointer (FP) value for each initiator.
P UA	Displays the Pending Unit Attention (P UA) value for each initiator.

D Hardware Errors by Error Code

This appendix provides the following information about the library hardware error codes:

- **Error code.** Lists the hexadecimal error codes that display when an error occurs. These errors may be displayed on the library LCD or on a console if you are using diagnostics through the CHS Monitor port. The error codes are listed in hexadecimal order.
- **Description.** Provides a description of the error.
- **Corrective action.** Suggests recommended corrective actions.

Error code	Description	Corrective action
03h	The CHM is attempting to place a cartridge in a cartridge magazine slot or in the tape drive when another cartridge was already present. (This error occurs only in sequential mode.)	Open the library door, remove one of the conflicting cartridges, then close the door. Library operation should resume normally. (If you removed the cartridge from the gripper, the library considers the place operation complete. If you removed the cartridge from the cartridge slot or tape drive, the library will place the cartridge left in the CHM.)
05h	The library's door is open; automatic operation could not continue.	Close the door of the library.
06h	A cartridge magazine is not installed.	Install a cartridge magazine.

Error code	Description	Corrective action
07h	The library finished processing all cartridges in the cartridge magazine. (This error occurs only in sequential mode.)	<p>The library is waiting for operator action. You can restart the pick-and-place cycle in one of these ways:</p> <ul style="list-style-type: none"> ■ Use the operator panel to specify the next cartridge to be processed (see <i>EXB-10h 8mm Library Installation and Operation</i> for instructions). ■ Replace the cartridge magazine. If you replace the cartridge magazine, the library will resume operation with cartridge 1. ■ Use the operator panel to turn on the loop option.
08h	The library finished processing what appears to be an empty cartridge magazine.	<p>The library is waiting for operator action. Install a magazine; or if the magazine is empty, install cartridges. The library resumes operation with cartridge 1.</p> <p>If the magazine is not empty, the cartridges have not been processed.</p> <ul style="list-style-type: none"> ■ Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM card and J3 on the motor control card. ■ Check the the vertical lead screw, vertical drive belt, and vertical drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the horizontal lead screw assembly, you may need to replace the CHM (see Section 4.3). ■ Recalibrate the cartridge sensor position (see Section B.1). If calibration does not solve the problem, you may need to replace the CHM (see Section 4.3).
09h	The library cannot execute SCSI motion commands.	<p>From the operator panel, press Menu return to the Main Menu. Select the CHM Control Menu and set the CHM control to Random. If you were performing diagnostics through the CHS Monitor port, be sure to exit the diagnostics program.</p>

Error code	Description	Corrective action
0Bh	The CHM attempted to move to the park position at the base of the library or attempted to restart sequential mode, but could not accomplish this move because there is a cartridge in the gripper. (This error occurs in sequential mode, after a reset.)	Carefully remove the cartridge from the gripper. Press Reset on the operator panel to reset the library.
0Ch	The CHM is moving to the home position, which occurs periodically to prevent the CHM from losing position. This status message may also indicate that the library is performing a cartridge sensor calibration or an eject position calibration.	None. The library will resume normal operation.
0Fh	The firmware load is not complete, or the library firmware may be corrupted.	This message appears when you are loading new firmware through the CHS Monitor port and a host computer. To complete the firmware load, press F on the computer keyboard. If the firmware is corrupted, re-download the firmware (see Section C.5). If necessary, contact Exabyte to receive new firmware.
11h	The CHM could not pick a cartridge because there was already a cartridge in the gripper.	Remove the cartridge from the gripper. Then, press Reset on the operator panel to reset the library.
12h	The CHM could not execute a retry when picking a cartridge from the tape drive.	<ul style="list-style-type: none"> Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. Make sure the vertical flex cable is properly connected to J3 on the motor control card and the J1 connector on the ECHM card. Check the belt and pulley assemblies on the CHM. Make sure the belts are not loose and the pulleys are not damaged. You may need to replace the CHM (see Section 4.3).

Error code	Description	Corrective action
13h	The CHM cannot complete the move away from the data cartridge magazine after picking a cartridge, or the CHM cannot move in close enough to the tape drive to engage the cam on the tape drive faceplate.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM card and J3 on the motor control card. ■ Check the the horizontal lead screw, horizontal drive belt, and horizontal drive motor on the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the horizontal lead screw assembly, you may need to replace the CHM (see Section 4.3).
14h	The CHM could not move toward the data cartridge magazine or tape drive to pick a cartridge, or the CHM cannot cock the gripper fingers.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the CHM. If there is, an obstruction remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM card and J3 on the motor control card. ■ Check the the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the horizontal lead screw assembly, you may need to replace the CHM (see Section 4.3).
15h, 16h	The CHM could not pick a cartridge from the tape drive.	<ul style="list-style-type: none"> ■ If you replaced the tape drive, make sure the tape drive is mounted correctly (see Section 5.2). ■ If the tape drive is not the problem, there may be a CHM failure, in which case you need to replace the CHM (see Section 4.3).

Error code	Description	Corrective action
1Ah	The CHM attempted to pick a cartridge from the source (tape drive or data cartridge magazine slot). The cartridge inventory indicates the source is full.	<ul style="list-style-type: none"> ■ Make sure that there is a cartridge magazine installed. Check to see if there is a cartridge in the source. ■ Make sure that the gripper fingers are not cocked. ■ If there is no cartridge in the source, the CHM automatically moves to the next action in the current pick-and-place cycle (Sequential mode only). ■ If there is a cartridge in the source, make sure it is not caught. If it is not caught, the CHM may not be gripping the cartridge correctly. Check the vertical and horizontal drive assemblies, including the lead screws, belts, and motors. Check to see if the belts are loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3) or the motor control card (see Section 6.3).
1Bh	The CHM cannot pick from the tape drive because the cartridge is not ejected.	<p>If you are in Sequential mode:</p> <ul style="list-style-type: none"> ■ If you want to restart the pick-and-place cycle where it left off, press the unload button on the tape drive to eject the cartridge. ■ If you want to restart the cycle from cartridge 1: <ol style="list-style-type: none"> 1. Make sure the Restart option is ON. 2. Power cycle the library (off, on). <p>If you are in Random mode, the host may be waiting for the drive to eject the cartridge or there may be a problem with the software on the host or with the tape drive.</p>
1Ch	The CHM cannot properly grip the cartridge and returned the cartridge to its source (either the tape drive or the slot).	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the fingers on the gripper are not sticking. If they are, you may need to replace the CHM (see Section 4.3). ■ If the cartridge is fully seated, the linkage in the gripper may be worn. Recalibrate the cartridge sensor position (see Section B.1). If calibration does not solve the problem, you may need to replace the CHM (see Section 4.3).

Error code	Description	Corrective action
1Dh	The CHM cannot complete a pick operation because the source (tape drive or cartridge slot) was empty.	<ul style="list-style-type: none"> ■ Make sure that there is a cartridge magazine installed. Check to see if there is a cartridge in the source. ■ If the source is empty, place a cartridge in the source or pick from another source. ■ If there is a cartridge in the source, make sure it is not caught. If it is not caught, the CHM may not be gripping the cartridge correctly. Check the vertical and horizontal drive assemblies, including the lead screws, belts and motors. Check to see if the belts are loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3) or the motor control card (see Section 6.3). ■ Recalibrate the cartridge sensor position (see Section B.1). If calibration does not solve the problem, you may need to replace the CHM (see Section 4.3).
1Eh	The CHM attempted to pick a cartridge. The library cannot detect a cartridge in the gripper, even though the sensors indicate that there is.	Recalibrate the cartridge sensor position (see Section B.1). If calibration does not solve the problem, you may need to replace the CHM (see Section 4.3).
21h	The CHM cannot complete a place operation because the gripper was empty.	If there is a cartridge in the gripper, the solenoid or cartridge sensor may be malfunctioning. Use the library's diagnostics firmware to check these components (see Section C.14). If either one is malfunctioning, replace the CHM (see Section 4.3).
22h	The CHM cannot move upward to start the place procedure.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM card and J3 on the motor control card. ■ Check the the vertical lead screw, vertical drive belt, and vertical drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the horizontal lead screw assembly, you may need to replace the CHM (see Section 4.3).

Error code	Description	Corrective action
23h	The CHM cannot move toward the cartridge magazine slot or the tape drive while executing a place procedure.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the gripper. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM card and J3 on the motor control card. ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3).
24h	The CHM cannot move downward to the tape drive while executing a place procedure.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM card and J3 on the motor control card. ■ Check the the vertical lead screw, vertical drive belt, and vertical drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the horizontal lead screw assembly, you may need to replace the CHM (see Section 4.3).
25h	The CHM cannot move to a position where it could place a cartridge into the cartridge magazine or the tape drive.	<ul style="list-style-type: none"> ■ Check to see if the cartridge magazine is installed correctly, as described in <i>EXB-10h 8mm Library Installation and Operation</i>. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM card and J3 on the motor control card. ■ Check the lead screws, belts, and motors on the horizontal and vertical drive assemblies of the CHM. Make sure the belts are not loose and the pulleys are not damaged. If a pulley is damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3). ■ This error could also be caused by a misaligned CHM or an incorrectly mounted tape drive. If you replaced the tape drive, make sure the tape drive is mounted correctly (see Section 5.2).

Error code	Description	Corrective action
27h	The CHM cannot execute one of the moves that ejects the cartridge from the gripper.	<ul style="list-style-type: none"> ■ Calibrate the eject position (see Section B.2). ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3). ■ Check to see if the plunger linkage has failed. If so, replace the CHM (see Section 4.3). ■ Use the LCD Diagnostics Menu or the library's firmware diagnostics to test the solenoid and pick-and-place motions (see Sections A.3 and C.14). If the solenoid is misaligned or not functioning properly, replace the CHM (see Section 4.3).
28h	The CHM cannot eject a cartridge from the gripper.	<ul style="list-style-type: none"> ■ Use the LCD Diagnostics Menu or the library's firmware diagnostics to test the solenoid and pick-and-place motions (see Sections A.3 and C.14). If the solenoid is not functioning properly, replace the CHM (see Section 4.3). ■ Check to see if the plunger linkage has failed. If this is the case, replace the CHM (see Section 4.3).
29h, 2Ah	The CHM cannot place a cartridge into the tape drive or slot.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Use the LCD Diagnostics Menu or the library's firmware diagnostics to test the solenoid and pick-and-place motions (see Sections A.3 and C.14). If the solenoid is not functioning properly, replace the CHM (see Section 4.3). ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3).

Error code	Description	Corrective action
2Bh	The CHM tried to place a cartridge, but another cartridge was already present in the slot or tape drive.	<p>If another cartridge is <i>not</i> in the drive or slot:</p> <ul style="list-style-type: none"> Check to see if something is blocking the CHM. If there is, remove the obstruction and press Reset on the operator panel to reset the library. Use the LCD Diagnostics Menu or the library's firmware diagnostics to test the solenoid and pick-and-place motions (see Sections A.3 and C.14). If the solenoid is not functioning properly, replace the CHM (see Section 4.3).
2Ch	The CHM tried to place a cartridge in the tape drive, but a cartridge is already loaded. (This error occurs in sequential mode.)	<p>When this error occurs, the library's pick-and-place cycle has been interrupted. You need to restart the pick-and-place cycle by following these steps:</p> <ol style="list-style-type: none"> If there is a cartridge in the CHM, remove it. Press the unload button to eject the cartridge. If you want to restart the pick-and-place cycle, turn on the Restart option from the operator panel Set-up Menu. Press Reset on the operator panel to reset the library. <p>The library resumes the pick-and-place cycle with cartridge 1 and returns the appropriate status to the host.</p>
2Dh	The CHM cannot move toward the cartridge magazine to place a cartridge into either slots 1 through 5 or slots 7 through 10.	<ul style="list-style-type: none"> Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. Check the vertical lead screw, vertical drive belt, and vertical drive motor for the CHM. Make sure the vertical drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3).

Error code	Description	Corrective action
30h	The CHM cannot complete a procedure that allows it to define zero on the horizontal axis.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the Z Home sensor for obstructions. Use the LCD System Sensors screen to test the sensor operation. ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3).
31h	The CHM cannot complete a procedure that allows it to define zero on the horizontal axis.	<ul style="list-style-type: none"> ■ Press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the Z Home sensor for obstructions. Use the LCD System Sensors screen to test the sensor operation. ■ If these components do not appear to be the problem, you may need to replace the motor control (see Section 6.3) or the CHM (see Section 4.3).
32h, 33h, 34h	The CHM cannot complete a procedure that allows it to define zero on the horizontal axis.	<ul style="list-style-type: none"> ■ Press Reset on the operator panel to reset the library. ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3). ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ If these components do not appear to be the problem, you may need to replace the motor control card (see Section 6.3) or the CHM (see Section 4.3)

Error code	Description	Corrective action
35h	The CHM cannot complete a procedure that allows it to define zero on the vertical axis.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3). ■ If these components do not appear to be the problem, you may need to replace the motor control card (see Section 6.3) or the CHM (see Section 4.3).
36h	The CHM cannot complete a procedure that allows it to define zero on the vertical axis.	<ul style="list-style-type: none"> ■ Press Reset on the operator panel to reset the library. ■ Visually check the Y Home sensor for obstruction or use the LCD System Sensors screen. If an obstruction does not appear to be the problem, you may need to replace the CHM (see Section 4.3).
37h	The CHM cannot complete a procedure that allows it to define zero on the vertical axis.	<ul style="list-style-type: none"> ■ Press Reset on the operator panel to reset the library. ■ Check the vertical lead screw, vertical drive belt, and vertical drive motor for the CHM. Make sure the vertical drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3).

Error code	Description	Corrective action
38h	The CHM cannot complete a procedure that allows it to define zero on the vertical axis.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3).
41h	The CHM cannot move to the vertical axis position in front of the tape drive.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the vertical lead screw, vertical drive belt, and vertical drive motor for the CHM. Make sure the vertical drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3).
42h	The CHM cannot move to the horizontal axis position where it starts pushing the cartridge into the tape drive.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3).

Error code	Description	Corrective action
43h	The CHM cannot push the cartridge into the tape drive.	<ul style="list-style-type: none"> Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3).
44h	The CHM cannot move to the horizontal axis zero position after loading the cartridge.	<ul style="list-style-type: none"> Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3).
45h	The CHM cannot load a cartridge in the tape drive after several retries.	<ul style="list-style-type: none"> This error could be caused by cartridge that is incompatible with the tape drive. For example, if you have a non-XL tape drive and are trying to load an XL cartridge, the tape drive will not accept it. This error could be caused by a servo error in the tape drive firmware. If there is a servo error, the tape drive will not accept a cartridge. <p>To clear a servo error in the tape drive, press the unload button. If this fails to clear the error, make sure that the SCSI bus is idle, then reset the SCSI bus or cycle power to the library.</p>
50h	The firmware can not find a valid physical coordinate that corresponds to the specified logical position. This error may be caused by a malfunction in the library's firmware.	<ul style="list-style-type: none"> Press Reset on the operator panel to reset the library. Use the LCD Diagnostics Menu to perform Home Y and Home Z operations (see Section A.3). Reload the firmware (see Section C.5). If the error still appears, you may need to replace the motor control card (see Section 6.3).

Error code	Description	Corrective action
51h	The CHM cannot move to the horizontal axis zero position before starting the vertical axis move.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the gripper. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3).
52h	The CHM cannot move to the specified vertical axis physical position.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the vertical lead screw, vertical drive belt, and vertical drive motor for the CHM. Check to see if the vertical drive belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3).
58h, 59h	The CHM cannot move to the specified horizontal axis physical position.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Check to see if the horizontal drive belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3).
60h	Internal error. This error may indicate that there is a problem with the library's firmware.	<ul style="list-style-type: none"> ■ Press Reset on the operator panel to reset the library. ■ Reload the firmware (see Section C.5). If the error still appears, you may need to replace the motor control card (see Section 6.3).

Error code	Description	Corrective action
61h	Invalid nonvolatile RAM. This error may indicate that the nonvolatile RAM is not functioning properly.	Press Reset on the operator panel to reset the library. If this does not correct the error, you may need to replace the motor control card (see Section 6.3).
62h	The vertical motor's servo chip cannot be initialized properly. This error may indicate that the servo control chip is not functioning properly.	Press Reset on the operator panel to reset the library. If the error still appears, you may need to replace the motor control card (see Section 6.3).
63h	The horizontal drive motor's servo chip cannot be initialized properly. This error may indicate that the servo control chip is not functioning properly.	Press Reset on the operator panel to reset the library. If the error still appears, you may need to replace the motor control card (see Section 6.3).
64h	A CHM motion took longer than the maximum time allocated for it. When these functions cannot complete in the specified time, the currents to the servo motors are shut off.	Press Reset on the operator panel to reset the library. If the CHM still moves slowly, you may need to replace the motor control card (see Section 6.3) or the CHM (see Section 4.3).
65h	The SCSI chip failed.	Turn the library off and then on again. If the error recurs, replace the SCSI card (see Section 6.2).
90h	The gripper cannot move to the cartridge sensor calibration position.	<ul style="list-style-type: none"> Check to see if something is obstructing the gripper. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. Recalibrate the cartridge sensor position (see Section B.1). Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3) or the motor control card (see Section 6.3).

Error code	Description	Corrective action
91h	The gripper cannot move to a position where it starts polling for the cartridge sensor.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the gripper. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Recalibrate the cartridge sensor position (see Section B.1). ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3) or the motor control card (see Section 6.3).
92h	The CHM cannot find the cartridge sensor.	Make sure the calibration block is correctly placed in the gripper. If it is and you still receive this error, a cartridge sensor or the gripper linkage is malfunctioning. You may need to replace the CHM (see Section 4.3).
93h	The library is waiting for you to insert the calibration block.	Insert the calibration block in the gripper and close the library door.
94h	The CHM cannot complete the cartridge sensor calibration.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Recalibrate the cartridge sensor position (see Section B.1). ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3).
95h	The CHM cannot find a cartridge sensor anywhere on the horizontal axis.	A cartridge sensor may be malfunctioning. If so, you may need to replace the CHM (see Section 4.3).

Error code	Description	Corrective action
96h	The calibrated cartridge sensor value is not within the accepted range.	<ul style="list-style-type: none"> ■ Make sure the calibration block is fully seated. ■ Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Recalibrate the cartridge sensor position (see Section B.1). ■ Make sure the calibration block is properly seated in the gripper. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3).
97h	The CHM cannot move to the horizontal zero position after completing the cartridge sensor calibration.	<ul style="list-style-type: none"> ■ Make sure the calibration block is fully seated. ■ Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Recalibrate the cartridge sensor position (see Section B.1). ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3) or motor control card (see Section 6.3).

Error code	Description	Corrective action
98h	Internal error.	<ul style="list-style-type: none"> ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3) or motor control card (see Section 6.3).
9Ch	The library has completed cartridge sensor calibration and is now waiting for you to remove the calibration block.	Remove the calibration block and close the library's door.
A0h	The CHM cannot move to the cartridge sensor to determine whether a cartridge is in the gripper. This error may indicate a malfunction in the horizontal assembly.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3).
A1h	The CHM cannot find the cartridge sensor or the horizontal home sensor while moving in the horizontal axis. This error may indicate a malfunction in the horizontal assembly.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the gripper. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3).

Error code	Description	Corrective action
A2h	The library cannot determine if there is a cartridge in the gripper.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the gripper. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Check to see if the horizontal drive belt on the CHM is intact. If it is worn or broken, replace it (see Section 4.5). ■ Check the cartridge sensors on the ECHM card for damage or obstruction. Use the System Sensors screen to test the sensor operation. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Recalibrate the cartridge sensor position (see Section B.1). ■ If these components do not appear to be the problem, you may have to replace the CHM (see Section 4.3).
A3h	Internal error.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the gripper. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Check to see if the horizontal drive belt on the CHM is intact. If it is worn or broken, replace it (see Section 4.5). ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3).

Error code	Description	Corrective action
B0h	The CHM cannot move to the start position for the eject position calibration.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the gripper. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3) or motor control card (see Section 6.3).
B1h	The CHM cannot execute a move that prepares for the eject position calibration.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the gripper. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3) or motor control card (see Section 6.3).
B2h	The solenoid did not eject.	The solenoid is malfunctioning. You may need to replace the CHM (see Section 4.3).
B3h	The CHM cannot move to the “start push in” position.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the gripper. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the horizontal lead screw, horizontal drive belt, and horizontal drive motor for the CHM. Make sure the horizontal drive belt is not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assembly, you may need to replace the CHM (see Section 4.3) or motor control card (see Section 6.3).

Error code	Description	Corrective action
B4h	There is a cartridge in the gripper.	Remove the cartridge, reset the library, and calibrate the eject position (see Section B.2).
C0h	The CHM was unable to place the cartridge back in the source after a pick failure.	<ul style="list-style-type: none"> Check the horizontal and vertical drive assemblies on the CHM. These include the lead screws, belts, and motors. Make sure the belts are not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assemblies, you may need to replace the CHM (see Section 4.3). Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. If these components do not appear to be the problem, you may have to replace the CHM (see Section 4.3).
C1h	The CHM was unable to place the cartridge back in the source after a place failure.	<ul style="list-style-type: none"> Check the horizontal and vertical drive assemblies on the CHM. These include the lead screws, belts, and motors. Make sure the belts are not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assemblies, you may need to replace the CHM (see Section 4.3). Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. If these components do not appear to be the problem, you may have to replace the CHM (see Section 4.3).
C2h	The CHM was unable to place the cartridge back in the source after a SCSI abort.	<ul style="list-style-type: none"> Check the horizontal and vertical drive assemblies on the CHM. These include the lead screws, belts, and motors. Make sure the belts are not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assemblies, you may need to replace the CHM (see Section 4.3). Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card.
D0h	There are no cartridges in the cartridge magazine.	Place cartridges in the cartridge magazine.
D1h	The library cannot restart sequential mode because the tape drive contains a cartridge.	Remove the cartridge from the tape drive.
E0h	Error during diagnostics: The CHM cannot move to the tape drive with a cartridge in the gripper.	Remove the cartridge from the gripper.

Error code	Description	Corrective action
E1h	Error during diagnostics: The CHM cannot push the cartridge into the tape drive because of a conflicting cartridge or because the drive is empty.	Depending on the problem, perform one of the following actions: <ul style="list-style-type: none"> ■ Remove the cartridge from the gripper. ■ Eject the cartridge from the tape drive. ■ Place a cartridge in the tape drive.
E2h	Error during diagnostics: The CHM cannot perform the cycle solenoid function with a cartridge present in the gripper.	Remove the cartridge from the gripper.
E3h	Error during diagnostics: The CHM cannot perform the cycle Y-axis function with a cartridge present in the gripper.	Remove the cartridge from the gripper.
E4h	Error during diagnostics: The CHM cannot perform the cycle Z-axis function with a cartridge present in the gripper.	Remove the cartridge from the gripper.
E5h	Error during diagnostics: The CHM cannot complete a motion in the Z-axis during a diagnostic function.	<ul style="list-style-type: none"> ■ Check to see if something is obstructing the CHM. If there is an obstruction, remove it and press Reset on the operator panel to reset the library. ■ Make sure the vertical flex cable is properly connected to the J1 connector on the ECHM and the J3 connector on the motor control card. ■ Check the horizontal and vertical drive assemblies on the CHM. These include the lead screws, belts, and motors. Make sure the belts are not loose and the pulleys are not damaged. If the pulleys are damaged or detached from the lead screw assemblies, you may need to replace the CHM (see Section 4.3).
E6h	Error during diagnostics: The CHM cannot move to the park position with a cartridge present in the gripper.	Remove the cartridge from the gripper.
E7h	Error during diagnostics: The CHM cannot pick a cartridge because there is a cartridge in the gripper.	Remove the cartridge from the gripper.
E8h	Error during diagnostics: The CHM cannot place a cartridge because the gripper is empty.	Instruct the CHM to pick a cartridge to pick a cartridge before instructing it to place one.

Index

A

AC entry cable
 See AC servicing cable
accelerated test mode C-24

B

backplate
 See magazine mounting plate
baud rate, setting for the diagnostic ports C-18

C

calibration procedures B-1 to B-2, B-4, B-6
 accelerated test mode C-24 to C-25
 cartridge sensor position B-1 to B-4, C-24 to C-25
 eject position B-4 to B-5, C-24 to C-25
 set library options C-24 to C-25
 using diagnostics C-24 to C-25
Calibration/Setup Functions
 using C-24 to C-25
cartridge handling mechanism
 See CHM
cartridge inventory
 displaying C-22
 Index commands C-23
cartridge tape subsystem
 See tape drive
CHM
 base location 1-4
 description 1-4
 ECHM card location 4-6
 gripper location 1-4
 location 1-4
 moving 2-3 to 2-4
 removing the shield 4-2 to 4-5
 replacing 4-3 to 4-10
 replacing the ECHM card 4-11 to 4-15
 replacing the horizontal drive belt 4-16 to 4-17
 replacing the horizontal drive motor 4-18 to 4-23
 replacing the vertical drive belt 4-24 to 4-26
 replacing the vertical drive motor 4-27 to 4-29

CHS Monitor port
 description 1-6
 location 1-6
 replacing 8-13 to 8-15
 setting the baud rate C-18
CHS pick history screen C-21 to C-22
command history
 See diagnostics, displaying the command history
connector locations
 library 1-6
 tape drive 5-7
controller card
 See motor control card
cover assembly
 description 1-2
 installing 2-14 to 2-16
 location 1-2
 removing 2-9 to 2-13, 2-15
CTS
 See tape drive
CTS Monitor port
 connection to tape drive 5-7
 description 1-6
 location 1-6
 replacing 8-16 to 8-20

D

data cartridge magazine mounting plate
 See magazine mounting plate
data cartridge magazines
 description 1-3
 removing and installing 2-5
 type to use 2-6
DC harness cable
 location 8-24
 replacing 8-23 to 8-26
diagnostic dump
 obtaining C-11
Diagnostic Functions
 commands C-27 to C-28
 using C-26
diagnostic port
 See CHS Monitor port
 See CTS Monitor port
diagnostics C-1 to C-36
 accessing A-6 to A-7
 Calibration/Set-up Functions C-24 to C-25
 Cartridge Inventory C-22 to C-23
 Commands menu C-6
 Diagnostic Dump C-11
 Diagnostic Functions C-26 to C-28
 displaying the command history C-19
 Element Reserved Status C-30 to C-31

diagnostics (*continued*)

- Error Codes C-8
- History of Events C-19
- LCD Display Mode Select Parameters C-33 to C-34
- Main Menu C-5
- Mechanism Position C-7
- Pick History C-21 to C-22
- Position to Element A-7
- position to Home Y A-8
- position to Home Z A-8
- position to Park A-8
- preparing the library C-3 to C-5
- required hardware and software C-2
- resuming normal operation A-9
- Retry History of Events C-20
- ROM Console Main Menu C-8
- SCSI Functions Submenu C-29 to C-30
- SCSI Mode Parameters C-32 to C-33
- SCSI Sense Data C-35 to C-36
- setting up and starting C-3
- system date and time C-17
- System Sensors C-7
- System Statistics C-12 to C-15
- tape drive pick history C-21 to C-22
- Time/Baud Rate Menu C-16 to C-18
- upgrading to new firmware C-8, C-10
- using to move CHM 2-3

door

- description 1-2
- location 1-2
- replacing 3-10 to 3-12
- unlocking 2-5

downloading firmware

- See upgrading firmware

drive sensor cable

- location 8-11
- replacing 8-10 to 8-12

drive sensor switch

- description 1-3
- location 5-4
- replacing 5-4
- testing 5-10

E

ECHM card

- encoder cable connection 4-12
- location 4-6
- power connector 4-12
- replacing 4-11 to 4-15
- solenoid connector 4-12

Element Reserved Status C-30

error codes

- descriptions D-1 to D-23
- displayed by diagnostics C-8
- ESD protection 2-2

F

fan

- description 1-6
- replacing 7-2 to 7-3

front panel

- description 1-2
- location 1-2
- replacing 3-2 to 3-10

fuse

- location 7-7
- replacing 7-7 to 7-8

fuse drawer

- location 1-6

H

History of Events C-19

horizontal drive belt

- location 1-4
- replacing 4-16 to 4-17

horizontal drive motor

- location 1-4
- replacing 4-18 to 4-23

horizontal home position

- See Z Home position

horizontal lead screw

- location 1-4

I

interface cable

- location 8-5
- replacing 8-5 to 8-6

L

LCD control mode

- using to move CHM 2-3

LCD interface cable

- See interface cable

LCD menu

- commands C-34
- description of menu options A-4
- Main Menu overview A-1 to A-3

LCD menu (*continued*)
 modifying C-33
 quick reference A-1 to A-10
 LCD window
 installing 3-6
 removing 3-5
 lock
 location 1-2

M

magazine mounting plate
 description 1-3
 location 1-3
 replacing 5-11 to 5-13
 Main Menu
 overview A-1 to A-3
 Main Screen
 redisplaying from Main Menu A-4
 maintenance
 preparation 2-7 to 2-8
 tools list 2-2
 manuals, related xv
 motor control card
 description 1-5
 location 1-5
 replacing 6-7 to 6-11

O

on/off switch
 See power switch
 operator panel
 description 1-2
 location 1-2
 optical switch 3-4
 replacing 3-4
 operator panel cable
 disconnecting 8-2
 location 3-2
 replacing 8-2 to 8-4
 optical switch
 location 3-4

P

Position to Element A-7
 position to Home Y A-8
 position to Home Z A-8
 position to Park A-8

power connector
 ECHM card 4-12
 main AC 1-6
 tape drive 5-7
 power entry module
 description 1-6
 ground connection 7-6
 location 1-6
 replacing 7-4 to 7-6
 power supply
 description 1-5
 location 1-5
 replacing 6-12 to 6-16
 power switch
 location 1-6
 See also power entry module
 publications, related xv

R

R-packs
 See terminators
 retry/recovery history screen C-20

S

SCSI cable
 connection to tape drive 5-7
 replacing 8-7 to 8-9
 SCSI card
 description 1-5
 location 1-5
 replacing 6-2 to 6-6
 SCSI connectors
 description 1-6
 location 1-6
 SCSI Functions Submenu
 commands C-30
 using C-29
 SCSI ID jumper block
 tape drive 5-5
 SCSI ID select cable
 location 8-21
 replacing 8-20 to 8-22
 SCSI ID, library
 changing A-1, A-4
 SCSI ID, tape drive
 cable connection 5-7
 changing 5-10
 jumper block location 5-7
 remove jumpers 5-5
 SCSI Mode Parameters C-32

SCSI Sense Data
 commands C-35 to C-36
 displaying C-35 to C-36
shutting down the library 2-7
standards xv
system date
 setting C-16 to C-18
System Sensors
 diagnostics C-7
 status A-5
 status information A-4 to A-5
System Statistics
 commands C-13
 description C-15
 power on hours C-12, C-15
 retries C-13 to C-14
system time
 setting C-16 to C-18

T

tape drive
 connectors 5-7
 description 1-3
 location 1-3
 mounting bracket 5-5
 power cable 5-7
 replacing 5-2 to 5-11
 SCSI ID connector 6-8
 SCSI ID jumpers 5-5
 terminators 5-5
 testing 5-10
tape drive faceplate
 drive sensor 5-4
 replacing 5-4
terminators
 library 1-6
 tape drive 5-5

U

upgrading firmware C-8, C-10

V

vertical drive belt
 location 1-4
 replacing 4-24 to 4-26
vertical drive motor
 location 1-4
 replacing 4-27 to 4-30

vertical encoder cable
 connection to motor control card 6-8
vertical flex cable
 location 8-27
 replacing 8-27 to 8-30
vertical home position
 See Y Home position
vertical lead screw
 location 1-4
vertical motor cable
 connection to motor control card 6-8

Y

Y Home position C-7, C-15
Y position C-7
Y-encoder cable
 See vertical encoder cable
Y-motor cable
 See vertical motor cable

Z

Z Home position C-7, C-15
Z position C-7