EXB-10 and EXB-10i 8mm Cartridge Handling Subsystems

Maintenance

Exabyte®

510402-003

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Revision History

Previous revisions of this manual include the following:

Revision	Date
000	February 1991
001	October 1991
002	March 1992
003	March 1993

Changes and Enhancements to This Manual

Changes and enhancements to this revision of *EXB-10 and EXB-10i 8mm Cartridge Handling Subsystem Maintenance* (003) include the following:

- **Chapters 3 and 4**. Updated hardware error codes. Added error codes C0h through D1h.
- **Chapters 5, 6, and 7**. Updated instructions for using the Diagnostics firmware. Added the Retry / Recovery History screen, the CTS Pick History screen, the Calibration Setup screen, and the Diagnostic Functions screen.
- **Chapter 9.** Modified instructions for replacing the upper bezel. Added the ground cable.
- **Chapter 11.** Modified instructions for replacing the CHM. Added the new connection for the Vertical Flex cable.
- **Chapter 17**. Modified instructions for replacing the SCSI ID switch. Added instructions for the ESD plate.
- **Chapter 23**. Modified instructions for replacing the Vertical Flex cable. Added the new connection to the chassis wall.
- **Appendix C**. Added example diagnostic data.

This revision of the manual matches EXB-10i and EXB-10 firmware versions 3.0 and 3.1.

Product Warranty Caution

The EXB-10 and EXB-10i 8mm Cartridge Handling Subsystems (CHSs) are 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 your sales contract or contact the company from which the CHS was purchased.**

The warranty for the CHS shall not apply to failures of any unit when:

- The CHS is repaired by anyone other than the Manufacturer's personnel or approved agent.
- The CHS is physically abused or is used in a manner that is inconsistent with the operating instructions or product specification defined by the Manufacturer.
- The CHS fails because of accident, misuse, abuse, neglect, mishandling, misapplication, alteration, faulty installation, modification, or service by anyone other than the factory service center or its approved agent.
- The CHS 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 Manufacturer's serial number tag is removed.
- The CHS is damaged because of improper packaging on return.

CAUTION

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

If you are returning the CHS for repair, package it in its original packaging (or in replacement packaging obtained from your vendor). Refer to the packing instructions in *EXB-10 Cartridge Handling Subsystem Installation and Operation* or the *EXB-10i Cartridge Handling Subsystem User's Manual*.

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

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.

VDE Notices

Bescheinigung des Herstellers/Importeurs: Hiermit wird bescheinigt, daβ das EXB-10 in Übereinstimmung mit den Bestimmungen der Vfg 523/1969 und Vfg 1046/1984 funkentstört ist. Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt. Die Einhaltung der betreffenden Bestimmungen hängt von der Verwendung abgeschirmter Kabel ab. Für die Beschaffung entsprechender Kabel ist der Betreiber verantwortlich.

Dieses Gerät wurde sowohl einzeln als auch in einer Anlage, die einen normalen Anwendungsfall nachbildet, auf die Einhaltung der Funkentstörbestimmungen geprüft. Es ist jedoch möglich, daβ die Funkentstörbestimmungen unter ungünstigen Umständen bei anderen Gerätekombinationen nicht eingehalten werden. Der Betreiber ist für die Einhaltung der Funkentstör bestimmungen seiner eigenen Anlage verantwortlich, in der dieses Gerät betrieben wird.

English translation:
Certificate by Manufacturer/Importer: This is to certify that the EXB-10 is shielded against radio interference in accordance with the provisions of Vfg 523/1969 and Vfg 1046/1984. The German Postal Services have been advised that this device is being put on the market and that they have been given the right to inspect the series for compliance with the regulations. Compliance with applicable regulations depends on the use of shielded cables. It is the user who is responsible for procuring the appropriate cables.

This equipment has been tested concerning compliance with the relevant RFI protection requirements both individually and on system level (to simulate normal operation conditions). However, it is possible that these RFI requirements are not met under certain unfavorable conditions in other installations. It is the user who is responsible for compliance of his particular installation.

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About This Manual

This manual provides detailed instructions for performing maintenance procedures on the EXABYTE® EXB-10 and the EXB-10i 8mm Cartridge Handling Subsystem (CHS). This manual also explains how to determine the cause of error codes and how to fix problems associated with these codes.

This manual contains the following three parts:

- **Part 1**, **Introduction to the EXB-10 and EXB-10i**, provides general information about preparing for maintenance procedures. It also provides illustrations of major CHS components, describes electrostatic protection requirements, and describes required tools for removing and replacing CHS parts.
- **Part 2**, **Error Codes and Diagnostics**, describes each error code and provides suggestions for solving problems associated with each code. This part also describes the Diagnostics firmware, a feature that supplies internal CHS motion information to a personal computer (PC) running a VT100 terminal emulator program.
- **Part 3**, **Replacing CHS Components**, describes how to remove and replace all replaceable parts in the CHS.

Intended Audience

This manual is provided for EXABYTE customers who have signed self-maintenance contracts and who need to maintain and diagnose problems with the CHS.

Terms Used in This Manual

In this manual, the following terms are used frequently:

- *CHS:* Cartridge Handling Subsystem. Either the EXB-10 or the EXB-10i.
- *CTS:* Cartridge Tape Subsystem. Either the EXB-8200, the EXB-8200SX, the EXB-8500, or the EXB-8500c.
- *CHM:* cartridge handling mechanism. The robotic assembly in the CHS that moves horizontally and vertically to retrieve and place data cartridges.

Related Publications

For further information about related EXABYTE products and system standards, refer to the following publications:

EXB-10 or EXB-10i 8mm Cartridge Handling Subsystems

- *EXB-10 Cartridge Handling Subsystem Product Specification*, 510400
- *EXB-10 Cartridge Handling Subsystem Installation and Operation*, 510401
- *EXB-10/EXB-10i Cartridge Handling Subsystem Illustrated Parts Catalog*, 510404
- *EXB-10i Cartridge Handling Subsystem Product Specification*, 510600
- *EXB-10i Cartridge Handling Subsystem User's Manual*, 510601

EXB-8200 or EXB-8200SX 8mm Cartridge Tape Subsystem

- *EXB-8200 8mm Cartridge Tape Subsystem Product Specification*, 510005
- *EXB-8200 8mm Cartridge Tape Subsystem User's Manual*, 510006
- *EXB-8200 8mm Cartridge Tape Subsystem Maintenance*, 510003
- *EXB-8200SX 8mm Cartridge Tape Subsystem Product Specification and User's Manual*, 510011

EXB-8500 and EXB-8500c 8mm Cartridge Tape Subsystem

- *EXB-8500 and EXB-8500c 8mm Cartridge Tape Subsystems Product Specification*, 510200
- *EXB-8500 8mm Cartridge Tape Subsystem User's Manual*, 510201
- *EXB-8500c 8mm Cartridge Tape Subsystem User's Manual*, 510209
- *EXB-8500 8mm Cartridge Tape Subsystem Maintenance*, 510204

Standards

- ANSI *Small Computer System Interface (SCSI)*, X3.131-1989
- ANSI *Small Computer System Interface-2 (SCSI-2)*, X3.131-1991
- ANSI *Helical-Scan Computer System Digital Computer Tape Cartridge*, X33B5/89/136, Rev. 6

Conventions Used in This Manual

This manual uses special conventions to highlight notes, important information, cautions, and warnings. These conventions are explained below.

Note: Read *Notes* for hints or suggestions about the topic or procedure being discussed.

Important

Read the information in *Important* boxes to learn crucial information about the topic or procedure being discussed.

CAUTION

Read the information in *Caution* boxes to learn ways to avoid damaging the equipment.

WARNING

Read the information in WARNING boxes to learn ways to avoid damaging the equipment and yourself.

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:

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1685 38th Street
Boulder, CO 80301

Phone: (800) 445-7736
(303) 442-4333

Fax: (303) 447-0467

Part 1

Introduction to the EXB-10 and EXB-10i

1

Introduction

This chapter provides the following information:

- A general description of the EXABYTE® EXB-10 and the EXB-10i 8mm Cartridge Handling Subsystems (CHSs)
- Illustrations of major CHS components
- Diagrams of VMC card connector locations

1.1 About the EXB-10 and EXB-10i

The EXB-10 and the EXB-10i are robotic cartridge handling subsystems (CHSs) that provide unattended access to up to 100,000 megabytes—100 gigabytes—of data storage capacity. Incorporating a single, full-high EXABYTE 8mm Cartridge Tape Subsystem (CTS), the CHS includes a robotic cartridge handling mechanism (CHM) that performs automatic loading and unloading of up to ten 8mm data cartridges and eliminates the need for manual intervention. This robotic handler allows the CHS to deliver up to 28 hours of nonstop, unattended data backup.

Available in a convenient desktop enclosure, the CHS can accommodate both the single-ended and differential SCSI configurations of any one of the following 8mm Cartridge Tape Subsystems:

- EXB-8200
- EXB-8200SX
- EXB-8500
- EXB-8500c

The CHS offers up to 25 GBytes of tape storage with the EXB-8200 or EXB-8200SX installed, up to 50 GBytes with the EXB-8500 installed, or up to 100 GBytes with the EXB-8500c installed (assuming a 2:1 data compression ratio).

Additional Features of the EXB-10i

The EXB-10i features two user-selected modes of operation: a random mode and a sequential mode. In the random mode of operation, a Small Computer System Interface (SCSI) controller is implemented, which can accept commands from a host to move data cartridges in the EXB-10i in a specified order. In the sequential mode of operation, data cartridges in the data cartridge holder are loaded and unloaded in a sequential order.

The EXB-10i and the enclosed CTS both include SCSI controllers. They each occupy one SCSI ID on the SCSI bus, which means that the host considers the EXB-10i to be one target and the CTS in the EXB-10i to be a separate target. Both the EXB-10i and the CTS are available in single-ended and differential SCSI configurations.

1.2 Major CHS Components

This section provides illustrations of the major CHS components. Refer to this section when you need to know where a particular component is located.

Front Panel Components

Figure 1-1 shows the major components on the front panel of the CHS.

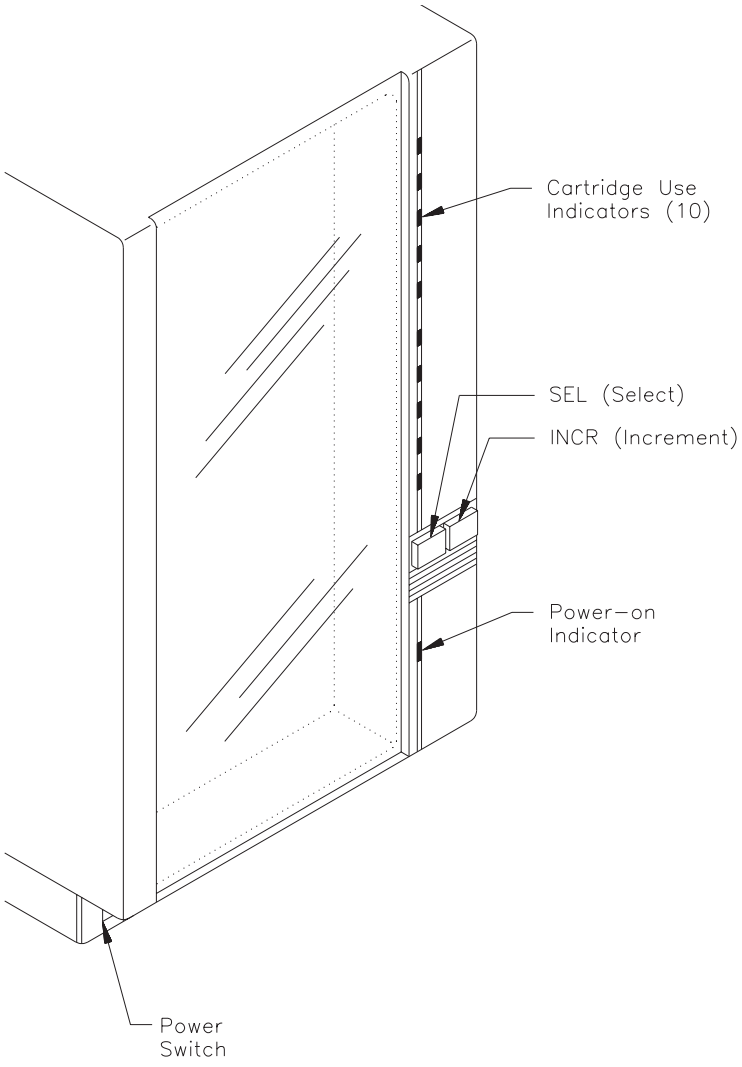

Figure 1-1 Front panel of the CHS

Inside Front Components

Figure 1-2 shows the inside of the CHS (with the cover and the upper bezel removed).

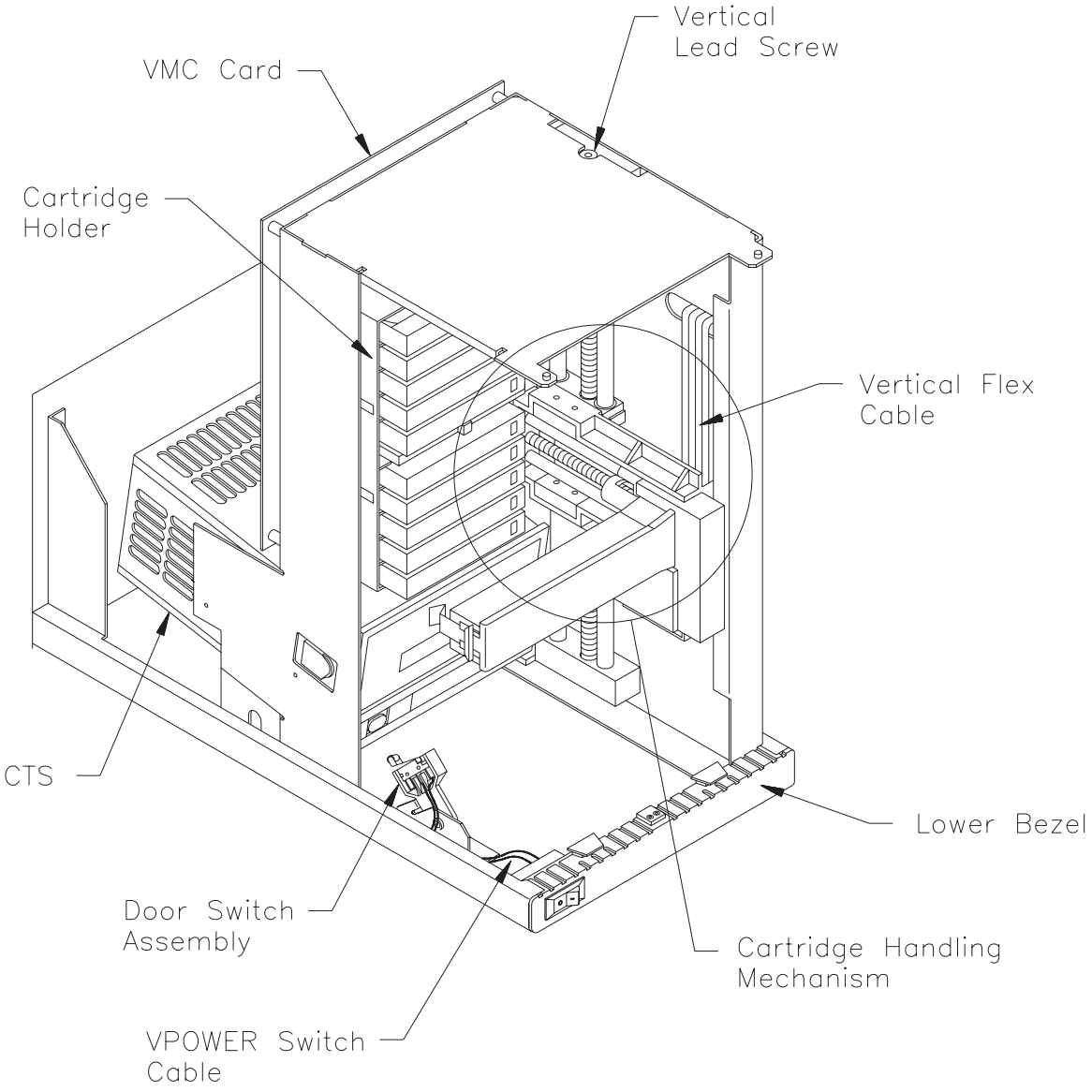

Figure 1-2 Inside of the CHS: front view

Rear Components

Figure 1-3 shows the rear components of the CHS.

Note: The figure below shows the rear of the EXB-10i, which has two SCSI ID switches. The EXB-10 has only one SCSI ID switch.

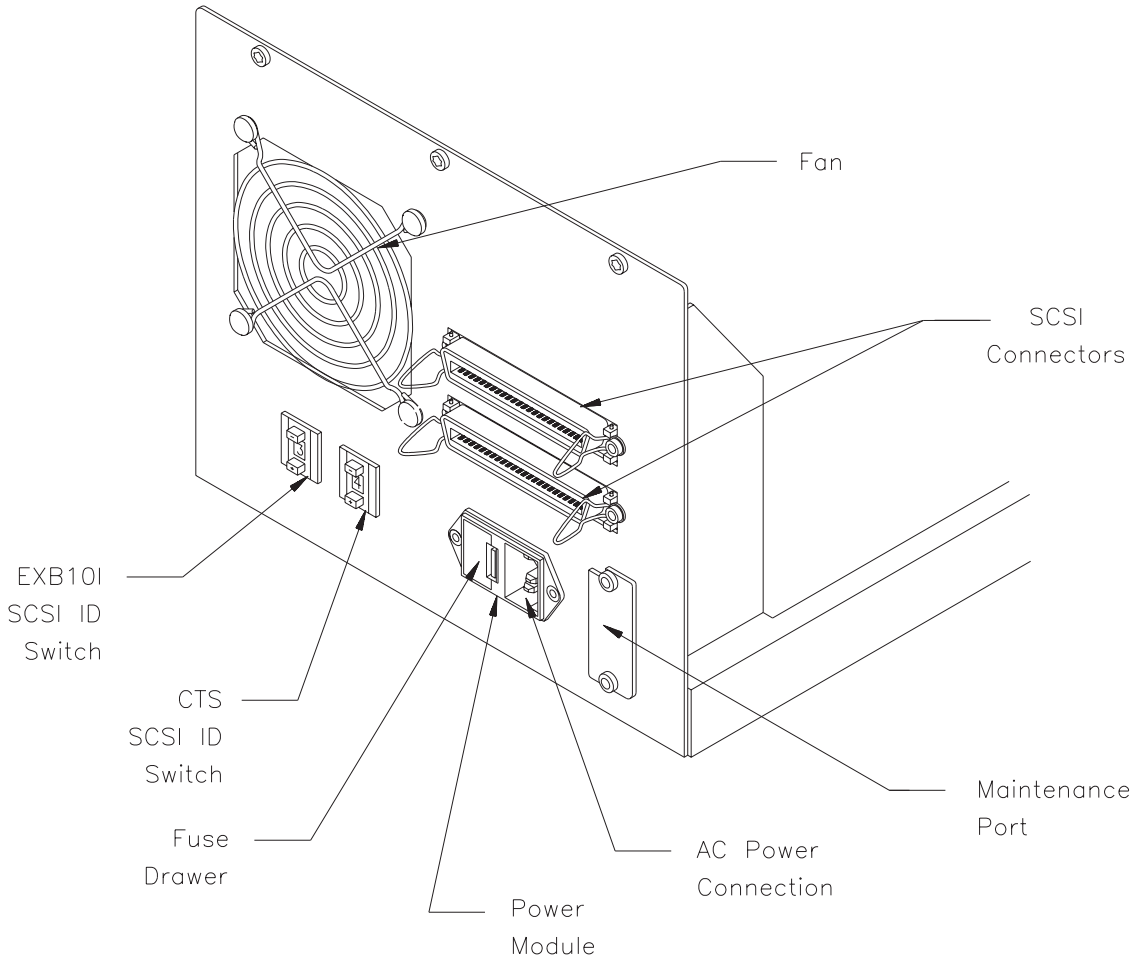

Figure 1-3 Back panel of the CHS (EXB-10i shown)

1.3 Connector Locations

This section provides illustrations of connector locations for the EXB-10 and the EXB-10i.

EXB-10 Connector Locations

The connector locations for the EXB-10 are shown in Figure 1-4.

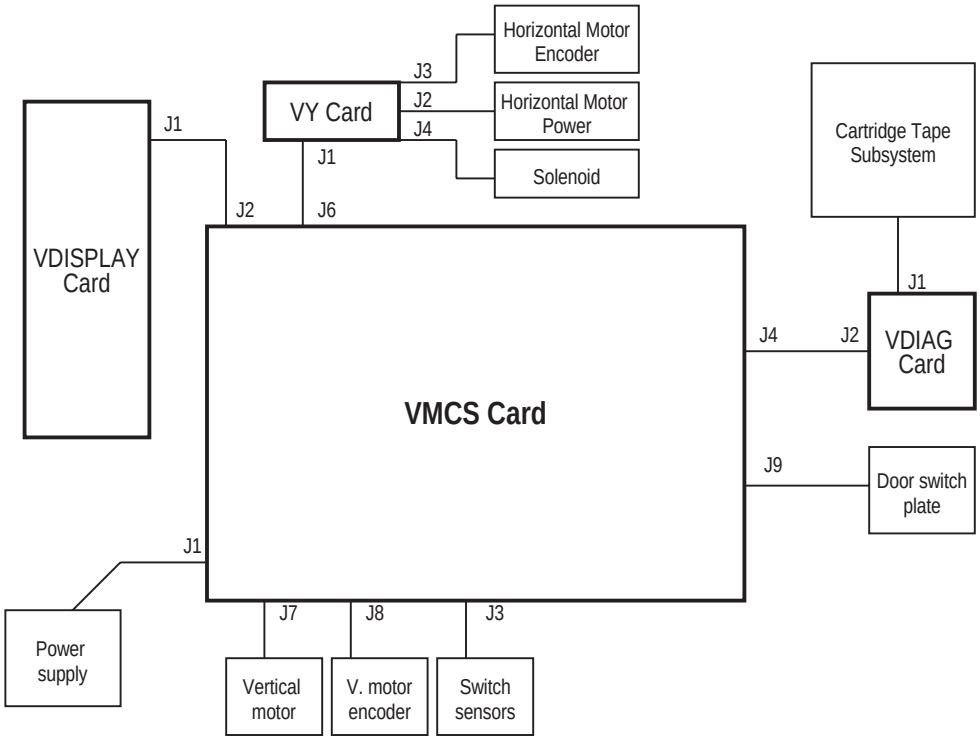

Figure 1-4 Interconnect diagram for the EXB-10's VMCS card

EXB-10i Connector Locations

The connector locations for the EXB-10i are shown in Figure 1-5.

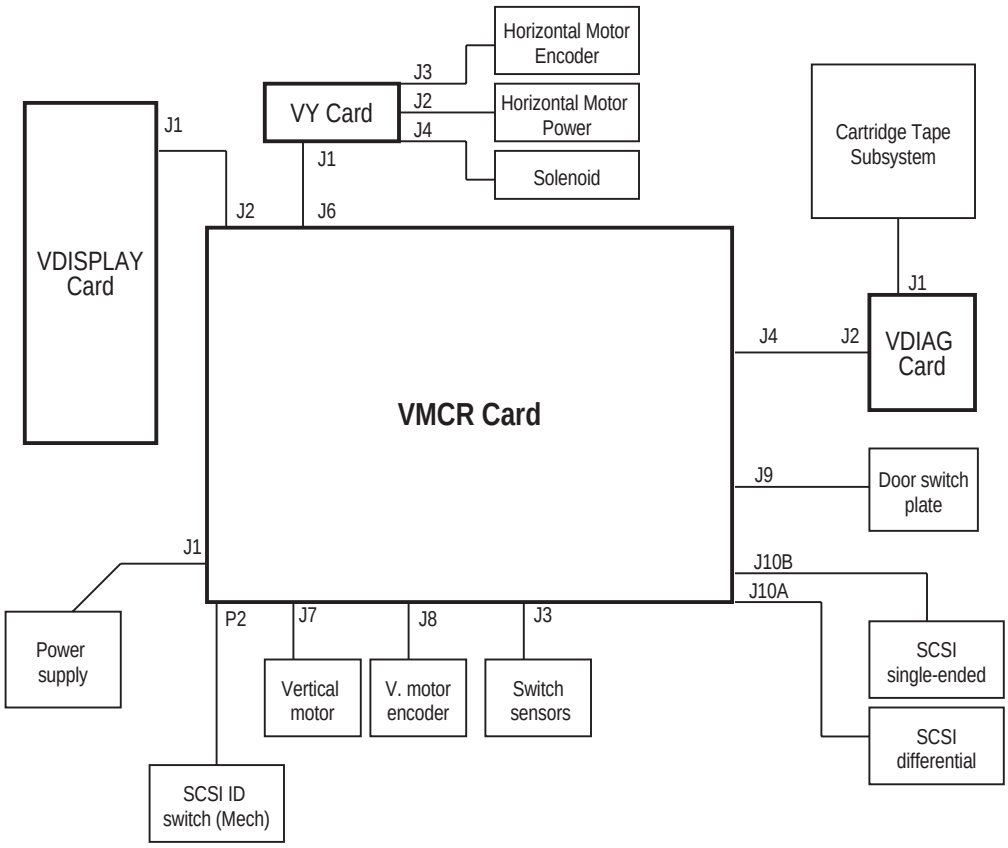

Figure 1-5 Interconnect diagram for the EXB-10i's VMCR card

Notes:

2

Maintenance Preparation

This chapter describes how to keep the repair environment free of electrostatic discharge (ESD) and lists tools required for repairs.

2.1 Electrostatic Protection Requirements

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

- Place a static protection mat on the work surface used for testing and repairing the CHS. Use a 1-megohm resistor to ground the static protection mat.
- Ensure that the power supply connected to the CHS is correctly grounded.
- Wear a static protection wrist band whenever you handle CHS 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 cards in antistatic bags when not in use.
- Ensure that the personal computer or VT100 compatible terminal used for the Diagnostics firmware and for the SCSI bus is properly grounded.

2.2 Required Tools

Table 2-1 lists the tools required for replacing CHS parts.

Table 2-1 Required tools: CHS parts

To replace this part . . .	You will need the following tools . . .				
	T-8 TORX® driver bit*	T-10 TORX driver bit*	T-15 TORX driver bit*	Flat-blade screw-driver	5/16-inch socket*
Cartridge handling mechanism		✔		✔	
Cover assembly		✔			
Cartridge Tape Subsystem		✔	✔	✔	
Door switch plate		✔	✔		
Fan		✔		✔	
Front door		✔			
Horizontal belt		✔			
Horizontal motor	✔	✔			
Power entry module	✔	✔			✔
Power switch		✔		✔	
Power supply		✔	✔	✔	
SCSI ID switch		✔	✔	✔	
Switch sensors	✔	✔	✔		
Upper bezel		✔			
VDIAG card		✔	✔		
VDISPLAY card		✔			
Vertical belt		✔			
Vertical motor	✔	✔			
VMC card		✔			

***** The 5/16-inch socket and all TORX driver bits must be used with a torque limiting screwdriver.

Table 2-2 lists the tools required for replacing CHS cables. Instructions for replacing cables are in Chapter 23.

Table 2-2 Required tools: CHS cables

To replace this cable . . .	You will need the following tools . . .		
	T-10 TORX driver bit*	T-15 TORX driver bit*	Flat-blade screwdriver
DC power cable	✔	✔	✔
Flat flex cable	✔		
Power entry cable	✔	✔	
SCSI cable	✔		
VDIAG cable	✔	✔	
Vertical flex cable	✔	✔	
VMC/VDIAG cable	✔	✔	
VMC VTENPCK cable	✔		
VPOWER switch cable	✔	✔	

***** All TORX driver bits must be used with a torque limiting screwdriver.

Part 2

Error Codes and Diagnostics

3

CHS Hardware Error Codes

This chapter lists the error codes that you may encounter during CHS operation, provides possible problems related to these codes, and suggests corrective actions.

3.1 How the CHS Displays Hardware Error Codes

CHS hardware error codes are displayed using eight of the ten cartridge use indicators to the right of the CHS door. Each error code consists of two or more flashing LEDs that indicate the error type. In normal CHS operation, no more than one LED flashes at one time.

In this chapter, the following convention is used to indicate an error code (❍ indicates that the LED is off; ❊ indicates that the LED is flashing):

❍ LED 10 (not used)
❍ LED 9
❍ LED 8
❍ LED 7
❍ LED 6

❍ LED 5 (not used)
❍ LED 4
❊ LED 3
❊ LED 2
❍ LED 1

For those users familiar with hexadecimal notation, CHS error codes are displayed in binary as two-digit hexadecimal numbers. LEDs 1 through 4 (that is, the lowest four LEDs) display the least significant digit of this number, while LEDs 6 through 9 display the most significant digit. LEDs 5 and 10 are not used for error code displays.

In the example above, error code 06h (= 0000 0110) is displayed.

3.2 Types of CHS Hardware Error Codes

This section explains the types of CHS hardware error codes.

User-Correctable Errors

Error codes of 03h through 0Fh can be easily corrected and can be distinguished from more serious errors because their codes use 0 as the most significant digit. When these errors occur, combinations of the bottom four LEDs will blink; the top six LEDs will be off.

More Serious Errors

Error codes of 10h and above indicate more serious error conditions. Table 3-1 lists the error code categories for the more serious errors.

Table 3-1 Types of serious hardware errors

Category	Type of Error
10h to 1Fh	Errors in picking a cartridge.
20h to 2Fh	Errors in placing a cartridge.
30h to 3Fh	Errors in finding the home or zero position.
40h to 4Fh	Errors in closing the CTS door.
50h to 5Fh	Errors in moving on the horizontal or vertical axis.
60h to 6Fh	Miscellaneous errors.
80h to 8Fh	CTS calibration errors.
90h to 9Fh	Cartridge sensor calibration errors.
A0h to AFh	Errors in determining if a cartridge is in the grab base.
B0h to BFh	Eject position calibration errors.
C0h to CFh	Errors in moving a cartridge.
D0h to DFh	Possible user errors.
E0h to EFh	Diagnostic errors (3.1 code only).

Section 3.3 provides a complete list of error codes and corrective actions.

3.3 List of CHS Error Codes

Table 3-2 in this section lists all of the error codes in hexadecimal order. The columns in these tables indicate the following:

- **Top LED Display**. Depicts the top five LEDs on the CHS's front panel (❍ = indicates that the LED is off; ❊ = indicates that the LED is flashing).
- **Bottom LED Display**. Depicts the bottom five LEDs on the CHS's front panel.
- **Error Code**. Displays the error code's hexadecimal number.
- **Console Message**. Displays the message that appears in the Diagnostics program. (See Chapters 5 and 6 for more information.)
- **Description/Corrective Action**. Provides a description of the error and suggests some corrective actions.

Note: To correct some errors, you may need to replace a CHS part. If you need to determine where a particular part is located, refer to Chapter 2 . If you need to order a CHS part, refer to the *EXB-10/EXB-10i Illustrated Parts Catalog* for part numbers and ordering information.

Table 3-2 User-correctable hardware error codes (listed in hexadecimal order)

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❍ ❍ ❍ ❍	❍ ❍ ❍ ❊ ❊	03h	CONFLICTING CARTRIDGE	**Description:** The CHM is attempting to place a cartridge in a cartridge holder slot or in the CTS when another cartridge is already present. (This error occurs only in the EXB-10 or in EXB-10i sequential mode.) **Corrective action:** Open the CHS door, remove one of the conflicting cartridges, close the door, and then reset the CHS by pressing the INCR and SEL buttons for two seconds. CHS operation should resume normally. (If you removed the cartridge from the grab base, the CHS considers the place operation complete. If you removed the cartridge from the cartridge slot or CTS, the CHS will place the cartridge left in the grab base.)

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❍ ❍ ❍ ❍	❍ ❍ ❊ ❍ ❊	05h	CHS DOOR IS OPEN	**Description:** The CHS's door is open; automatic operation cannot continue. **Corrective action:** Close the door of the CHS to restart operation.
	❍ ❍ ❊ ❊ ❍	06h	MISSING DATA CARTRIDGE HOLDER	**Description:** A cartridge holder is not installed or the cartridge holder is not properly seated. **Corrective action:** Install a cartridge holder if necessary or check to ensure that the cartridge holder is installed correctly. The state of the data cartridge holder is shown on the Diagnostic Main Menu (see Chapter 5). If the cartridge holder is not the problem, check to make certain that the VMC/VTENPACK cable is properly connected (see Section 23.2). If the cable is connected properly, you may need to replace the switch sensors, located on the mounting plate. See Sections 20.2 and 20.3 for instructions on replacing the switch sensors.
	❍ ❍ ❊ ❊ ❊	07h	ALL CARTRIDGES PROCESSED. RESTART PICK/PLACE CYCLE.	**Description:** The CHS has finished processing all cartridges in the cartridge holder. (This error occurs only in the EXB-10 or in the EXB-10i sequential mode.) **Corrective action:** The CHS is waiting for user action. You can restart the pick-and-place cycle in one of these ways: – Use select mode to specify the next cartridge to be processed. – Replace the cartridge holder. If you replace the cartridge holder, the CHS will resume operation with cartridge 1. – Turn on the loop option.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❍ ❍ ❍ ❍	❍ ❊ ❍ ❍ ❊	09h	*none*	**Description:** For the EXB-10, the CHS is in Manual Motion Control or executing Diagnostics from the maintenance port, so it cannot respond when the CTS door opens. For the EXB-10i, the CHS will not execute SCSI motion commands. **Corrective action:** Exit Manual Motion Control by pressing **Q** from the Manual Motion Control screen in Diagnostics or exit Diagnostics by pressing **Q** from the Diagnostics screen. For more information about Diagnostics, see Chapter 6.
	❍ ❊ ❍ ❊ ❊	0Bh	CARTRIDGE IN GRAB BASE CANNOT MOVE TO PARK	**Description:** The CHM is attempting to move to the park position at the base of the CHS but cannot accomplish this move because there is a cartridge in the grab base. (This error occurs in the EXB-10 or in the EXB-10i sequential mode, after a reset.) **Corrective action:** Carefully remove the cartridge from the grab base and reset the CHS by simultaneously pressing the INCR and SEL buttons for two seconds.
	❍ ❊ ❊ ❍ ❍	0Ch	PERFORMING HOME. PICK/PLACE CYCLE SUSPENDED	**Description:** 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 CHS is performing a CTS calibration, a cartridge sensor calibration, or a eject position calibration. **Corrective Action:** None. The CHS will resume normal operation.
	❍ ❊ ❊ ❊ ❊	0Fh	*none*	**Description:** The firmware load is not complete. or There may be a bad flash EEPROM checksum. If this is the case, a message displays in the message box on the ROM Console Main Menu. **Corrective Action:** If there is no message in the message box of the ROM Console Main Menu, transfer to flash EPROM by selecting **F**. If there is a bad flash EEPROM, contact your vendor to receive new firmware.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
does not display on LEDs		11h	CARTRIDGE IN GRAB BASE BEFORE PICK	**Description:** The grab base attempted to pick a cartridge from the CTS or slot, but there was already a cartridge in the grab base. (This error occurs only in the Diagnostics program and typically occurs during Manual Motion Control.) **Corrective Action:** None. The CHS proceeds to the next step in the current pick-and-place cycle. For the EXB-10i, the appropriate status is returned to the SCSI host.
❍ ❍ ❍ ❍ ❋	❍ ❍ ❍ ❋ ❍	12h	CANNOT EXECUTE CTS PICK RETRY	**Description:** The grab base cannot execute a retry when picking a cartridge from the CTS. **Corrective Action:** Check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is properly connected to "J1" on the CHM's VY card and "J6" on the VMC card. Third, check the vertical belt and pulley assembly. Check to see if the vertical belt is loose or if the pulleys are damaged. You may need to replace the CHM, as described in Chapter 11.
	❍ ❍ ❍ ❋ ❋	13h	CANNOT MOVE TO PICK_ SLOW_DOWN POS	**Description:** The grab base cannot complete the move toward the cartridge holder or CTS to pick a cartridge. **Corrective Action:** This error may indicate that the cartridge's dust cover is caught in the CTS. Check to see if the cartridge is placed halfway out of the CTS. If it is, manually remove the cartridge and avoid using it in the CHS again. Or, contact your vendor to receive a cartridge tape guide, which prevents the dust cover from getting caught. If the dust cover does not seem to be the problem, check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is properly connected to "J1" on the CHM's VY card and "J6" on the VMC card. Third, check the horizontal belt and pulley assembly. Check to see if the horizontal belt is loose or if the pulleys are damaged. You may need to replace the CHM, as described in Chapter 11.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❍ ❍ ❍ ❋	❍ ❍ ❋ ❍ ❍	14h	CANNOT MOVE TO PICK POS	**Description:** The grab base cannot move toward the cartridge holder or CTS to pick a cartridge. **Corrective Action:** This error may indicate that the cartridge's dust cover is caught in the CTS. Check to see if the cartridge is placed halfway out of the CTS. If it is, manually remove the cartridge and avoid using it in the CHS again. Or, contact your vendor to receive a cartridge tape guide, which prevents the dust cover from getting caught. If the dust cover does not seem to be the problem, check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is properly connected to "J1" on the CHM's VY card and "J6" on the VMC card. Third, check the horizontal belt and pulley assembly. Check to see if the horizontal belt is loose or if the pulleys are damaged. You may need to replace the CHM, as described in Chapter 11.
	❍ ❍ ❋ ❍ ❋	15h	CANNOT MOVE UP ON CTS PICK	**Description:** The grab base cannot pick a cartridge from the CTS. **Corrective Action:** Make certain the CTS is mounted correctly. Instructions for removing and replacing the CTS are in Chapter 10. If the CTS is not the problem, contact your vendor.
	❍ ❍ ❋ ❋ ❍	16h	CANNOT MOVE DOWN ON CTS PICK	**Description:** The grab base cannot pick the cartridge from the CTS. **Corrective Action:** Make certain the CTS is mounted correctly. Instructions for removing and replacing the CTS are in Chapter 10. If the CTS is not the problem, contact your vendor.
	❍ ❋ ❍ ❋ ❍	1Ah	CANNOT PICK CARTRIDGE	**Description:** The CHM cannot pick a cartridge from the source (CTS or cartridge holder slot). The cartridge inventory indicates the source is full. **Corrective Action:** Reset the CHS. If the error still occurs, you may need to replace the CHM, as described in Chapter 11.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❍ ❍ ❍ ❋	❍ ❋ ❍ ❋ ❋	1Bh	CANNOT PICK FROM CTS. CTS DOOR IS CLOSED	**Description:** The CHM cannot pick from the CTS because the CTS door is closed. **Corrective Action:** If you want to restart the pick-and-place cycle, press the unload button to open the CTS door. If you do not want the CHM to pick from the CTS, power cycle the CHS and set the restart option to on. This action ensures that the CHS starts its pick-and-place cycle from cartridge 1. For the EXB-10i, the EXB-10i returns Door Closed status to the host.
	❍ ❋ ❋ ❍ ❍	1Ch	CARTRIDGE NOT FULLY SEATED IN GRAB BASE	**Description:** The CHM picked a cartridge that it could not seat in the grab base. The grab base returned the cartridge to its source. **Corrective Action:** Recalibrate the cartridge sensor position by following the instructions in Appendix A. If calibration does not solve the problem, contact your vendor. You may need to replace the CHM, as described in Chapter 11.
	❍ ❋ ❋ ❍ ❋	1Dh	SLOT OR CTS EMPTY	**Description:** The CHM attempted to pick a cartridge from the source (CTS or cartridge holder slot). **Corrective Action:** None. The CHM automatically moves to the next action in the current pick-and-place cycle. For the EXB-10i, a Slot or CTS Empty status is returned to the host.
	❍ ❋ ❋ ❋ ❍	1Eh	CARTRIDGE NOT FULLY SEATED IN GRAB BASE	**Description:** The CHM picked a cartridge that it could not place. The grab base returned the cartridge to its source. The CHS cannot detect if there is a cartridge in the grab base. **Corrective Action:** Recalibrate the cartridge sensor position by following the instructions in Appendix A. If calibration does not solve the problem, contact your vendor. You may need to replace the CHM, as described in Chapter 11.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
does not display on LEDs		21h	NO CARTRIDGE TO PLACE	**Description:** There is no cartridge in the grab base. This error may occur during Manual Motion Control in Diagnostics. (This error will not display on the LEDs.) **Corrective Action:** None. The CHS automatically moves to the next cartridge in the cycle. For the EXB-10i, the appropriate status is returned to the host.
❍ ❍ ❍ ❊ ❍	❍ ❍ ❍ ❊ ❍	22h	CANNOT MOVE UP DURING PLACE	**Description:** The grab base cannot move upward to start the place procedure. **Corrective Action:** Check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. If the error still displays, contact your vendor.
	❍ ❍ ❍ ❊ ❊	23h	CANNOT MOVE TO SLOT ENTRY POS	**Description:** The grab base cannot move toward the cartridge holder slot or the CTS while executing a place procedure. **Corrective Action:** Check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. If the error still displays, contact your vendor.
	❍ ❍ ❊ ❍ ❍	24h	CANNOT MOVE DOWN DURING PLACE	**Description:** The grab base cannot move downward to the CTS while executing a place procedure. **Corrective Action:** Check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. If the error still displays, contact your vendor.
	❍ ❍ ❊ ❍ ❊	25h	CANNOT MOVE TO PLACE POSITION	**Description:** The grab base cannot move to a position where it can place a cartridge into the cartridge holder. **Corrective Action:** Check to see if the cartridge holder is installed correctly. If the cartridge holder is not the problem, this error could be caused by a misaligned CHM or an incorrectly mounted CTS. You may need to replace the CHM, as described in Chapter 11; or replace the CTS, as described in Chapter 10.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❍ ❍ ❊ ❍	❍ ❍ ❊ ❊ ❊	27h	CANNOT MOVE TO EJECT POS	**Description:** The grab base cannot execute one of the moves that ejects the cartridge. **Corrective Action:** Inspect the horizontal motion assembly on the CHM, which includes the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM. If the horizontal assembly is intact, this error could be caused by a misaligned solenoid on the CHM.
	❍ ❊ ❍ ❍ ❍	28h	CARTRIDGE IN GRAB BASE AFTER PLACE. POSSIBLE SOLENOID PROBLEM	**Description:** The grab base could not eject a cartridge. **Corrective Action:** . This error could be caused by a bad solenoid on the CHM. You may need to replace the CHM, as described in Chapter 11.
	❍ ❊ ❍ ❍ ❊	29h	CANNOT MOVE TO END PUSH IN POS	**Description:** The grab base cannot place a cartridge into the CTS. **Corrective Action:** Check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. If the error still displays, contact your vendor.
	❍ ❊ ❍ ❊ ❍	2Ah	CANNOT MOVE TO START PUSH IN POS	**Description:** The grab base cannot place a cartridge into the CTS. **Corrective Action:** Inspect the horizontal motion assembly on the CHM, which includes the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM. If the horizontal assembly is intact, this error could be caused by a misaligned solenoid on the CHM.
	❍ ❊ ❍ ❊ ❊	2Bh	CANNOT MOVE TO Z ZERO POS AFTER CARTRIDGE CONFLICT.	**Description:** The grab base tried to place a cartridge, but another cartridge was already present in the slot or CTS. **Corrective Action:** Check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. If the error still displays, contact your vendor.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❍ ❍ ❊ ❍	❍ ❊ ❊ ❍ ❍	2Ch	CTS DOOR IS CLOSED. CANNOT PLACE INTO CTS.	**Description:** The CHM is trying to place a cartridge in the CTS, but the CTS door is closed. This error may occur if you manually intervened with the pick-and-place cycle and closed the CTS door. (This error occurs in the EXB-10 or in the EXB-10i's sequential mode.) **Corrective Action:** When this error occurs, the CHS's pick-and-place cycle has been interrupted. You need to restart the pick-and-place cycle by following these steps: 1. If there is a cartridge in the grab base, remove it. 2. Press the unload button to open the CTS door. 3. Turn on the restart option. 4. Reset the CHS. The CHS will resume the pick-and-place cycle with cartridge 1. For the EXB-10i, the appropriate status is returned to the host.
	❍ ❊ ❊ ❍ ❊	2Dh	CANNOT MOVE TO START MOVE UP.	**Description:** The grab base cannot move towards the cartridge holder to place a cartridge into either slots 1 through 5 or slots 7 through 10. **Corrective Action:** Check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is properly connected to "J1" on the CHM's VY card and "J6" on the VMC card. Third, inspect the horizontal motion assembly on the CHM, which includes the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❍ ❍ ❊ ❊	❍ ❍ ❍ ❍ ❍	30h	CANNOT MOVE INTO Z HOME SENSOR	**Description:** The grab base cannot complete a procedure that allows it to define zero on the horizontal axis. **Corrective Action:** First, check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain that the vertical flex cable is properly connected to "J1" on the VY card and "J6" on the VMC card. Third, inspect the horizontal motion assembly on the CHM, which includes the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.
	❍ ❍ ❍ ❍ ❊	31h	INTERNAL HOME ERROR. UNEXPECTED INTERRUPT STATUS	**Description:** The grab base cannot complete a procedure that allows it to define zero on the horizontal axis. **Corrective Action:** Reset the CHS. If the error still displays, contact your vendor. You may need new firmware.
	❍ ❍ ❍ ❊ ❍	32h	INTERNAL HOME ERROR. UNEXPECTED LM629 STATUS	**Description:** The grab base cannot complete a procedure that allows it to define zero on the horizontal axis. **Corrective Action:** Reset the CHS. If the error still displays, contact your vendor. You may need new firmware.
	❍ ❍ ❍ ❊ ❊	33h	CANNOT MOVE AWAY FROM Z HOME TO DEFINE Z ZERO	**Description:** The grab base cannot complete a procedure that allows it to define zero on the horizontal axis. **Corrective Action:** First, check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain that the vertical flex cable is properly connected to "J1" on the VY card and "J6" on the VMC card. Third, inspect the horizontal motion assembly on the CHM, which includes the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❍ ❍ ❊ ❊	❍ ❍ ❊ ❍ ❍	34h	CANNOT EXECUTE RETRY ON Z HOME	**Description:** The grab base cannot complete a procedure that allows it to define zero on the horizontal axis. **Corrective Action:** First, check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain that the vertical flex cable is properly connected to "J1" on the VY card and "J6" on the VMC card. Third, inspect the horizontal motion assembly on the CHM, which includes the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.
	❍ ❍ ❊ ❍ ❊	35h	CANNOT MOVE INTO Y HOME SENSOR	**Description:** The grab base cannot complete a procedure that allows it to define zero on the vertical axis. **Corrective Action:** First, check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is properly connected to "J1" on the VY card and "J6" on the VMC card. Third, inspect the vertical motion assembly on the CHM, which includes the lead screw, belt, and motor. Check to see if the vertical belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.
	❍ ❍ ❊ ❊ ❍	36h	INTERNAL HOME ERROR. UNEXPECTED INTERRUPT STATUS	**Description:** The grab base cannot complete a procedure that allows it to define zero on the vertical axis. **Corrective Action:** Reset the CHS. If the error still displays, contact your vendor. You may need new firmware.
	❍ ❍ ❊ ❊ ❊	37h	INTERNAL HOME ERROR. UNEXPECTED LM629 STATUS	**Description:** The grab base cannot complete a procedure that allows it to define zero on the vertical axis. **Corrective Action:** Reset the CHS. If the error still displays, contact your vendor. You may need new firmware.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❍ ❍ ❊ ❊	❍ ❊ ❍ ❍ ❍	38h	CANNOT MOVE AWAY FROM Y HOME TO DEFINE Y ZERO	**Description:** The grab base cannot complete a procedure that allows it to define zero on the vertical axis. **Corrective Action:** First, check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is properly connected to “J1” on the VY card and “J6” on the VMC card. Third, inspect the vertical motion assembly on the CHM, which includes the lead screw, belt, and motor. Check to see if the vertical belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.
❍ ❍ ❊ ❍ ❍	❍ ❍ ❍ ❍ ❊	41h	CANNOT MOVE ON Y TO START CTS DOOR CLOSE	**Description:** The grab base cannot move to the vertical axis position where it starts pushing against the CTS door to close it. **Corrective Action:** First, check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is properly connected to “J1” on the VY card and “J6” on the VMC card. Third, inspect the vertical motion assembly on the CHM, which includes the lead screw, belt, and motor. Check to see if the vertical belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.
	❍ ❍ ❍ ❊ ❍	42h	CANNOT MOVE ON Z TO START CTS CLOSE	**Description:** The grab base cannot move to the horizontal axis position where it starts pushing against the CTS door to close it. **Corrective Action:** First, check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is properly connected to “J1” on the VY card and “J6” on the VMC card. Third, inspect the horizontal motion assembly on the CHM, which includes the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❍ ❊ ❍ ❍	❍ ❍ ❍ ❊ ❊	43h	CANNOT CLOSE CTS DOOR. STALLED ON CLOSE MOTION.	**Description:** The grab base cannot close the CTS door. **Corrective Action:** If you have a new CTS and a new cartridge, this error might appear because the cartridge slides out of the CTS. If this is the problem, reset the CHS. In a short time, this problem will disappear. If the CTS has been used frequently in the past, this error might appear because the door on the CTS is not closing properly. If you have trouble closing it, you may need to replace the door on the CTS, as described in the maintenance manual for your CTS.
	❍ ❍ ❊ ❍ ❍	44h	CANNOT MOVE TO Z ZERO AFTER CTS DOOR CLOSE	**Description:** The grab base cannot move to the horizontal axis zero position after closing the CTS door. **Corrective Action:** Check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. If the error still displays, contact your vendor.
	❍ ❍ ❊ ❍ ❊	45h	CANNOT CLOSE CTS DOOR. DOOR REOPENED AFTER CLOSE	**Description:** The grab base cannot close the CTS door after several retries. **Corrective Action:** This error could be caused by a servo error in the CTS firmware. If there is a servo error, the CTS will not accept a cartridge. To clear a servo error in the CTS, power cycle the CHS or reset the SCSI bus. If the CTS has been used frequently in the past, the latch on the door might be worn out. Try manually closing the CTS door with a cartridge loaded. If it does not close, the CTS door latch may be broken. If this is the case, you must replace the CTS, as described in Chapter 10.
	❍ ❍ ❊ ❊ ❍	46h	CANNOT CLOSE CTS DOOR. DOOR REOPENED AFTER CLOSE.	**Description:** The grab base cannot close the CTS door after several retries. The grab base did not stall against the CTS door as expected. **Corrective Action:** (Same corrective action as error 45h.)

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❍ ❊ ❍ ❍	❍ ❍ ❊ ❊ ❊	47h	CANNOT MOVE TO DRIVE DOOR POSITION ON Y AXIS.	**Description:** The grab base cannot make one of the moves necessary to close the CTS door. **Corrective Action:** First, check to see if something is blocking the grab base or the CTS door. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is properly connected to "J1" on the VY card and "J6" on the VMC card. Third, inspect the vertical motion assembly, including the lead screw, belt, and motor. Check to see if the vertical belt is loose or if one of the pulleys is damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.
	❍ ❊ ❍ ❍ ❍	48h	CANNOT MOVE ON Z IN THE ATTEMPT TO RESEAT THE CARTRIDGE.	**Description:** The grab base cannot make one of the moves necessary to close the CTS door. **Corrective Action:** First, check to see if something is blocking the grab base or the CTS door. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is properly connected to "J1" on the VY card and "J6" on the VMC card. Third, inspect the horizontal motion assembly, including the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if one of the pulleys is damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11. If the horizontal assembly is intact, there may be a problem with the CTS. Instructions for replacing the CTS are in Chapter 10.
	❍ ❊ ❍ ❍ ❊	49h	CANNOT MOVE TO Z ZERO AFTER SEATING THE CARTRIDGE	**Description:** The grab base cannot make one of the moves necessary to close the CTS door. **Corrective Action:** First, check to see if something is blocking the grab base or the CTS door. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is properly connected to "J1" on the VY card and "J6" on the VMC card. Third, inspect the horizontal motion assembly, including the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if one of the pulleys is damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❍ ❊ ❍ ❊	❍ ❍ ❍ ❍ ❍	50h	NO PHYSICAL POSITION FOR SPECIFIED LOGICAL POSITION	**Description:** The firmware cannot find a valid physical coordinate that corresponds to the specified logical position. This error may be caused by a malfunction in the CHS firmware. **Corrective Action:** Reset the CHS by simultaneously pressing the INCR and SEL buttons for two seconds. If the error still displays, contact your vendor.
	❍ ❍ ❍ ❍ ❊	51h	CANNOT MOVE TO Z ZERO BEFORE A MOVE ON Y	**Description:** The grab base cannot move to the horizontal axis zero position before starting the vertical axis move. **Corrective Action:** First, check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is properly connected to “J1” on the VY card and “J6” on the VMC card. Third, inspect the horizontal motion assembly, including the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if one of the pulleys is damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.
	❍ ❍ ❍ ❊ ❍	52h	FAILED TO MOVE ON Y	**Description:** The grab base cannot move to the specified vertical axis physical position. **Corrective Action:** First, check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical motor’s blue ribbon cable is connected to “J8” on the VMC card and that the power lead cable is connected to “J7” on the VMC card. Also, make certain the vertical flex cable is properly connected to “J1” on the VY card and “J6” on the VMC card. Third, inspect the vertical motion assembly, including the lead screw, belt, and motor. Check to see if the vertical belt is loose or if one of the pulleys is damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❍ ❊ ❊ ❍	❍ ❍ ❍ ❍ ❍	60h	INTERNAL ERROR	**Description:** Internal error. This error may indicate that there is a problem with the CHS firmware. **Corrective Action:** Reset the CHS by simultaneously pressing the INCR and SEL buttons for two seconds. If the error code still displays, contact your vendor.
	❍ ❍ ❍ ❍ ❊	61h	INVALID NONVOLATILE RAM	**Description:** Invalid nonvolatile RAM. This error may indicate that the nonvolatile RAM is bad. **Corrective Action:** Reset the CHS by simultaneously pressing the INCR and SEL buttons for two seconds. If this does not correct the error, you may need a new VMC card. Instructions for replacing the VMC card are in Sections 14.2 and 14.3.
	❍ ❍ ❍ ❊ ❍	62h	CANNOT INITIALIZE Y LM629	**Description:** The vertical motor's servo chip cannot be initialized properly. This error may indicate that the servo control chip is bad. **Corrective Action:** Reset the CHS by simultaneously pressing the INCR and SEL buttons for two seconds. If the error code still displays, you need to replace the VMC card. Instructions for replacing the VMC card are in Sections 14.2 and 14.3.
	❍ ❍ ❍ ❊ ❊	63h	CANNOT INITIALIZE Z LM629	**Description:** The horizontal motor's servo chip cannot be initialized properly. This error may indicate that the servo control chip is bad. **Corrective Action:** Reset the CHS by simultaneously pressing the INCR and SEL buttons for two seconds. If this error code still displays, you need to replace the VMC card. Instructions for replacing the VMC card are in Sections 14.2 and 14.3.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❍ ❊ ❊ ❍	❍ ❍ ❊ ❍ ❍	64h	TIMEOUT ON SERVO PROCESS	**Description:** 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. **Corrective Action:** Reset the CHS by simultaneously pressing the INCR and SEL buttons for two seconds. If the motors still move slowly, there may be a problem in the firmware. You can check the history screen in Diagnostics to see what process caused the timeout. (See Chapter 6.) If you need to replace the VMC card, instructions are in Sections 14.2 and 14.3. If you need new firmware, contact your vendor.
	❍ ❍ ❊ ❍ ❊	65h	CANNOT INIT SCSI INTERFACE	**Description:** The SCSI chip failed. (This error occurs only in the EXB-10i.) **Corrective Action:** Turn the EXB-10i off and then on again. If the error code still displays, you need to replace the VMC card. Instructions for replacing the VMC card are in Sections 14.2 and 14.3.
❍ ❊ ❍ ❍ ❍	❍ ❍ ❍ ❍ ❊	81h	OPEN CTS DOOR FOR CTS CALIBRATION	**Description:** The CHS cannot perform the CTS calibration procedure while the CTS door is closed. **Corrective Action:** Open the CTS door and then restart the calibration procedure.
	❍ ❍ ❍ ❊ ❍	82h	REMOVE CARTRIDGE FROM GRAB BASE FOR CTS CALIBRATION	**Description:** The CHS cannot perform the calibration procedure while a cartridge is in the grab base. **Corrective Action:** Remove the cartridge from the grab base and then restart the calibration procedure.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❊ ❍ ❍ ❍	❍ ❍ ❊ ❊ ❍	86h	CANNOT MOVE FROM CTS DOOR AFTER LOCATING THE CTS	**Description:** The CHM cannot perform one of the CTS calibration moves. **Corrective Action:** First, check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain that the vertical motor's blue ribbon cable is connected to "J8" on the VMC card and the power lead cable is connected to "J7" on the VMC card. Third, inspect the vertical motion assembly, including the lead screw, belt, and motor. Check to see if the vertical belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.
	❍ ❍ ❊ ❊ ❊	87h	CANNOT MOVE TO Z ZERO	**Description:** The CHM cannot perform one of the CTS calibration horizontal moves. **Corrective Action:** First, check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is properly connected to "J1" on the VY card and "J6" on the VMC card. Third, inspect the horizontal motion assembly, including the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.
	❍ ❊ ❍ ❍ ❍	88h	CANNOT FIND VALID CTS POS	**Description:** The CHM has exhausted the possible positions for picking from the CTS. It cannot find a CTS position where it can pick reliably. **Corrective Action:** Make certain the CTS is mounted correctly. Instructions for removing and replacing the CTS are in Chapter 10.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❊ ❍ ❍ ❍	❍ ❊ ❍ ❍ ❊	89h	CANNOT MOVE GRAB BASE AGAINST CTS FOR Z CALIBRATION	**Description:** The CHM cannot perform CTS calibration on the horizontal axis. **Corrective Action:** The CTS's horizontal axis position may be out of range. Try reinstalling the CTS to see if this solves the problem. If the CTS is installed correctly, check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is properly connected to "J1" on the VY card and "J6" on the VMC card. Third, inspect the horizontal motion assembly, including the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.
	❍ ❊ ❍ ❊ ❍	8Ah	CARTRIDGE FOUND IN CTS. INVALID CTS CALIBRATION	**Description:** The CHM cannot perform the CTS calibration because there is a cartridge in the CTS. **Corrective Action:** Manually remove the cartridge from the CTS. Make certain the CTS door is open and that no cartridge is in the grab base. Then reset the CHS.
	❍ ❊ ❍ ❊ ❊	8Bh	CARTRIDGE HOLDER EMPTY FOR CTS CALIBRATION	**Description:** The CHM cannot find a cartridge in the cartridge holder. **Corrective Action:** Place a cartridge in the cartridge holder and reset the CHS. *Note:* The calibration will perform after a reset only if the calibration was part of a power-on self-test, not if calibration was invoked through SCSI or through Diagnostics.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❋ ❍ ❍ ❋	❍ ❍ ❍ ❍ ❍	90h	CANNOT MOVE TO START SENSOR CALIBRATION	**Description:** The grab base cannot move to the cartridge sensor calibration position. **Corrective Action:** First, check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is connected to “J1” on the VY card and “J6” on the VMC card. Third, inspect the horizontal motion assembly, including the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.
	❍ ❍ ❍ ❍ ❋	91h	CANNOT MOVE TO SLOW DOWN POS FOR SENSOR CALIBRATION	**Description:** The grab base cannot move to a position where it starts polling for the cartridge sensor. **Corrective Action:** First, check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is connected to “J1” on the VY card and “J6” on the VMC card. Third, inspect the horizontal motion assembly, including the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.
	❍ ❍ ❍ ❋ ❍	92h	BAD Z HOME SENSOR OR NO CALIBRATION TOOL PRESENT	**Description:** The grab base cannot find the cartridge sensor. **Corrective Action:** Make certain the calibration block is placed in the grab base. If it is and you still receive this error, the cartridge sensor is malfunctioning. You may need to replace the CHM.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❋ ❍ ❍ ❋	❍ ❍ ❍ ❋ ❋	93h	INSERT SENSOR CALIBRATION TOOL	**Description:** The CHS is waiting for you to insert the calibration block. **Corrective Action:** Insert the calibration block in the grab base.
	❍ ❍ ❋ ❍ ❍	94h	COULD NOT FIND CARTRIDGE SENSOR OR Z HOME SENSOR	**Description:** The CHM could not complete the calibration. **Corrective Action:** First, check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is connected to “J1” on the VY card and “J6” on the VMC card. Third, inspect the horizontal motion assembly, including the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.
	❍ ❍ ❋ ❍ ❋	95h	INTERNAL ERROR. UNEXPECTED INTERRUPT STATUS	**Description:** The CHM could not find the cartridge sensor anywhere on the horizontal axis. **Corrective Action:** Contact your vendor. You may need new firmware.
	❍ ❍ ❋ ❋ ❍	96h	INVALID DISTANCE BETWEEN CARTRIDGE AND Z HOME SENSORS	**Description:** The cartridge sensor is not properly located on the grab base. **Corrective Action:** First, check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is connected to “J1” on the VY card and “J6” on the VMC card. Third, inspect the horizontal motion assembly, including the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❊ ❍ ❍ ❍	❍ ❍ ❊ ❊ ❊	97h	CANNOT MOVE TO Z ZERO	**Description:** The CHM cannot move to the horizontal zero position after completing the cartridge sensor calibration. **Corrective Action:** First, check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is connected to “J1” on the VY card and “J6” on the VMC card. Third, inspect the horizontal motion assembly, including the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.
	❍ ❊ ❍ ❍ ❍	98h	INTERNAL ERROR. UNEXPECTED LM629 STATUS	**Description:** Internal error. **Corrective Action:** Contact your vendor. You may need new firmware.
	❍ ❊ ❊ ❍ ❍	9Ch	REMOVE CALIBRATION TOOL	**Description:** The CHS has completed cartridge sensor calibration and is now waiting for you to remove the calibration block. **Corrective Action:** Remove the calibration block.
❍ ❊ ❍ ❊ ❍	❍ ❍ ❍ ❍ ❍	A0h	CANNOT MOVE ON Z TO CHECK FOR CARTRIDGE IN GRAB BASE	**Description:** The CHM cannot move to the cartridge sensor to determine whether a cartridge exists in the grab base. This error may indicate a malfunction in the horizontal motion assembly. **Corrective Action:** Check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is connected to “J1” on the VY card and “J6” on the VMC card. Third, inspect the horizontal motion assembly, including the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❋ ❍ ❋ ❍	❍ ❍ ❍ ❍ ❋	A1h	STALLED WHILE SEARCHING FOR CARTRIDGE IN GRAB BASE	**Description:** The CHM cannot find the cartridge sensor or the horizontal home sensor while it moves on the horizontal axis. This error may indicate a malfunction in the horizontal motion assembly. **Corrective Action:** Check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is connected to “J1” on the VY card and “J6” on the VMC card. Third, inspect the horizontal motion assembly, including the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.
	❍ ❍ ❍ ❋ ❍	A2h	INTERNAL ERROR. UNEXPECTED INTERRUPT STATUS	**Description:** Internal error. **Corrective Action:** Contact your vendor.
	❍ ❍ ❍ ❋ ❋	A3h	INTERNAL ERROR. UNEXPECTED LM629 STATUS	**Description:** Internal error. **Corrective Action:** Contact your vendor.
❍ ❋ ❍ ❋ ❋	❍ ❍ ❍ ❍ ❍	B0h	CANNOT MOVE TO Z ZERO	**Description:** The grab base cannot move to the start position for the eject position calibration. **Corrective Action:** Check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is connected to “J1” on the VY card and “J6” on the VMC card. Third, inspect the horizontal motion assembly, including the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❊ ❍ ❊ ❊	❍ ❍ ❍ ❍ ❊	B1h	CANNOT MOVE TO END PUSH IN	**Description:** The grab base cannot execute a move that prepares for the eject position calibration. **Corrective Action:** Check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is connected to “J1” on the VY card and “J6” on the VMC card. Third, inspect the horizontal motion assembly, including the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.
	❍ ❍ ❍ ❊ ❍	B2h	SOLENOID DID NOT EJECT	**Description:** The solenoid did not eject. **Corrective Action:** The solenoid is malfunctioning. You may need to replace the CHM as described in Chapter 11.
	❍ ❍ ❍ ❊ ❊	B3h	CANNOT MOVE TO START PUSH IN	**Description:** The grab base cannot move to the “start push in” position. **Corrective Action:** Check to see if something is blocking the grab base. If there is, remove the obstruction and reset the CHS. Second, make certain the vertical flex cable is connected to “J1” on the VY card and “J6” on the VMC card. Third, inspect the horizontal motion assembly, including the lead screw, belt, and motor. Check to see if the horizontal belt is loose or if the pulleys are damaged. If the pulleys are damaged or detached from the lead screw assembly, you will need to replace the CHM as described in Chapter 11.
	❍ ❍ ❊ ❍ ❍	B4h	CARTRIDGE IN GRAB BASE CANNOT PERFORM EJECT CALIBRATION	**Description:** There is a cartridge in the grab base. **Corrective Action:** Remove the cartridge and retry the calibration procedure by resetting the CHS.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❊ ❊ ❍ ❍	❍ ❍ ❍ ❍ ❍	C0h	CANNOT PUT CARTRIDGE BACK AFTER PICK FAILURE	**Description:** The grab base was unable to place the cartridge back in the source after a pick failure. **Corrective Action:** Remove the cartridge from the grab base and return it to the source. Reset the CHS by pressing INCR and SEL simultaneously for two seconds. If this does not solve the problem, contact your vendor.
	❍ ❍ ❍ ❍ ❊	C1h	CANNOT PUT CARTRIDGE BACK AFTER PLACE FAILURE	**Description:** The grab base was unable to place the cartridge back in the source after a place failure. **Corrective Action:** Remove the cartridge from the grab base and return it to the source. Reset the CHS by pressing INCR and SEL simultaneously for two seconds. If this does not solve the problem, contact your vendor.
	❍ ❍ ❍ ❊ ❍	C2h	CANNOT RETURN CARTRIDGE AFTER SCSI ABORT	**Description:** The CHM cannot place the cartridge back in the source after a SCSI abort. **Corrective Action:** Remove the cartridge from the grab base and return it to the source. Reset the CHS by pressing INCR and SEL simultaneously for two seconds. If this does not solve the problem, contact your vendor.
❍ ❊ ❊ ❍ ❊	❍ ❍ ❍ ❍ ❍	D0h	EMPTY CARTRIDGE HOLDER DURING SEQUENTIAL MODE	**Description:** There are no cartridges in the cartridge holder. (This error occurs in the EXB-10 or the EXB-10i when operating in sequential mode.) **Corrective Action:** Place cartridges in the cartridge holder. If the cartridge holder *does* contain cartridges, you may need to replace the CHM, as described in Chapter 11.
	❍ ❍ ❍ ❍ ❊	D1h	CANNOT RESTART SEQUENTIAL MODE, CTS IS FULL	**Description:** The EXB-10i cannot restart sequential mode, because the CTS contains a cartridge. **Corrective Action:** Remove the cartridge from the CTS.
❍ ❊ ❊ ❊ ❍	❍ ❍ ❍ ❍ ❍	E0h	CANNOT MOVE TO CTS. GRAB BASE FULL.	**Description:** During diagnostics, the CHM could not move to the CTS because a cartridge was in the grab base and the CTS door was closed. **Corrective Action:** Remove the cartridge from the grab base.

Top LED Display	Bottom LED Display	Error Code	Console Message	Description/Corrective Action
❍ ❊ ❊ ❊ ❍	❍ ❍ ❍ ❊ ❍	E2h	CANNOT CYCLE SOLENOID. GRAB BASE FULL.	**Description:** During diagnostics, the CHS could not cycle the solenoid on and off because a cartridge was in the grab base. **Corrective Action:** Remove the cartridge from the grab base.
	❍ ❍ ❍ ❊ ❊	E3	CANNOT CYCLE Y AXIS. GRAB BASE FULL.	**Description:** During diagnostics, the CHM could not move on the vertical axis because a cartridge was in the grab base. **Corrective Action:** Remove the cartridge from the grab base.
	❍ ❍ ❊ ❍ ❍	E4	CANNOT CYCLE Z AXIS. GRAB BASE FULL.	**Description:** During diagnostics, the CHM could not move on the horizontal axis because a cartridge was in the grab base. **Corrective Action:** Remove the cartridge from the grab base.
	❍ ❍ ❊ ❍ ❊	E5	EXCEEDED Z POS ERROR	**Description:** During diagnostics, the CHM did not move within the expected horizontal position range. **Corrective Action:** Contact your vendor.
	❍ ❍ ❊ ❊ ❍	E6	CANNOT PARK. GRAB BASE FULL	**Description:** During diagnostics, the CHM could not move to the park position because a cartridge was in the grab base. **Corrective Action:** Remove the cartridge from the grab base.

Notes:

4

EXB-10i SCSI Errors

This chapter provides a summary of SCSI error conditions for the EXB-10i.

4.1 List of Error Conditions

Table 4-1 below describes the five sense keys that are associated with EXB-10i errors. These sense keys are returned in byte 02 of the sense data for the REQUEST SENSE (03h) command.

Table 4-1 Sense key descriptions

Sense Key Hex Values	Meaning	Explanation
0h	No Sense	There is no specific sense key information to be reported for the EXB-10i.
2h	Not Ready	The EXB-10i cannot accept any motion commands. See Table 4-2.
4h	Hardware Error	The EXB-10i detected a non-recoverable hardware failure while performing the command or during a self-test. See Table 4-4.
5h	Illegal Request	There was an illegal parameter in the command descriptor block or in the additional parameters supplied as data for a command. See Table 4-5.
6h	Unit Attention	Something happened that may have changed the state of the EXB-10i. See Table 4-6.
Bh	Aborted Command	The EXB-10i aborted the last command. See Table 4-7.

The following sections list the ASC and ASCQ settings that result from EXB-10i error conditions. These descriptions are listed in order by ASC and ASCQ for each of the sense keys.

The tables contain three or four columns, as described below:

- **ASC**. (Additional Sense Code.) Corresponds to byte 12 of the sense data returned in response to the REQUEST SENSE command.
- **ASCQ.** (Additional Sense Code Qualifier.) Corresponds to byte 13 of the sense data returned in response to the REQUEST SENSE command.
- **LED Display**. Provides the number in hex that displays on the LEDs (if applicable). Not all tables contain this column.
- **Description**. Provides an explanation of the error.

Not Ready Sense Key (2h)

The EXB-10i returns a sense key of Not Ready (2h) to the initiator in the following situations:

- If the EXB-10i door is open
- If the EXB-10i data cartridge holder is missing
- When the EXB-10i is performing a power-on self-test
- When the EXB-10i is in Manual Motion Control (for firmware 3.0 and below) or Diagnostics (for firmware 3.1 and above)
- When the EXB-10i is executing Diagnostics through the maintenance port

During a Not Ready condition, the EXB-10i returns Check Condition status in response to each motion command until the Not Ready condition is removed. During this time, the sense key is set to Not Ready and the ASC and ASCQ are set to codes specifying why the EXB-10i is not ready. All commands other than motion commands perform normally.

Table 4-2 lists Not Ready sense key (2h) error conditions.

Table 4-2 ASC and ASCQ Values for the Not Ready Sense Key (2h)

ASC (byte 12)	ASCQ (byte 13)	LED Display	Description
04h	85h	05h	The EXB-10i door is open.
	86h	06h	The EXB-10i cartridge holder is missing.
	89h	09h	The EXB-10i is in Manual Motion control or Diagnostics, or is executing Diagnostics through the maintenance port.
	8Ch	0Ch	The EXB-10i is performing a power-on self-test.

Hardware Error Sense Key (4h)

The EXB-10i returns a sense key of Hardware Error (4h) when a hardware-related error occurs. Table 4-3 provides a general description of hardware error types. These are the same error categories described in Table 3-1 in Chapter 3.

Table 4-3 Hardware error types

ASC	Type of Error
81h	Pick errors.
82h	Place errors.
83h	Home or zero position errors.
84h	CTS door close errors.
85h	Move errors.
86h	Miscellaneous errors.
88h	CTS calibration errors.
89h	Cartridge sensor calibration errors.
8Ah	Check cartridge present errors.
8Bh	Eject position calibration errors.

After a Hardware Error occurs, the EXB-10i will not accept motion commands. For each additional motion command, the EXB-10i returns Check Condition status with the same Hardware Error. For the TEST UNIT READY (00h) command, the EXB-10i also responds with a Hardware Error sense key. All other commands are executed normally.

To clear a Hardware Error, perform one of the following actions:

- Reset the EXB-10i by pressing both SEL and INCR for a minimum of two seconds.
  or
- Send a Bus Device Reset message.
  or
- Perform a SCSI bus reset.
  or
- Power cycle the EXB-10i.

If resetting the EXB-10i does not clear the error, refer to Chapter 3 for more information about corrective actions for Hardware Errors.

Table 4-4 lists Hardware Error (4h) conditions.

Table 4-4 ASC and ASCQ values for the Hardware Error Sense Key (4h)

ASC (byte 12)	ASCQ (byte 13)	LED Display	Description
3Bh	87h	1Ch	The grab base picked a cartridge that it could not seat in the grab base. The grab base returned the cartridge to its source.
		1Eh	The grab base picked a cartridge that it could not seat in the grab base. The grab base returned the cartridge to its source. The CHS cannot detect if there is a cartridge in the grab base.
40h	80h	—	No cartridge was successfully picked and placed during a SEND DIAGNOSTIC self test. Either the sensor that detects whether there is a cartridge in the grab base is malfunctioning or there were no cartridges in the data cartridge holder.
44h	0h	—	An internal target failure occurred. Contact your vendor for assistance.
81h	12h	12h	The grab base could not pick the cartridge from the CTS.
	13h	13h	The grab base could not move toward the cartridge holder or CTS to pick a cartridge.
	14h	14h	
	15h	15h	The grab base could not execute the motions necessary to pick the cartridge from the CTS.
	16h	16h	
	1Ah	1Ah	The grab base was unable to pick a cartridge. The cartridge inventory indicates the location is full.
	1Bh	1Bh	The CHM was unable to pick a cartridge from the CTS because the CTS door was closed.
	1Ch	1Ch	The CHM could not seat the cartridge in the grab base after a pick operation and returned the cartridge to its source.
	1Eh	1Eh	
	C0h	C0h	The grab base was unable to place the cartridge back in the source after a pick failure.
	C1h	C1h	The grab base was unable to place the cartridge back in the source after a place failure.

ASC (byte 12)	ASCQ (byte 13)	LED Display	Description
82h	22h	22h	The grab base could not move upward to start the place procedure.
	23h	23h	The grab base could not move towards the cartridge holder or the CTS while executing a place procedure.
	24h	24h	The grab base could not move downward to the CTS while executing a place procedure.
	25h	25h	The grab base could not move to a position where it can place a cartridge into the cartridge holder or the CTS.
	27h	27h	The grab base could not execute one of the moves that ejects the cartridge.
	28h	28h	The grab base has moved away from the cartridge holder or the CTS, but did not place the cartridge. The cartridge is still in the grab base.
	29h	29h	The grab base could not execute one of the moves that ejects the cartridge.
	2Ah	2Ah	
	2Bh	2Bh	The grab base could not retract to the horizontal zero position after it discovered a conflicting cartridge in the cartridge holder or CTS.
	2Ch	2Ch	The grab base tried to place a cartridge into the CTS, but the CTS door was closed.
	2Dh	2Dh	The grab base could not move toward the cartridge holder to place a cartridge into either slots 1 through 5 or 7 through 10.
83h	30h	30h	The grab base could not complete a procedure that allows it to define zero on the horizontal axis.
	31h	31h	
	32h	32h	
	33h	33h	
	34h	34h	
	35h	35h	The grab base could not complete a procedure that allows it to define zero on the vertical axis.
	36h	36h	
	37h	37h	
	38h	38h	

ASC (byte 12)	ASCQ (byte 13)	LED Display	Description
84h	41h	41h	The grab base could not move to the vertical axis position where it starts pushing against the CTS door to close it.
	42h	42h	The grab base could not move to the horizontal axis position where it starts pushing against the CTS door to close it.
	43h	43h	The grab base could not close the CTS door.
	44h	44h	The grab base could not move to the horizontal zero position after closing the CTS door.
	45h	45h	The grab base could not close the CTS door even after several retries.
	46h	46h	The grab base failed to close the CTS door even after several retries. The EXB-10i did not stall against the CTS door as expected.
	47h	47h	The grab base could not make one of the moves necessary to close the CTS door even after several retries.
	48h	48h	
	49h	49h	
85h	50h	50h	The grab base could not move to the physical position that corresponds to the logical position specified.
	51h	51h	The grab base could not move to the horizontal axis zero position before starting the vertical axis move.
	52h	52h	The grab base could not move to the specified vertical position.
86h	61h	61h	Invalid nonvolatile RAM.
	62h	62h	The vertical motion parameters could not be initialized properly.
	63h	63h	The horizontal motion parameters could not be initialized properly.
	64h	64h	A CHM motion took longer than the maximum time allocated for it. When motion functions do not complete in the allocated time, the currents to the servo motors are shut off.
	65h	65h	The SCSI hardware could not be initialized.
88h	86h	86h	The EXB-10i could not perform one of the calibration vertical moves.
	87h	87h	The EXB-10i could not perform one of the calibration horizontal moves.
	89h	89h	The EXB-10i could not perform calibration on the horizontal axis.

ASC (byte 12)	ASCQ (byte 13)	LED Display	Description
88h	—	8Ah	The EXB-10i could not perform the calibration because there is a cartridge in the CTS.
	—	8Bh	The EXB-10i tried to locate a cartridge in the cartridge holder, but could not find one.
89h	90h	90h	The grab base could not start the move to the cartridge sensor calibration position.
	91h	91h	The grab base could not move to the sensor calibration start position.
	92h	92h	The cartridge sensor was not found.
	93h	93h	The EXB-10i could not locate the calibration block in the grab base.
	94h	94h	The grab base could not complete the calibration.
	95h	95h	The EXB-10i could not locate the cartridge sensor position.
	96h	96h	A motion error occurred while the grab base was searching for the cartridge sensor position.
	97h	97h	The grab base could not move to the horizontal zero position after completing the cartridge sensor calibration.
	98h	98h	Internal error.
	9Ch	9Ch	The calibration is complete. Remove the calibration block.
8Ah	A0h	A0h	An unrecoverable hardware error occurred while the EXB-10i was checking for the presence of a cartridge in the grab base. No more motion commands will be accepted until you reset the EXB-10i.
	A1h	A1h	
	A2h	A2h	Internal error.
	A3h	A3h	
8Bh	B0h	B0h	The grab base could not move to the start position for the eject position calibration.
	B1h	B1h	The grab base could not execute a move that prepares for the eject position calibration.
	B2h	B2h	The solenoid did not eject.
	B3h	B3h	The grab base could not move to the “start push in” position.
	B4h	B4h	There is a cartridge in the grab base.

Illegal Request Sense Key (5h)

Table 4-5 lists Illegal Request (5h) error conditions.

Table 4-5 ASC and ASCQ values for the Illegal Request Sense Key (5h)

ASC (byte 12)	ASCQ (byte 13)	Description
1Ah	00h	The parameter list length was not valid (appears in the MODE SELECT command).
20h	00h	The command OP code was invalid. If the command OP code has a valid group code, the EXB-10i will receive all the CDB bytes. If the command OP code does not have a valid group code, the EXB-10i will go to Status phase after the first byte in the Command phase and return Check Condition status.
24h	00h	There were invalid fields in the CDB.
	80h	There was an invalid element address specified in the CDB.
25h	00h	The logical unit specified in the Identify message or in the CDB is not zero.
26h	00h	There was an invalid parameter in the parameter list.
3Bh	0Dh	The destination element was occupied for a MOVE MEDIUM command.
	3Eh	The source element was empty for a MOVE MEDIUM command.
	80h	The CHM was occupied for a MOVE MEDIUM command.
	81h	A MOVE MEDIUM command was issued and both the source and destination element were the CHM.
	83h	The CTS door was closed and the source element in a MOVE MEDIUM command was the CTS.
	84h	The CTS door was closed and the destination element was the CTS.
	85h	The destination element in a POSITION TO ELEMENT command was park, but there is a cartridge in the grab base and the EXB-10i could not move to park.
	86h	The destination element in a POSITION TO ELEMENT command was the CTS, but there is a cartridge in the grab base and the CTS door is closed. This move is not allowed because if the CTS door opens while the grab base is positioned at the CTS with a cartridge, the cartridge will be knocked out of the grab base.

ASC (byte 12)	ASCQ (byte 13)	Description
3Dh	00h	There were invalid bits in the Identify message. Either one of the reserved bits was nonzero or the LUNTAR field was nonzero.
	81h	There was a cartridge in the grab base when the EXB-10i received a SEND DIAGNOSTIC command, with one of the following tests specified: self test, CTS calibration test, cartridge sensor calibration test, eject calibration test, or the pick-and-place test.
	82h	The CTS door was closed and the initiator sent a SEND DIAGNOSTIC command with the Verify Pick and Place Functionality page.
	83h	There was no cartridge in the data cartridge holder and the initiator sent a SEND DIAGNOSTIC command with the CTS Calibration page.
	84h	There was a cartridge in the CTS and the initiator sent a SEND DIAGNOSTIC command with the CTS Calibration page.
	85h	The CHM picked a cartridge that was not correctly seated. The CHM returned the cartridge to its original slot.

Unit Attention Sense Key (6h)

The EXB-10i returns a sense key of Unit Attention (6h) in the following situations:

- After a Bus Device Reset message, a SCSI bus reset, or a power-on reset.
- After the EXB-10i firmware is upgraded to a new revision.
- After the EXB-10i door is opened and then closed.
- When the EXB-10i is in Manual Motion Control or Diagnostics, or executing the Diagnostics program through the maintenance port.
- When the mode parameters are changed by another initiator through a MODE SELECT command.

  Note: If mode parameters have been changed, the initiator should issue a MODE SENSE (1Ah) command to determine what the new mode parameters are.

The EXB-10i does not stack Unit Attention conditions. Whenever there are two or more Unit Attention conditions, the EXB-10i reports only the last one encountered. A Unit Attention condition remains in effect for a particular initiator until that initiator clears it.

If the EXB-10i has not yet returned Check Condition status for the Unit Attention condition generated, the EXB-10i responds in the following manner:

- If a REQUEST SENSE command is received, the EXB-10i reports a sense key of Unit Attention (The ASC and ASCQ bytes provide additional information about the condition.) Then, the EXB-10i clears the Unit Attention condition.
- If an INQUIRY command is received, the EXB-10i performs the INQUIRY command but does not clear the Unit Attention condition.
- If any other command is received, the EXB-10i returns Check Condition status for the command. The command is not performed and the Unit Attention condition is not cleared.

If the EXB-10i has already returned Check Condition for the Unit Attention condition generated, the EXB-10i responds in the following manner:

- If a REQUEST SENSE command is received, the EXB-10i reports a sense key of Unit Attention. (The ASC and ASCQ bytes provide additional information about the condition.) Then, the EXB-10i clears the Unit Attention condition.
- If an INQUIRY command is received, the EXB-10i performs the INQUIRY command but does not clear the Unit Attention condition.
- If any other command is received, the EXB-10i clears the Unit Attention and associated sense data. Then, the EXB-10i performs the requested command.

Table 4-6 lists combinations of ASC and ASCQ values for the Unit Attention sense key (6h).

Table 4-6 ASC and ASCQ values for the Unit Attention Sense Key (6h)

ASC (byte 12)	ASCQ (byte 13)	LED Display	Description
3Fh	00h	—	New microcode was upgraded.
29h	00h	—	A power-on or SCSI bus reset occurred.
2Ah	01h	—	Mode parameters have been changed.
04h	89h	09h	The EXB-10i was in Manual Motion Control, Diagnostic Functions, or was executing Diagnostics through the maintenance port.
28h	00h	—	The EXB-10i door was opened, then closed.

Aborted Command Sense Key (Bh)

The EXB-10i returns a sense key of Aborted Command (Bh) in the following situations:

- The initiator sent an Abort message.
- An invalid message sequence occurred.
- A message error occurred after status was returned to the initiator (for example, when the status byte has already been sent for a command, but after that, an invalid message sequence occurred).
- The EXB-10i firmware detected an internal inconsistency.

The table below lists the combinations of ASC and ASCQ values for the Aborted Command sense key (Bh).

Table 4-7 ASC and ASCQ values for the Aborted Command Sense Key (Bh)

ASC (byte 12)	ASCQ (byte 13)	Description
43h	00h	The EXB-10i received a message at an invalid time.
44h	*nn*h*	The EXB-10i firmware encountered an internal inconsistency. Contact your vendor.
47h	00h	Either the message system was not enabled and the EXB-10i discovered a parity error on the SCSI bus, or the message system was enabled and the initiator rejected a Restore Data Pointers message that the EXB-10i sent in to recover from a parity error.
48h	00h	The EXB-10i received an Initiator Detected Error message at an inappropriate time or the initiator rejected a Restore Data Pointers message that the EXB-10i sent in response to the Initiator Detected Error message.
4Eh	—	The EXB-10i disconnected while executing a MOVE MEDIUM, SEND DIAGNOSTIC, or POSITION TO ELEMENT command. During this time, the same initiator that issued the motion command also selected the target and tried to issue another command. When this error occurs, the EXB-10i terminates the current connection with Check Condition status and aborts the motion command in progress for that initiator.

*The ASCQ for this ASC can be any one of about 20 values that indicate where in the firmware the inconsistency was discovered.

Notes:

5

Diagnostics: Basic Operations

This chapter provides basic instructions for running the Diagnostics firmware, which is contained in the CHS's flash EPROM. This firmware can be used to help determine operational problems with the CHS, to gather CHS system statistics, and to upgrade to new firmware.

This chapter contains the following information:

- Required hardware and software for running Diagnostics
- How to run Diagnostics
- Information about the Diagnostics Main Menu

5.1 Required Hardware and Software

To run Diagnostics, you must have the following:

- A VT100 compatible terminal with an RS-232 serial port.

  or

  An IBM AT®, XT™, or compatible system with a serial port and VT100 terminal-emulation software. EXABYTE's CHS Terminal program acts as terminal-emulation software.

- Line settings configured at 9600 baud, no parity, 8 data bits, 1 stop bit, full duplex.

- A telecommunications program that supports the XMODEM protocol (used for upgrading to new firmware) and supports ASCII transfers (used for performing diagnostic dumps). If you have an IBM PC or a compatible system, you can use EXABYTE's CHS Terminal program.

- A 4-pin to 25-pin RS-232 connector cable (EXABYTE part number 727005), and, if the terminal's serial port has 9 pins, a 9-pin to 25-pin adapter (available from most computer stores).

5.2 Starting Diagnostics

To start Diagnostics, follow these steps:

1. Using a T-15 TORX driver bit, loosen or remove the top screw that holds the metal plate over the maintenance port on the back of the CHS. Twist the metal plate to the side, as shown in Figure 5-1.

2. Connect the 4-pin connector of the RS-232 cable to the bottom port, labeled "MECH," on the back of the CHS. Do not connect the cable to the top port connector; this port is used for CTS diagnostics.

3. Connect the 25-pin connector of the RS-232 cable to the port on the VT100 compatible terminal or PC.

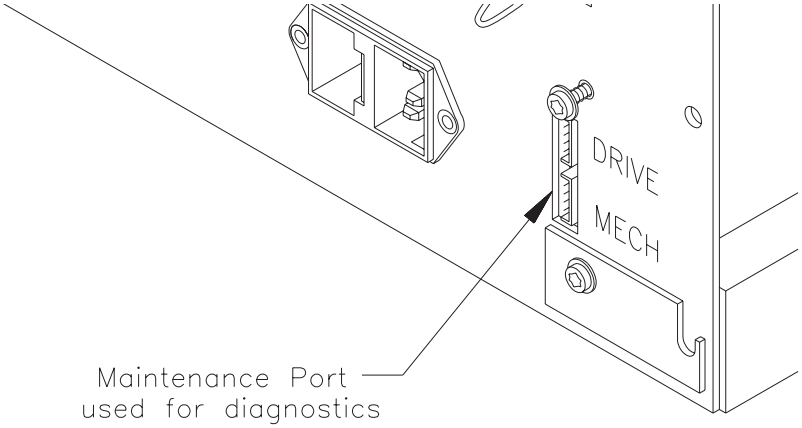

Figure 5-1 Maintenance port (rear view of the CHS)

4. Enter the terminal-emulation software. If you are using the CHS Terminal program, enter **chsterm** in the directory where you installed the program.

   After the terminal-emulation software executes, one of the Diagnostic menus appears.

5. Press **R** for REDRAW SCREEN to display the screen.

6. If a menu other than the Diagnostic Main Menu appears (shown in Figure 5-2), press **Q** to exit from the current menu and display the Diagnostic Main Menu.

5.3 Diagnostic Main Menu

This section describes the menus and windows on the Diagnostic Main Menu, shown in Figure 5-2 below.

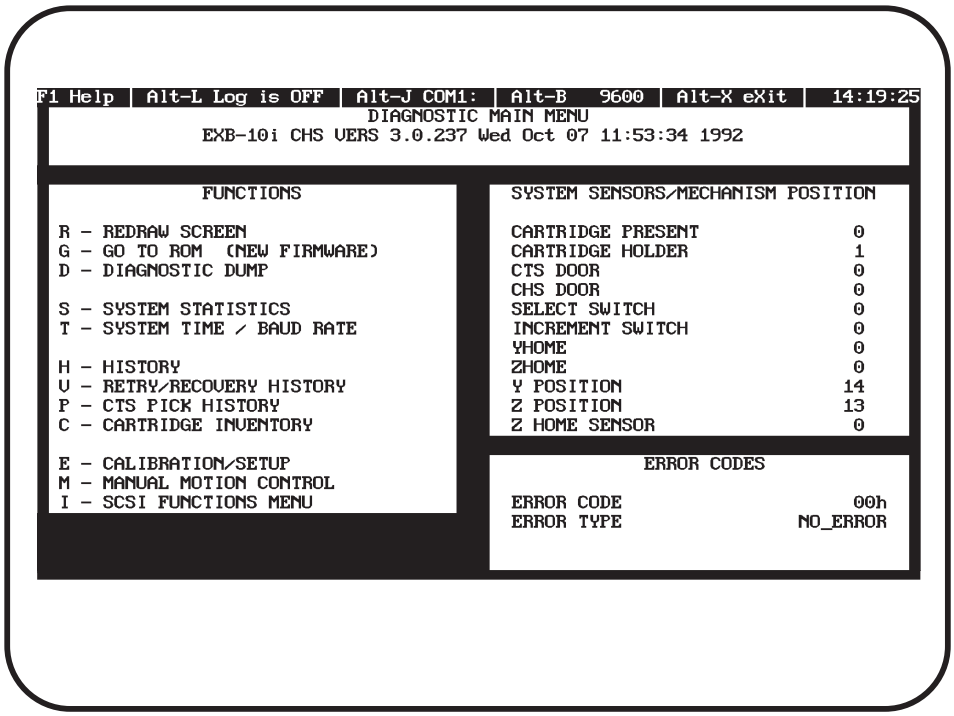

Figure 5-2 Diagnostic Main Menu (for the EXB-10i code level 3.0)

The Diagnostic Main Menu contains a title bar and three windows. The title bar of the Diagnostic Main Menu displays the software version number and the date this firmware version was generated. Each of the windows—FUNCTIONS, SYSTEM SENSORS / MECHANISM POSITION, and ERROR CODES—is described in the following sections.

Notes: Figure 5-2 shows an example of the EXB-10i's Diagnostic Main Menu, code level 3.0. For code level 3.1, the MANUAL MOTION CONTROL selection is replaced by the DIAGNOSTIC FUNCTIONS selection.

The EXB-10's Diagnostic Main Menu is similar, except that it does not contain the SCSI FUNCTIONS MENU selection under FUNCTIONS.

Functions

Table 5-1 describes the selections listed under FUNCTIONS on the Diagnostic Main Menu.

Table 5-1 Diagnostic Main Menu: FUNCTIONS

Menu Selection	Function
R - REDRAW SCREEN	Clears the screen of jumbled characters and redisplays the current menu.
G - GO TO ROM (NEW FIRMWARE)	Exits to ROM, so you can upgrade to new firmware. (See Section 6.1.)
D - DIAGNOSTIC DUMP	Allows you to perform a diagnostic dump. (See Section 6.2.)
S - SYSTEM STATISTICS	Shows operational information about the CHS. (See Section 6.3.)
T - SYSTEM TIME/ BAUD RATE	Allows you to view and set the real-time clock that is kept in the CHS and set the serial port baud rate. (See Section 6.4.)
H - HISTORY	Displays a list of recent events that occurred for the CHS. (See Section 6.5.)
V - RETRY/RECOVERY HISTORY	Displays messages when the CHS attempts to recover from a potential error and when the CTS position is automatically recalibrated. (See Section 6.6.)
P - CTS PICK HISTORY	Displays information about the CHM picking from the CTS, including calibration locations and the number of attempted picks. (See Section 6.7.)
C - CARTRIDGE INVENTORY	Displays the cartridge inventory and the information returned in a READ ELEMENT STATUS command. (See Section 6.8.)
E - CALIBRATION/ SETUP	Allows you to perform CHS calibration and place the CHS in certain test modes. (See Section 6.9.)
M - MANUAL MOTION CONTROL or DIAGNOSTIC FUNCTIONS	Displays another menu that allows you to manually perform the motions of the cartridge handling mechanism. (See Section 6.10.)
I - SCSI FUNCTIONS MENU	(EXB-10i only.) Allows you to view element reservation status, mode parameters, cartridge inventory, and sense data. (See Chapter 7.)

System Sensors/Mechanism Position

The SYSTEM SENSORS / MECHANISM POSITION lines displayed on the Diagnostic Main Menu indicate the status of the CHS's mechanical sensors or switches and show the CHM's current coordinates in counts. (A *count* is a unit of measurement the system uses.) The CHS firmware uses the system sensor information to determine the position of various components, as well as other information valuable to CHS operation. Table 5-2 describes the information under SYSTEM SENSORS / MECHANISM POSITION.

Table 5-2 Diagnostic Main Menu: SYSTEM SENSORS/MECHANISM POSITION

Line	Description
CARTRIDGE PRESENT	0 – No cartridge is in the grab base. 1 – A cartridge is in the grab base. **Note:** The cartridge sensor only works when the grab base is around the horizontal zero position (outermost position).
CARTRIDGE HOLDER	0 – A cartridge holder is not currently installed. 1 – A cartridge holder is currently installed.
CTS DOOR	0 – The CTS door is closed. 1 – The CTS door is open.
CHS DOOR	0 – The CHS door is closed (in contact with both the top and bottom door switches). 1 – The CHS door is open.
SELECT SWITCH	0 – The Select (SEL) button is off. This is the left button on the CHS front panel. 1 – The Select button is on (the user is pressing the button).
INCREMENT SWITCH	0 – The Increment (INCR) button is off. This is the right button on the CHS front panel. 1 – The Increment button is on (the user is pressing the button).
YHOME	0 – The grab base is not at the topmost vertical position. 1 – The grab base is at the topmost vertical position.

Line	Description
ZHOME	0 – The grab base is not at the outermost horizontal position (toward the CHS door). 1 – The grab base is at the outermost horizontal position.
Y POSITION	Indicates the number of counts the grab base is away from the topmost vertical position. Since the grab base is always down from the top position, this number is always negative.
Z POSITION	Indicates the number of counts the grab base is away from the outermost horizontal position, the position closest to the CHS door. This number is usually positive.
Z HOME SENSOR	Indicates the physical position of the Z Home sensor on the horizontal axis. The number can be used to determine whether the horizontal axis position information is valid. The number should be between –500 and –1,000.

Error Codes

If an error code appears on the LEDs, the lines under ERROR CODES on the Diagnostic Main Menu display information specific to that error. Table 5-3 describes these lines.

Table 5-3 Diagnostic Main Menu: ERROR CODES

Line	Description
ERROR CODE	Displays the hex number of the error code currently displayed on the LEDs. See Chapter 3 for a complete list of error codes.
ERROR TYPE	Displays the type of error and a brief explanation of the error code. See Chapter 3 for a complete list of error codes and corrective actions. The error types can be one of the following: – Soft error – Pick error – Place error – Home error – Close error – Move error on Y or Z axis – Misc. error – Test error – CTS calibration error – Sensor calibration error – Tape present error – Eject calibration error – Cartridge moving error – Possible user error

6

Diagnostics: Using the Functions Menu

This chapter describes how to use the Functions Menu, which is displayed on the Diagnostics Main Menu.

The Functions Menu contains selections that allow you to perform the following tasks:

- Upgrade to new firmware
- Perform a diagnostic dump
- Display system statistics
- Set the system time or baud rate for the diagnostic port
- Display a history of commands sent to the CHS
- Display a history of retry and recovery functions
- Display a history of the grab base's attempts to pick a cartridge
- Display the cartridge inventory
- Perform calibration and setup functions
- Use Manual Motion Control or Diagnostics to move the grab base
- Enter the SCSI Functions Menu (EXB-10i only)

The Functions Menu is shown in Figure 6-1.

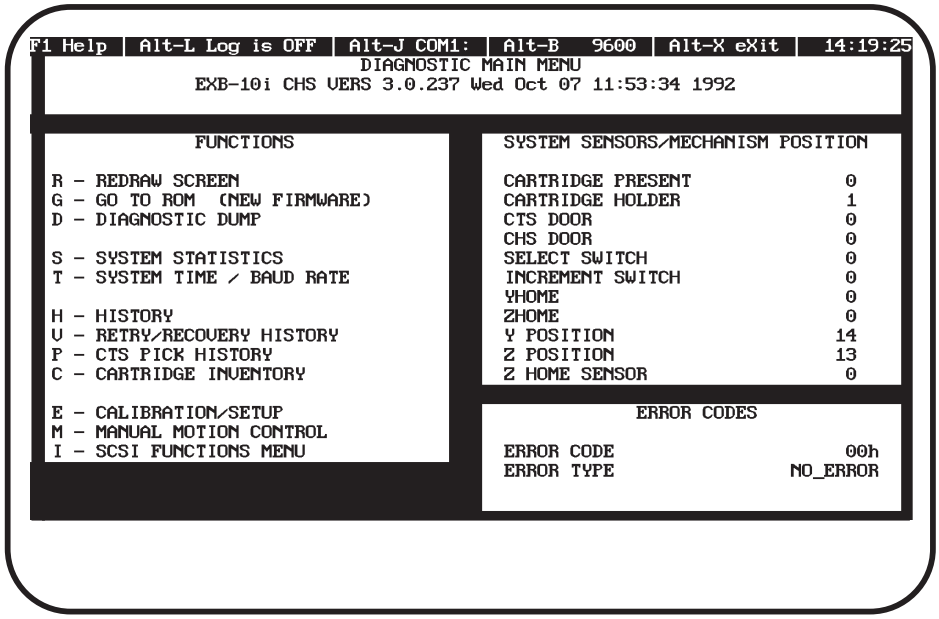

Figure 6-1 Functions Menu in the Diagnostics Main Menu (for the EXB-10i)

Note: Figure 6-1 shows an example of the EXB-10i's Diagnostic Main Menu, code level 3.0. For code level 3.1, the MANUAL MOTION CONTROL selection is replaced by the DIAGNOSTIC FUNCTIONS selection. The EXB-10's Diagnostic Main Menu is similar, except that it does not contain the SCSI FUNCTIONS MENU selection under

FUNCTIONS. The SCSI FUNCTIONS MENU selection is described in Chapter 7.

6.1 Upgrading to New Firmware

When you receive a new CHS firmware release, you can use the GO TO ROM (NEW FIRMWARE) selection on the Diagnostic Main Menu to transfer the new code to the CHS's flash EPROM. The new release file is contained on a 5¼-inch double-density floppy disk.

To upgrade the firmware, follow these steps:

1. Insert the floppy disk that contains the new firmware into the PC floppy drive.
2. Press **G** to select GO TO ROM (NEW FIRMWARE) from the Diagnostic Main Menu.

   The ROM Console Main Menu appears, as shown in Figure 6-2.

   Note: While you are in ROM, error code 0Fh displays on the LEDs.

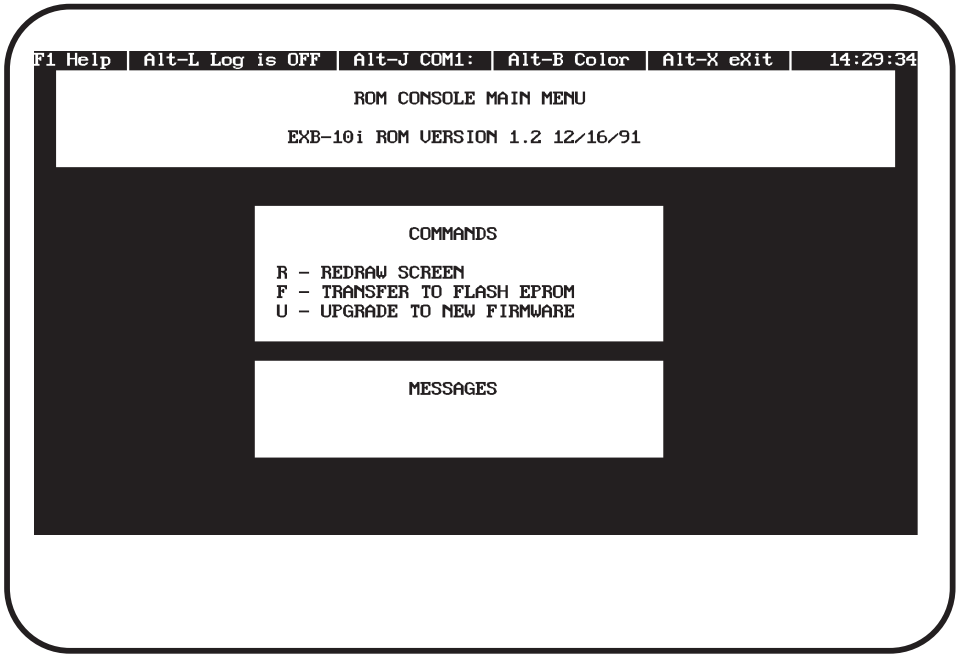

Figure 6-2 ROM Console Main Menu

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

   The program asks if you are sure you want to erase and program the flash EPROM.

4. Press **Y** to erase the old CHS firmware or **N** to cancel the upgrade function.

   If you press **Y**, the program proceeds to erase the old firmware and displays the following message: “Prepare Xmodem Transfer.”

5. Use your telecommunications program to prepare an XMODEM transfer of the firmware to the CHS.

   If you are using the CHS Terminal program, follow these steps:

   a. Press **Alt-S**.

   b. Enter the filename of the firmware file and press **Enter**. For example: **a:chs10.out**.

      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 redisplays.

6. Press **F** for TRANSFER TO FLASH EPROM. This action executes the new firmware.

   When the firmware has been successfully transferred, the message “Upload Successful,” displays under MESSAGES. If any error codes display, you need to perform the upgrade procedure again. If the procedure is still unsuccessful, contact your vendor.

6.2 Performing a Diagnostic Dump

The DIAGNOSTIC DUMP selection in the Functions Menu allows you to dump data over the serial port to a file on the hard disk of your computer. The diagnostic dump includes the following information:

- Mode parameters and sense data (EXB-10i only)
- 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 to a slower rate while you are performing a diagnostic dump. (See Section 6.4 for more information about setting baud rates.)

To perform a diagnostic dump, follow these steps:

1. If you are using the CHS Terminal program, turn on logging by pressing **Alt-L**.

2. Press **D** to select DIAGNOSTIC DUMP from the Functions Menu.

   You are prompted to prepare an ASCII transfer.

3. Using your telecommunications package, prepare an ASCII transfer from the CHS to your terminal.

   If you are using the CHS Terminal program, the default CHSTERM.LOG appears on the screen. The program prompts you to replace or append to the current .LOG file if it already exists.

4. After you are done preparing an ASCII transfer, send two <CR> (carriage return) characters to the CHS.

   The diagnostic data begins to scroll on the screen while it is being written to a file. If you are using the CHS Terminal program, the data is written to the default file, CHSTERM.LOG, or whatever name you specified in step 3.

Refer to Appendix C for more information about the diagnostic dump information.

6.3 Displaying System Statistics

The SYSTEM STATISTICS selection on the Diagnostic Main Menu provides useful information about the CHS. 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 subprocesses have been successfully executed since the CHS's first power up.
- Determining CHS retries.

To display system statistics, press **S** to select SYSTEM STATISTICS from the Diagnostic Main Menu. The screen shown in Figure 6-3 appears.

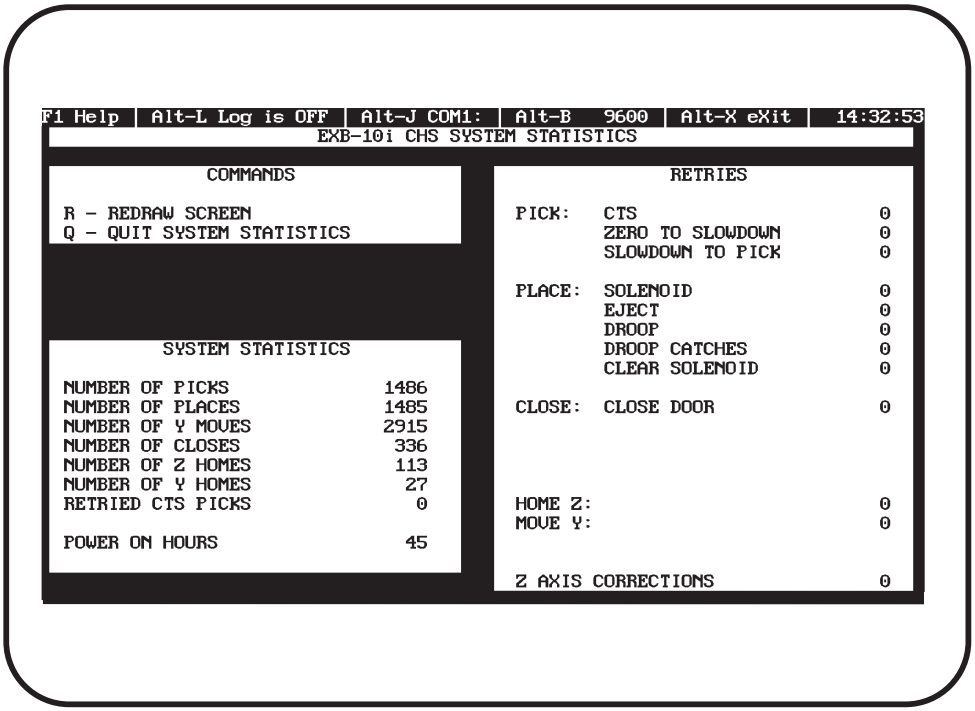

Figure 6-3 System Statistics Screen

Commands

Table 6-1 describes the COMMANDS shown on the System Statistics screen.

Table 6-1 System Statistics Screen: COMMANDS

Command	Function
R - REDRAW SCREEN	Clears jumbled characters and redisplays the screen.
Q - QUIT SYSTEM STATISTICS	Exits to the Diagnostic Main Menu.

CHS Retries

When the CHS 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 EXB-10 (or EXB-10i) Retries screen and are reset to zero every time the processor restarts. If the CHS fails during a motion command, you can view this screen to see if the CHS displays an attempted number of pick or place retries. This screen can help you isolate where the problem occurred.

Table 6-2 describes the CHS Retries information.

Table 6-2 System Statistics Screen: CHS RETRIES

Line	Description
PICK: CTS	Displays the number of times the CHM attempted to pick a cartridge from the CTS.
PICK: ZERO TO SLOWDOWN	Displays the number of times the CHM retried picking a cartridge from the CTS. A number here may indicate that one of the cartridges in the cartridge holder has a dust cover that catches on the CTS door bezel once in a while. To correct this problem, contact your vendor to receive a cartridge tape guide.

Line	Description
PICK: SLOWDOWN TO PICK	Displays the number of times the CHM retried picking a cartridge from the CTS. A number here may indicate that the cartridge's dust cover is caught inside the CTS. Contact your vendor to receive a cartridge tape guide.
PLACE: SOLENOID	Displays the number of times the CHS has retried the entire place procedure because of a weak solenoid. If the CHS has a weak solenoid, you should replace the CHM.
PLACE: EJECT	Displays the number of times the CHS has retried a move to the eject position during a place procedure.
PLACE: DROOP	Displays the number of times the CHM could not place a cartridge because it was not firmly seated in the grab base. A large number here may indicate that the CHM needs to be replaced.
PLACE: DROOP CATCHES	Displays the number of times the cartridge hit against the cartridge holder slot because the cartridge was not firmly 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 grab base retried to place a cartridge because of a slow or stuck solenoid. A number here may indicate that the CHM needs to be replaced.
CLOSE: CLOSE DOOR	Displays the number of times the CHM attempted to close the CTS door. A number here may indicate that the CTS door latch is broken or that there is a servo error in the CTS.
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 missing encoder counts or a loose horizontal belt.

System Statistics

The SYSTEM STATISTICS lines on the System Statistics screen show a running tally of grab base operations from the time the CHS was first powered up to the present. The values in this screen are retained even after the CHS is turned off and then on again, and after new firmware is loaded. Table 6-3 describes system statistics.

Table 6-3 System Statistics

Line	Description
NUMBER OF PICKS	The number of times the grab base has picked a cartridge from the cartridge holder or CTS. (This value resets to zero after it reaches 65,535 picks.)
NUMBER OF PLACES	The number of times the grab base has placed a cartridge in the cartridge holder or CTS. (This value resets to zero after 65,535 places.)
NUMBER OF Y MOVES	The number of vertical moves the grab base has performed. A *vertical move* is either an upward or downward movement along the vertical axis.
NUMBER OF CLOSES	The number of times the grab base has closed the CTS door. (This value resets to zero after it reaches 65,535 closes.)
NUMBER OF Z HOMES	The number of times the grab base has returned to the home position on the horizontal axis. (This value resets to zero after it reaches 65,535 homes.)
NUMBER OF Y HOMES	The number of times the grab base has returned to the home position on the vertical axis. (This value resets to zero after it reaches 65,535 homes.)
RETRIED CTS PICKS	The number of times the grab base retried more than once to pick a cartridge from the CTS.
POWER ON HOURS	The number of hours the CHS has been in operation since the first power up.

6.4 Setting the System Time and Baud Rates

The CHS contains a real-time clock that keeps the correct time even during power-off periods. You can view or set the current date and time by selecting SYSTEM TIME/BAUD RATE from the Diagnostic Main Menu. This displays the CHS Time/Baud Rate Menu, which is shown in Figure 6-4. From this menu, you can also change the baud rate setting of the CHS's maintenance port.

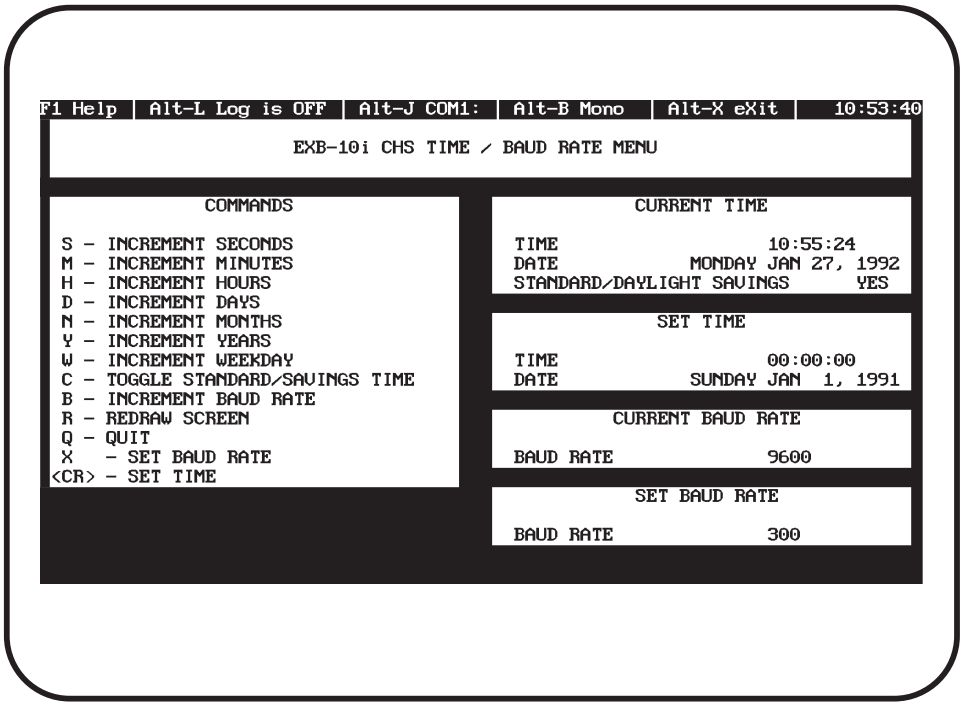

Figure 6-4 CHS Time Menu

This menu contains five windows: COMMANDS, CURRENT TIME, SET TIME, CURRENT BAUD RATE, and SET BAUD RATE. The Commands window, described on the next page, allows you to set the time in the Set Time window. The Current Time window displays the current time, date, and whether the standard/daylight savings option is on.

The Current Baud Rate window displays the baud rate that the CHS's maintenance port is currently using; the Set Baud Rate window allows you to change that setting.

Commands

Table 6-4 describes the commands shown on the CHS Time/Baud Rate Menu.

Table 6-4 CHS Time/Baud Rate Menu: COMMANDS

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 CHS 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 - INCREMENTS 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.
C - TOGGLE STANDARD/SAVINGS TIME	Toggles the Standard/Daylight Savings setting in the Current Time window. If set to Yes, the CHS internal clock automatically adjusts the time for standard and daylight savings.
B - INCREMENT BAUD RATE	Increments the baud rate to the next available baud rate that the CHS’s maintenance port can use.
R - REDRAW SCREEN	Redraws the screen.
Q - QUIT	Exits from this menu and returns to the Main Menu. (Issuing Quit does not save the new date and time.)
x - SET BAUD RATE	Sets the baud rate to the value shown in the Set Baud Rate window.
<CR> SET TIME	Pressing **Enter** saves the time and date currently displayed in the Set Time window.

Setting the CHS Date and Time

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

1. Use the commands described in Table 6-4 to set the current seconds, minutes, hours, days, and so on.

   Note: If you change the time, you must also change the date. If you do not, the date will change back to the default (Jan. 1, 1991).

   If you want the CHS to automatically switch between standard and daylight savings time, use **C** to set the Standard / Daylight Savings option to YES. Be sure to set the weekday correctly to ensure that the switch between standard and daylight savings time occurs at the proper hour.

   Note: Although the CHS makes certain that only valid numbers are set for seconds, minutes, hours, days of month, days of week, months, and years, it will not make certain that the date you set corresponds correctly to the specified weekday. For example, it will not check to see if January 1, 1992, is a Wednesday.

2. When finished, press **Enter**.

   This saves the settings.

3. To exit the CHS Time Menu, press **Q**.

Setting the CHS Baud Rate

The default baud rate for the CHS's maintenance 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, and 19200.

> **Important**
>
> Once you change the baud rate for the CHS's maintenance port, the CHS will remember this rate over power cycles. If you need to change the CHS's baud rate back to the default, use the 9600 baud option, described in the *EXB-10i Cartridge Handling Subsystem User's Manual* and *EXB-10 Cartridge Handling Subsystem Installation and Operation*.

To change the baud rate of the maintenance port, follow these steps:

1. At the CHS Time/Baud Rate Menu, press **B** to cycle through the available baud rates.

2. When the desired rate appears in the Set Baud Rate window, press **X** to set the CHS baud rate.

   When you set the new value in this window, the CHS 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 of your communications program to operate at the same baud rate that you specified for the maintenance port. If you are using the CHS Terminal program, you toggle the baud rate by using **Alt-B**. Then refresh the screen by typing **R**.

6.5 Displaying the Command History

You can use the History selection from the Diagnostic Main Menu to view the most recent 100 events of the CHS history. The most recent event is displayed first.

To view history records, follow these steps:

1. Press **H** to select HISTORY from the Functions Menu.

   The History of Events screen appears, similar to the screen shown in Figure 6-5.

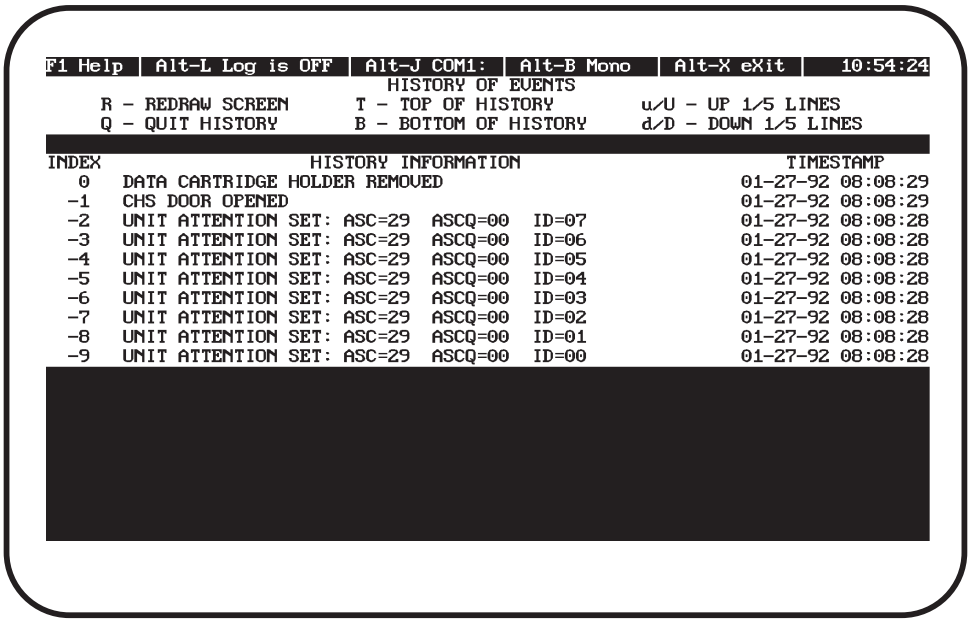

Figure 6-5 History of Events Screen

For more information about this screen and for help determining potential problems with the CHS, contact your vendor.

2. To scroll through this screen, use the commands that are described under “History of Events.”

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

6.6 Displaying the Retry/Recovery History

The RETRY / RECOVERY HISTORY selection on the Functions Menu leads to a screen that displays messages when the CHS attempts to recover from a potential error and when it recalibrates the CTS position automatically.

To display the retry / recover history, follow these steps:

1. Press **V** to select RETRY / RECOVERY HISTORY from the Functions Menu.

   A screen similar to the one shown in Figure 6-6 appears.

   Note: If the CHS has made no recovery attempts, the screen area below the column heads will be blank.

```
F1 Help | Alt-L Log is OFF | Alt-J COM1: | Alt-B  9600 | Alt-X eXit | 10:12:40
                    EXB-10i RETRY HISTORY OF EVENTS
                R - REDRAW SCREEN      Q - QUIT HISTORY

INDEX  TYPE        HISTORY INFORMATION                          TIMESTAMP
  0    ACTION      C:HOME ON Y     P1: 0  P2: 0  P3: 0          10-26-92 10:14:10
 -1    CALIBRATE   OLD_POS:  4  NEW_POS:  5  RETRY_RATE 144%    10-26-92 10:14:10
 -2    CAL BEGIN   P: 1  R1: 0  R2: 0  Q1: 0  Q2: 0            10-26-92 10:14:10
 -3    ERROR,1Ah   C:MOVE CART     P1: 0  P2:10  P3: 1         10-26-92 10:14:10
 -4    ACTION      C:HOME ON Z     P1: 0  P2: 0  P3: 0          10-26-92 10:13:49
 -5    ACTION      C:HOME ON Y     P1: 0  P2: 0  P3: 0          10-26-92 10:13:30
 -6    CALIBRATE   OLD_POS:  3  NEW_POS:  4  RETRY_RATE 144%    10-26-92 10:13:30
 -7    CAL BEGIN   P: 1  R1: 0  R2: 0  Q1: 0  Q2: 0            10-26-92 10:13:30
 -8    ERROR,1Ah   C:MOVE CART     P1: 0  P2:10  P3: 1         10-26-92 10:13:30
 -9    ACTION      C:HOME ON Z     P1: 0  P2: 0  P3: 0          10-26-92 10:13:09
-10    ACTION      C:HOME ON Y     P1: 0  P2: 0  P3: 0          10-26-92 10:12:51
-11    CALIBRATE   OLD_POS:  2  NEW_POS:  3  RETRY_RATE 144%    10-26-92 10:12:51
-12    CAL BEGIN   P: 1  R1: 0  R2: 0  Q1: 0  Q2: 0            10-26-92 10:12:51
-13    ERROR,1Ah   C:MOVE CART     P1: 0  P2:10  P3: 1         10-26-92 10:12:51
-14    ACTION      C:HOME ON Z     P1: 0  P2: 0  P3: 0          10-26-92 10:12:29
-15    ACTION      C:HOME ON Y     P1: 0  P2: 0  P3: 0          10-26-92 10:12:11
-16    CALIBRATE   OLD_POS:  1  NEW_POS:  2  RETRY_RATE 144%    10-26-92 10:12:11
-17    CAL BEGIN   P: 1  R1: 0  R2: 0  Q1: 0  Q2: 0            10-26-92 10:12:11
-18    ERROR,1Ah   C:MOVE CART     P1: 0  P2:10  P3: 1         10-26-92 10:12:11
-19    ACTION      C:HOME ON Z     P1: 0  P2: 0  P3: 0          10-26-92 10:11:49
```

Figure 6-6 Retry/Recovery History Screen

For more information about this screen and for help determining potential problems with the CHS, contact your vendor.

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

6.7 Displaying the CTS Pick History

The CTS PICK HISTORY selection on the Functions Menu leads to a screen that displays a table of information about how well the CHM has been picking cartridges from the CTS since it was last reset.

To display the CTS pick history, follow these steps:

1. Press **P** to select CTS PICK HISTORY from the Functions Menu.

   The screen shown in Figure 6-7 appears.

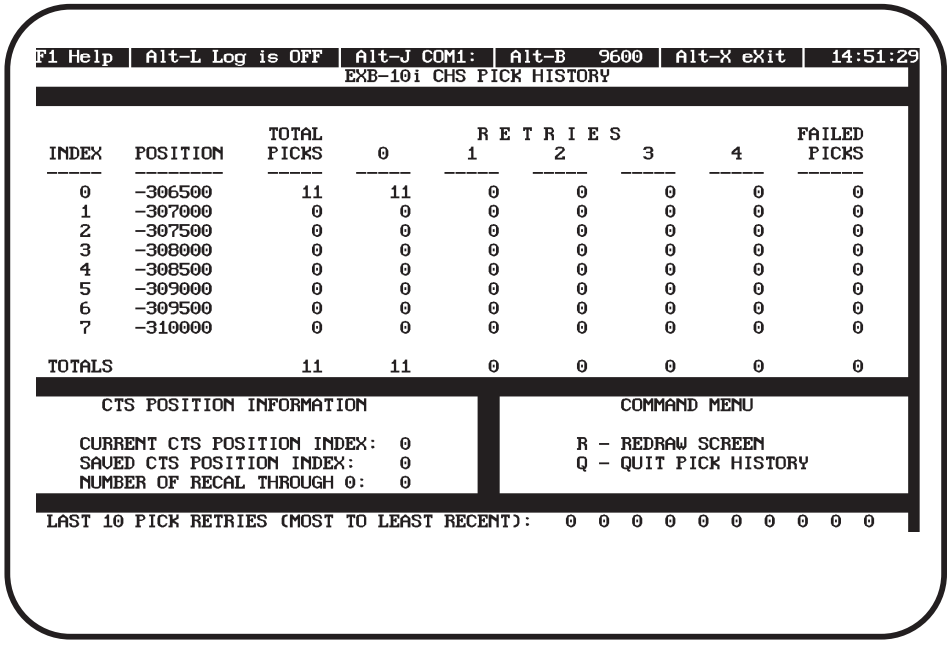

Figure 6-7 CTS Pick History Screen

Table 6-5 describes the information on the CTS Pick History screen.

Table 6-5 Diagnostic Functions Menu: CTS PICK HISTORY

Column/Line	Description
INDEX	Displays an index number that identifies the CHM's vertical position.
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 4)	Displays the number of pick retries (either 0, 1, 2, 3, or 4) at each vertical position.
FAILED PICKS	Displays the number of times the CHM could not pick a cartridge after four retries.
CURRENT CTS POSITION INDEX	Displays the CTS position from which the CHM is currently picking.
SAVED CTS POSITION INDEX	Displays the saved CTS position (in memory). This is the last index at which the CHM successfully picked a cartridge from the CTS.
NUMBER OF RECAL THROUGH 0	Displays the number of times the CHM looped back to Index 0 from Index 7 in the process of automatically recalibrating.

6.8 Displaying the Cartridge Inventory (EXB-10i only)

The CARTRIDGE INVENTORY selection on the Functions Menu leads to the Cartridge Inventory screen that displays the cartridge inventory and other information about EXB-10i elements available from the READ ELEMENT STATUS command. (An *element* is either a cartridge holder slot, the CHM, or the CTS.) This screen is a dynamic display. If any parameter changes, the screen immediately updates to reflect that change.

Note: The information in this screen does not apply to the EXB-10.

To display the cartridge inventory status, follow these steps:

1. Press **C** to select CARTRIDGE INVENTORY from the Functions Menu.

   The screen shown in Figure 6-8 appears.

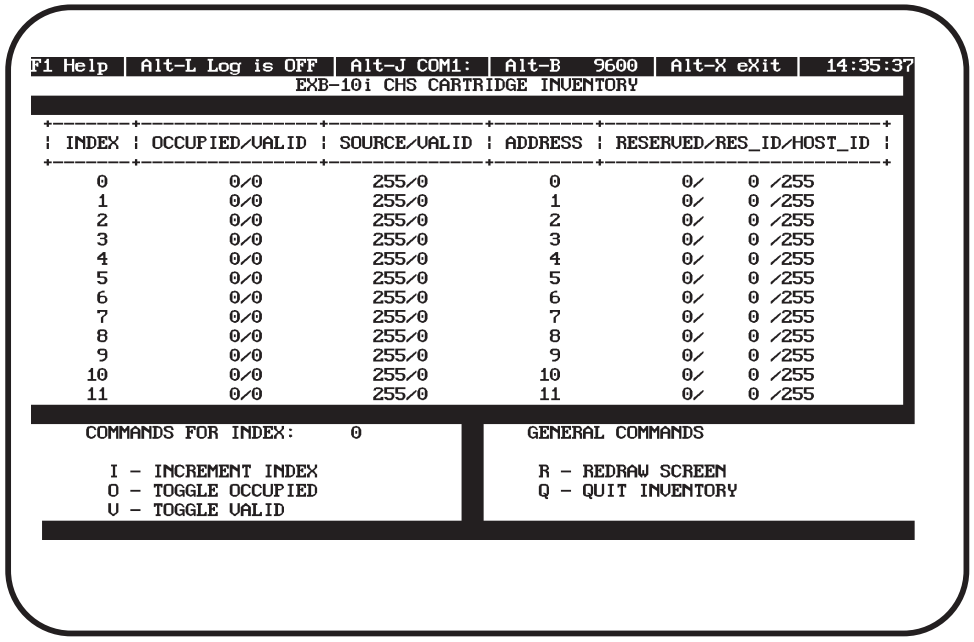

Figure 6-8 Cartridge Inventory Screen (EXB-10i only)

Table 6-6 describes the information in the Cartridge Inventory screen.

Table 6-6 Diagnostic Functions Menu: CARTRIDGE INVENTORY

Column	Description
INDEX	Displays the element index (for example; 0=CTS, 1–10=cartridge holder slots, 11=CHM).
OCCUPIED/VALID	Under OCCUPIED, displays 1 if there is a cartridge located in that address or 0 if there is not a cartridge in that address. Under VALID, displays 1 if the Occupied flag is accurate or 0 if it is questionable.
SOURCE/VALID	Under SOURCE, shows the address of the last storage element from which the cartridge was moved. Under VALID, displays 1 if the Source Element Address field is accurate or 0 if it is questionable.
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. Under RES_ID, displays the SCSI ID of the initiator that reserved the element. Under HOST_ID, displays the reservation ID as set in the RESERVE command.

2. If desired, use the index commands to manually change the status of the index.

   Table 6-7 describes each of the index commands.

Table 6-7 Cartridge Inventory screen: index commands

Command	Description
I - INCREMENT INDEX	Increments to the next element index.
0 - TOGGLE OCCUPIED	Toggles between 1 (occupied) and 0 (not occupied).
V - TOGGLE VALID	Toggles between 1 (valid) or 0 (not valid).

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

6.9 Performing Calibration and Setup Functions

The CALIBRATION / SETUP selection in the Functions Menu allows you to do the following:

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

Note: The CHS only enters this screen when there is no error code flashing or if it has already received a motion command. If you press **E** at any other time, the following message appears at the bottom of the screen: “Please wait . . . (Esc to Cancel).”

To perform calibration / setup functions, follow these steps:

1. Press **E** to select CALIBRATION / SETUP from the Functions Menu.

   The CALIBRATION / SETUP screen appears, as shown in Figure 6-9.

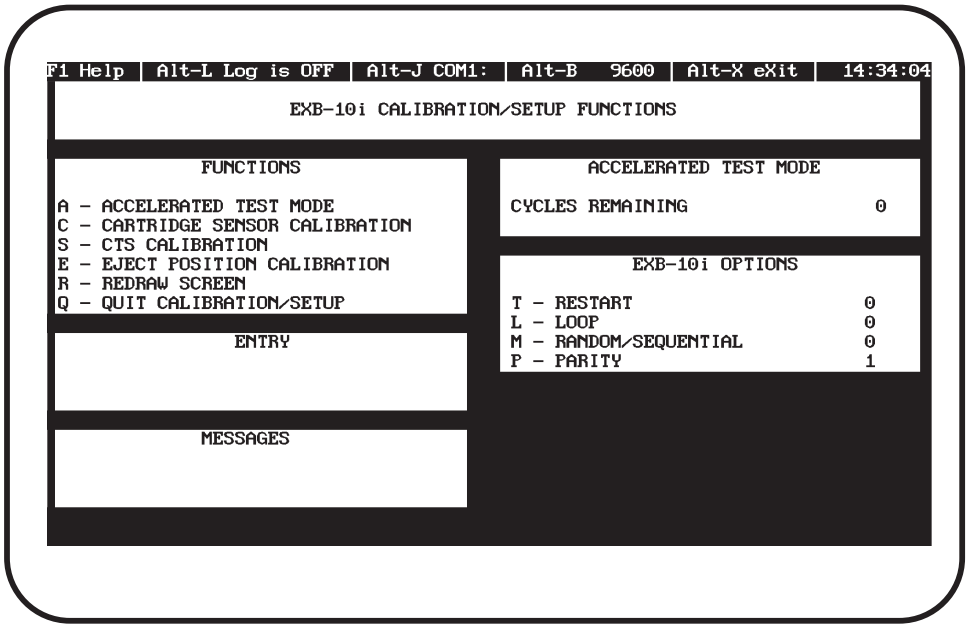

Figure 6-9 Calibration/Setup Screen

2. Use any of the functions or options in this screen.

Table 6-8 describes the selections in the Functions window.

Table 6-8 Calibration/Setup Functions Menu: FUNCTIONS

Menu Selection	Description
A - ACCELERATED TEST MODE	Allows you to place the CHS into a mode in which the grab base will not close the CTS door completely during the pick-and-place cycle. This function allows you to quickly accumulate cycles in the CHS for testing purposes. When you press **A**, the Entry window prompts you to enter the number of cycles the CHS will complete in the accelerated test mode. To stop accelerated test mode, power cycle the CHS or set the number to zero. (You cannot stop accelerated test mode by resetting the SCSI bus or by pressing the SEL and INCR buttons.)
C - CARTRIDGE SENSOR CALIBRATION	Allows you to perform a cartridge sensor calibration. See Appendix A for detailed instructions; you will need a calibration block for this procedure.
S - CTS CALIBRATION	Allows you to perform a CTS calibration. See Appendix B for detailed instructions.
E - EJECT POSITION CALIBRATION	Allows you to perform an eject position calibration. See Appendix A for detailed instructions.
R - REDRAW SCREEN	Allows you to redraw the screen.
Q - QUIT CALIBRATION/ SETUP	Allows you to exit back to the main menu.

Table 6-9 describes the selections in the EXB-10i Options window. For more information about these options, refer to the *EXB-10i 8mm Cartridge Tape Subsystem User's Manual*.

Table 6-9 Calibration/Setup Functions Menu: EXB-10i Options

Menu Selection	Description
T - RESTART	Turns the Restart option on (1) or off (0).
L - LOOP	Turns the Loop option on (1) or off (0).
M - RANDOM/ SEQUENTIAL	Turns the Random/Sequential option on (1) or off (0).
P - PARITY	Turns the Parity option on (1) or off (0).

6.10 Using Manual Motion Control (3.0 code) or Diagnostic Functions (3.1 code)

For 3.0 firmware levels and below, you can use the MANUAL MOTION CONTROL selection from the Diagnostic Main Menu to determine and isolate possible problems with the CHS. For 3.1 firmware levels and above, you can use the DIAGNOSTIC FUNCTIONS selection. These selections display a menu from which you can manually perform various grab base motions and see whether an on-screen error code appears.

To use Manual Motion Control or Diagnostic Functions, press **M** from the Diagnostic Main Menu.

Note: The CHS only enters Manual Motion Control or Diagnostic Functions when there is no error code flashing or if the CHS has already received a motion command. If you press **M** at any other time, the following message appears at the bottom of the screen: “Please wait . . (Esc to Cancel).”

Manual Motion Control and Diagnostic Functions are discussed separately on the following pages.

Manual Motion Control

The Manual Motion Control Menu is shown in Figure 6-10.

Note: Do not open the CHS door while performing motion commands. If you do, the CHS suspends operations and does not respond to any keystrokes until the door is closed again.

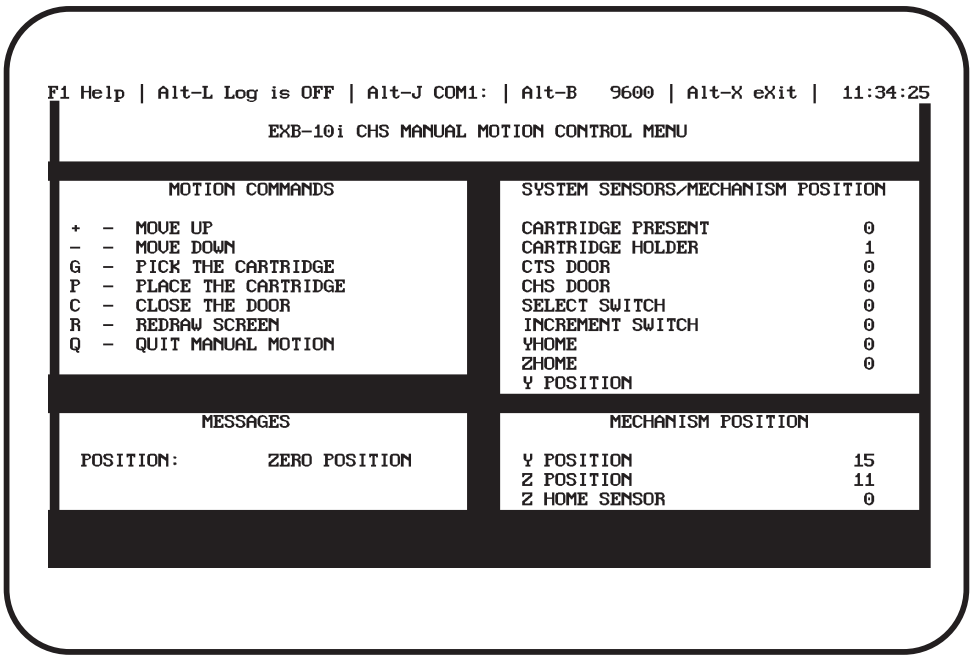

Figure 6-10 Manual Motion Control Menu

Table 6-10 on the next page describes the motion commands in the Manual Motion Control Menu.

Table 6-10 Manual Motion Control Menu: MOTION COMMANDS

Command	Function
+ - MOVE UP	Moves the CHM up to the next legal position.
— - MOVE DOWN	Moves the CHM down to the next legal position.
G - PICK THE CARTRIDGE	Causes the CHM to take a cartridge from the slot where it is currently positioned.
P - PLACE THE CARTRIDGE	Causes the CHM to place the cartridge into the slot where it is currently positioned.
C - CLOSE THE DOOR	Causes the CHM to close the CTS door.
R - REDRAW SCREEN	Clears the screen and redisplays the menu.
Q - QUIT MANUAL MOTION	Exits back to the Diagnostic Main Menu.

As you perform a function with a motion command, the POSITION line under MESSAGES displays the current grab base position. In addition, the RETURN STATUS line appears.

All logical position that can appear next to the POSITION line are described in Table 6-11.

Table 6-11 Logical Y Positions

Position	Description
PARK	At the bottom of the CHS.
CTS DOOR	In front of the CTS.
SLOT 1	In front of slot 1 (bottommost slot) on the cartridge holder.
SLOT 2	In front of slot 2 on the cartridge holder.
SLOT 3	In front of slot 3 on the cartridge holder.
SLOT 4	In front of slot 4 on the cartridge holder.
SLOT 5	In front of slot 5 on the cartridge holder.
SLOT 6	In front of slot 6 on the cartridge holder.
SLOT 7	In front of slot 7 on the cartridge holder.
SLOT 8	In front of slot 8 on the cartridge holder.
SLOT 9	In front of slot 9 on the cartridge holder.
SLOT 10	In front of slot 10 (topmost slot) on the cartridge holder.
ZERO	The topmost position on the vertical axis.

As the grab base performs an action, look at the information displayed for the RETURN STATUS line. If the requested grab base function was executed properly, RETURN STATUS displays 0h. If the requested grab base function did not complete successfully, an error code appears.

The error codes that can appear next to the RETURN STATUS line are listed in Section 3.3. When a hardware error displays, the CHS will not respond to any more keystrokes from the keyboard.

Diagnostic Functions

Table 6-12 describes the motion commands in the Diagnostic Functions Menu. (The Diagnostic Functions Menu is not shown.)

Note: The Diagnostic Functions Menu also contains a *location map,* the numbers 10 through 0 in the middle of the screen. Each number corresponds to an element address. To cycle through the addresses, press **j** to go up or **k** to go down.

Table 6-12 Diagnostic Functions Menu: DIAGNOSTIC FUNCTIONS COMMANDS

Command	Function
E - POSITION TO ELEMENT	Moves the grab base to the location specified in the location map (see note above).
G - PICK CARTRIDGE	Moves the grab base to the location specified in the location map (see note above) and picks the cartridge.
P - PLACE CARTRIDGE	Moves the grab base to the location specified in the location map (see note above) and places the cartridge.
M - MOVE CARTRIDGE	Causes the grab base to move a cartridge from one location to another. (Another window appears that allows you to enter a source and destination address.)
C - CLOSE CTS DOOR	Causes the grab base to close the CTS door.
T - CYCLE PICK/PLACE	Causes the grab base to pick and place a cartridge for the specified number of cycles. (Another window appears that allows you to enter the number of cycles.)
O - POST	Causes the CHM to perform a power-on self-test.
L - CYCLE SOLENOID	Causes the grab base to move to slot 1, and turn the solenoid on and off a specified number of times. To determine whether the solenoid is turning on and off, listen for a clicking noise.
Y - CYCLE Y AXIS	Cycles the grab base up and down on the vertical axis a specified number of cycles. (Another window appears that allows you to enter the number of cycles.)

Command	Function
Z - CYCLE Z AXIS	Moves to slot 1, then cycles the grab base in and out on the horizontal axis a specified number of cycles. (Another window appears that allows you to enter the number of cycles.)
A - PARK	Causes the grab base to move to the park position.
H - HOME Y	Causes the CHM to recalculate the vertical home position.
B - HOME Z	Causes the CHM to recalculate the horizontal home position.
R - REDRAW SCREEN	Clears the screen and redisplays the menu.
Q - QUIT DIAG. FUNCTIONS	Exits back to the Diagnostics Main Menu.

As the grab base performs an action, look at the information displayed for the RETURN STATUS line. If the requested grab base function was executed properly, RETURN STATUS displays 0h. If the requested grab base function did not complete successfully, an error code appears.

The error codes that can appear next to the RETURN STATUS line are listed in Section 3.3. When a hardware error displays, the CHS will not respond to any more keystrokes from the keyboard.

7

Diagnostics: Using the SCSI Functions Menu

This chapter describes how to use the SCSI Functions Menu with the EXB-10i. If you have an EXB-10i, the SCSI Functions selection appears on the Diagnostic Main Menu, as shown in Figure 5-2. This menu allows you to view element reservation status, mode parameters, and sense data. If you are developing SCSI drivers, these diagnostic screens can be extremely helpful in verifying that your commands worked.

To display the SCSI Functions Menu, press **I** to select SCSI FUNCTIONS from the Diagnostics Main Menu.

The screen shown in Figure 7-1 appears.

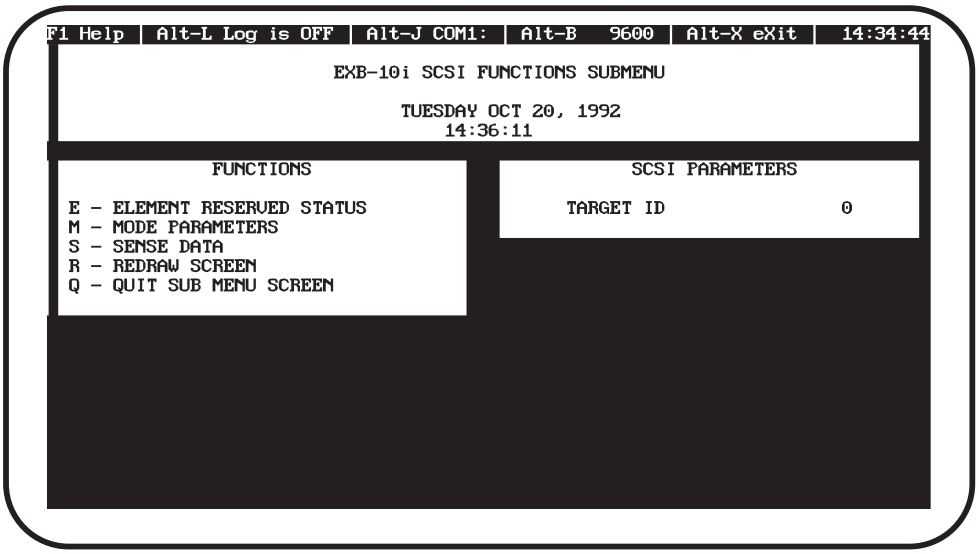

Figure 7-1 SCSI Functions Menu

The selections in the FUNCTIONS Menu are described in Table 7-1.

Table 7-1 SCSI Functions Menu: FUNCTIONS

Menu Selection	Function
E - ELEMENT RESERVED STATUS	Displays the elements that are presently reserved, the reserving host, and the reservation ID. (See Section 7.1.)
M - MODE PARAMETERS	Displays the three types of mode parameters: default, current, and saved. (See Section 7.2.)
S - SENSE DATA	Displays the sense bytes for initiators. (See Section 7.3.)
R - REDRAW SCREEN	Clears the screen of jumbled characters and redisplays the current menu.
Q - QUIT SUBMENU SCREEN	Returns to the previous menu.

The SCSI PARAMETERS window allows you to view the EXB-10i's SCSI address (target ID), as shown on the SCSI ID switch (Mech) on the back of the EXB-10i. You cannot change the address from this screen.

7.1 Displaying the Element Reservation Status

The ELEMENT RESERVED STATUS selection on the SCSI Functions Menu leads to the Element Reserved Status screen that shows which elements the initiator has reserved, the address of each element, the reserving host, and the reservation ID. 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 **E** to select ELEMENT RESERVED STATUS from the SCSI Functions Menu.

   The screen shown in Figure 7-2 appears.

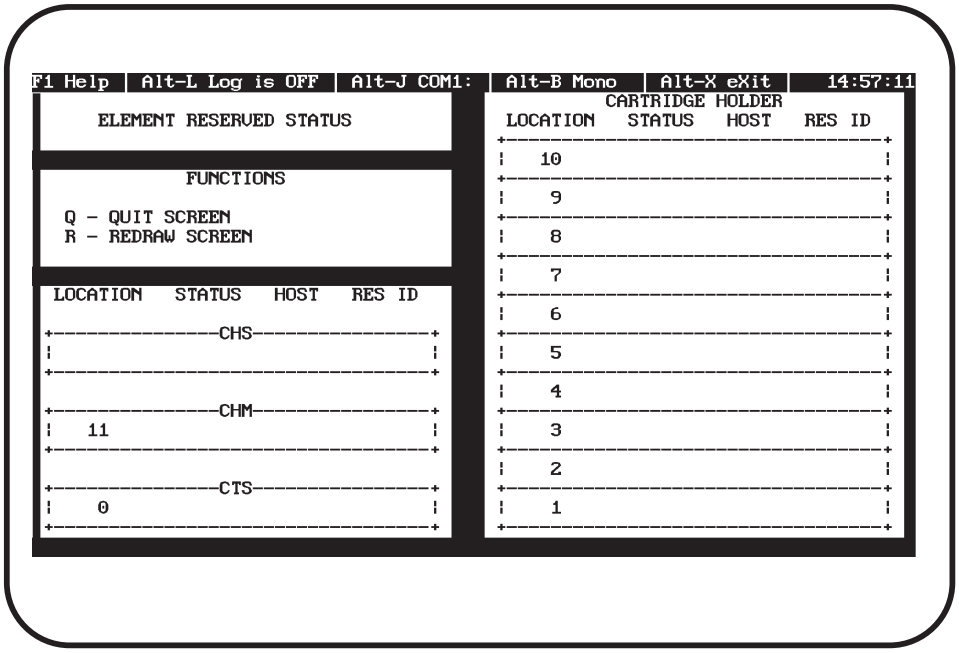

Figure 7-2 Element Reserved Status Screen

The Element Reserved Status screen contains the information described in Table 7-2.

Table 7-2 Element Reserved Status Screen

Line	Description
FUNCTIONS	Allows you to press **Q** to exit back to the SCSI Functions Menu or press **R** to clear the screen of jumbled characters.
LOCATION/STATUS /HOST/RES ID	Shows element reservation information about the EXB-10i, the cartridge handling mechanism (CHM), and the Cartridge Tape Subsystem (CTS). The Location column shows the SCSI address of the EXB-10i, the CHM, and the CTS. The Status column displays RESERVED if the EXB-10i, CHM, or CTS is reserved. The Host column displays the reserving host address. The Res ID column displays the reservation ID.
CARTRIDGE HOLDER LOCATION/ STATUS/HOST /RES ID	Shows element reservation information about the data cartridge holder slots. The Location column displays the address of the cartridge holder slot. The Status column displays RESERVED if the slot is reserved. The host column displays the reserving host address. The Res ID column displays the reservation ID.

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

7.2 Displaying Mode Parameters

The MODE PARAMETERS selection on the SCSI Functions Menu leads to the SCSI Mode Parameters screen that displays three types of mode parameters: default parameters, current parameters, and saved parameters. This screen is a dynamic display. If any parameter changes, the screen immediately updates to reflect that change.

To display mode parameters, follow these steps:

1. Press **M** to select MODE PARAMETERS from the SCSI Functions Menu.

   The screen shown in Figure 7-3 appears.

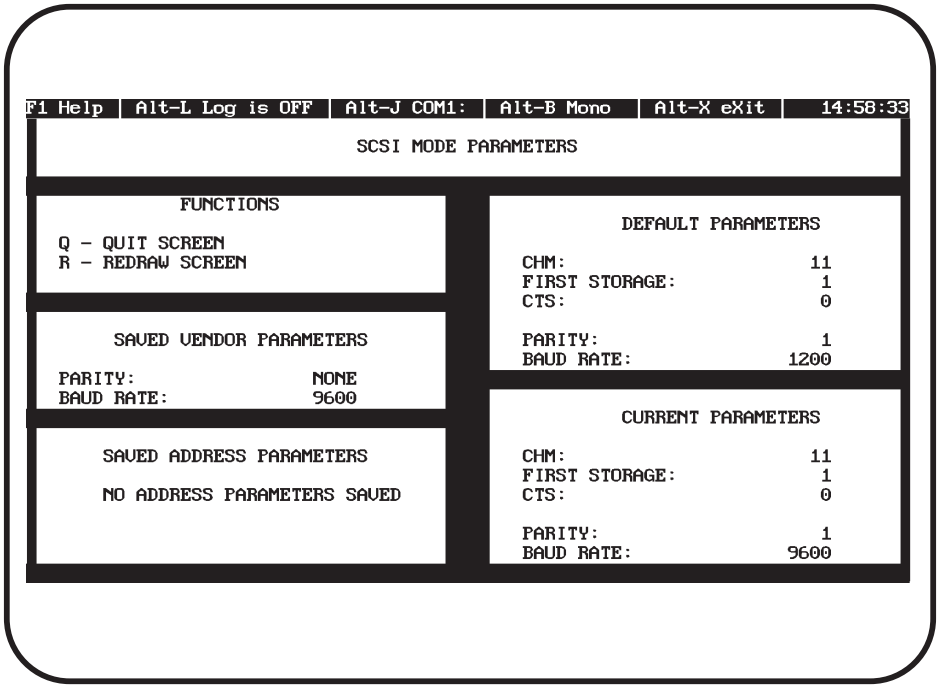

Figure 7-3 SCSI Mode Parameters Screen

The SCSI Mode Parameters screen contains the information described in Table 7-3.

Table 7-3 SCSI Mode Parameters Screen

Line	Description
FUNCTIONS	Allows you to press **Q** to exit back to the SCSI Functions Menu or press **R** to clear the screen of jumbled characters.
SAVED VENDOR PARAMETERS	Displays the saved vendor parameters, which include the parity setting and the baud rate from the MODE SELECT command.
SAVED ADDRESS PARAMETERS	Displays the saved address parameters, which includes the CTS address, the CHM address, and the bottommost slot address from the MODE SELECT command.
DEFAULT PARAMETERS	Displays the factory-set values of the element addresses, the parity setting, and the baud rate from the MODE SELECT command.
CURRENT PARAMETERS	Displays the values of the element addresses, the parity setting, and the baud rate from the MODE SELECT command.

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

7.3 Displaying Sense Data

The SENSE DATA selection on the SCSI Functions Menu leads to the SCSI Sense Data screen that displays the current sense bytes for each initiator. This screen is a dynamic display. If any parameter changes, the screen immediately updates to reflect that change.

To display sense data, follow these steps:

1. Press **S** to select SENSE DATA from the SCSI Functions Menu.

   The screen shown in Figure 7-4 appears.

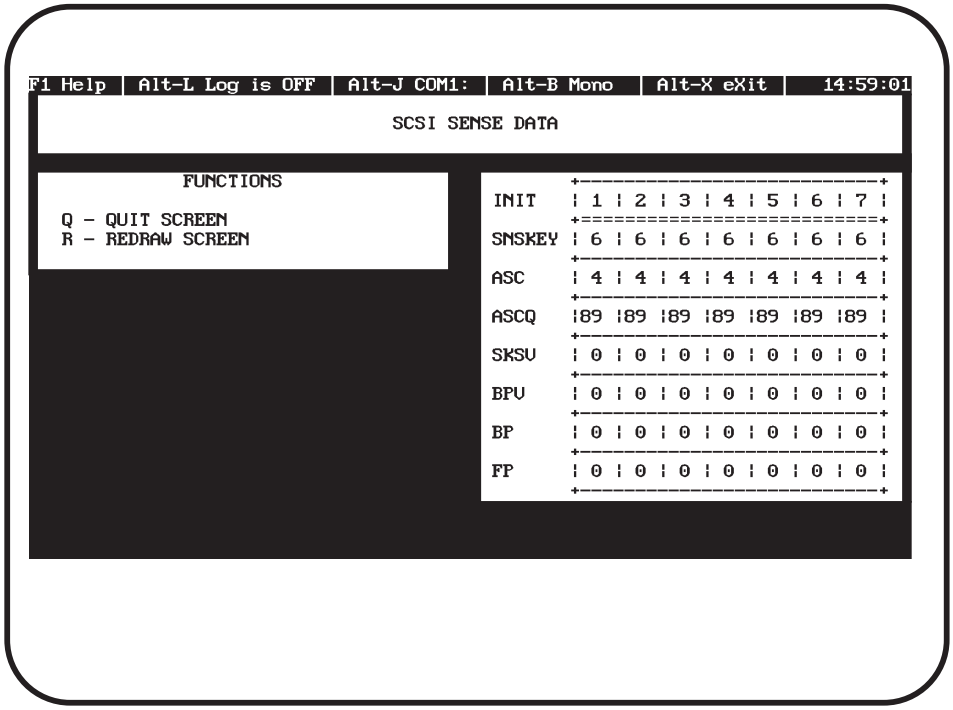

Figure 7-4 SCSI Sense Data Screen

The SCSI Sense Data screen contains the information described in Table 7-4. For more information about sense data, refer to the REQUEST SENSE command description in the *EXB-10i 8mm Cartridge Handling Subsystem User's Manual.*

Table 7-4 SCSI Sense Data

Line	Description
FUNCTIONS	Allows you to press **Q** to exit back to the SCSI Functions Menu or press **R** to clear the screen of jumbled characters.
INIT	Shows each initiator ID.
SNSKEY	Displays the Sense Key value.
ASC	Displays the Additional Sense Code (ASC) value.
ASCQ	Displays the Additional Sense Code Qualifier (ASCQ) value.
SKSV	Displays the Sense Key Specific Valid (SKSV) value.
BPV	Displays the Bit Pointer Valid (BPV) value.
BP	Displays the Bit Pointer (BP) value.
FP	Displays the Field Pointer (FP) value.

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

Part 3

Replacing CHS Components

8

Cover Assembly Replacement

This chapter describes how to remove and replace the cover assembly. You must remove the cover to access most of the CHS components.

8.1 Preliminary Procedures

Before removing the cover, follow the instructions in this section.

Required Tools

Make certain you have the following tools:

- ✓ Torque limiting screwdriver
- ✓ T-10 TORX driver bit

ESD Requirements

Make certain you protect the CHS from electrostatic discharge (ESD). Refer to Section 2.1 for more information.

8.2 Removing the Cover

To remove the cover, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Using a T-10 TORX driver bit, remove the three screws located on the back cover, as shown in Figure 8-1.

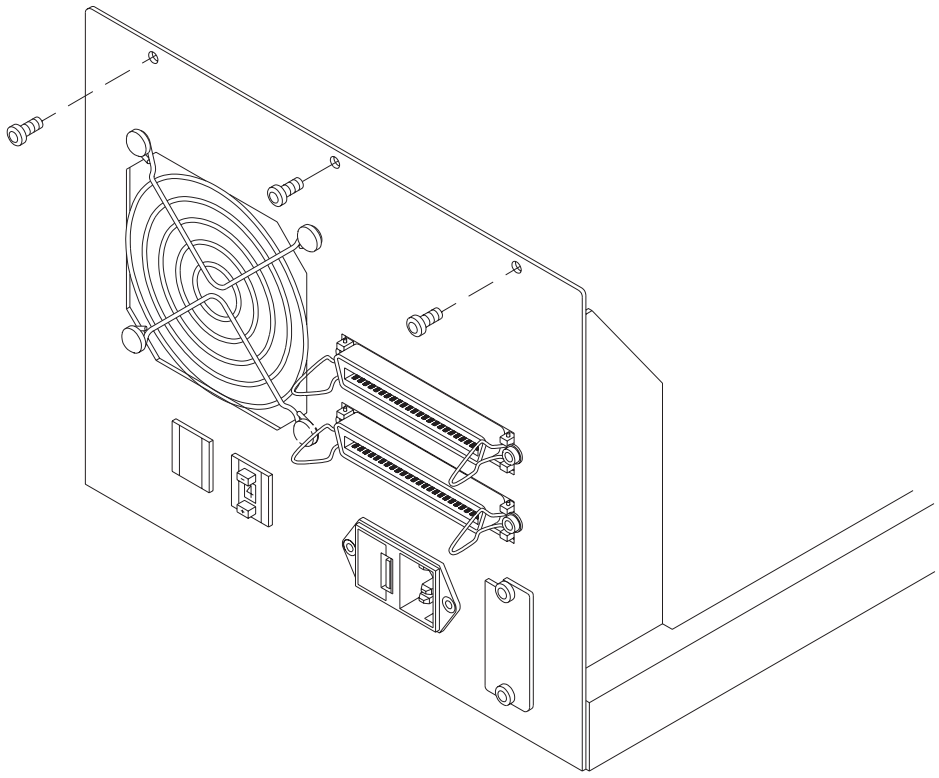

Figure 8-1 Screws at the rear of the CHS (EXB-10 shown)

3. Using a T-10 TORX driver bit, remove the four screws on the CHS's base (two on each side), as shown in Figure 8-2.

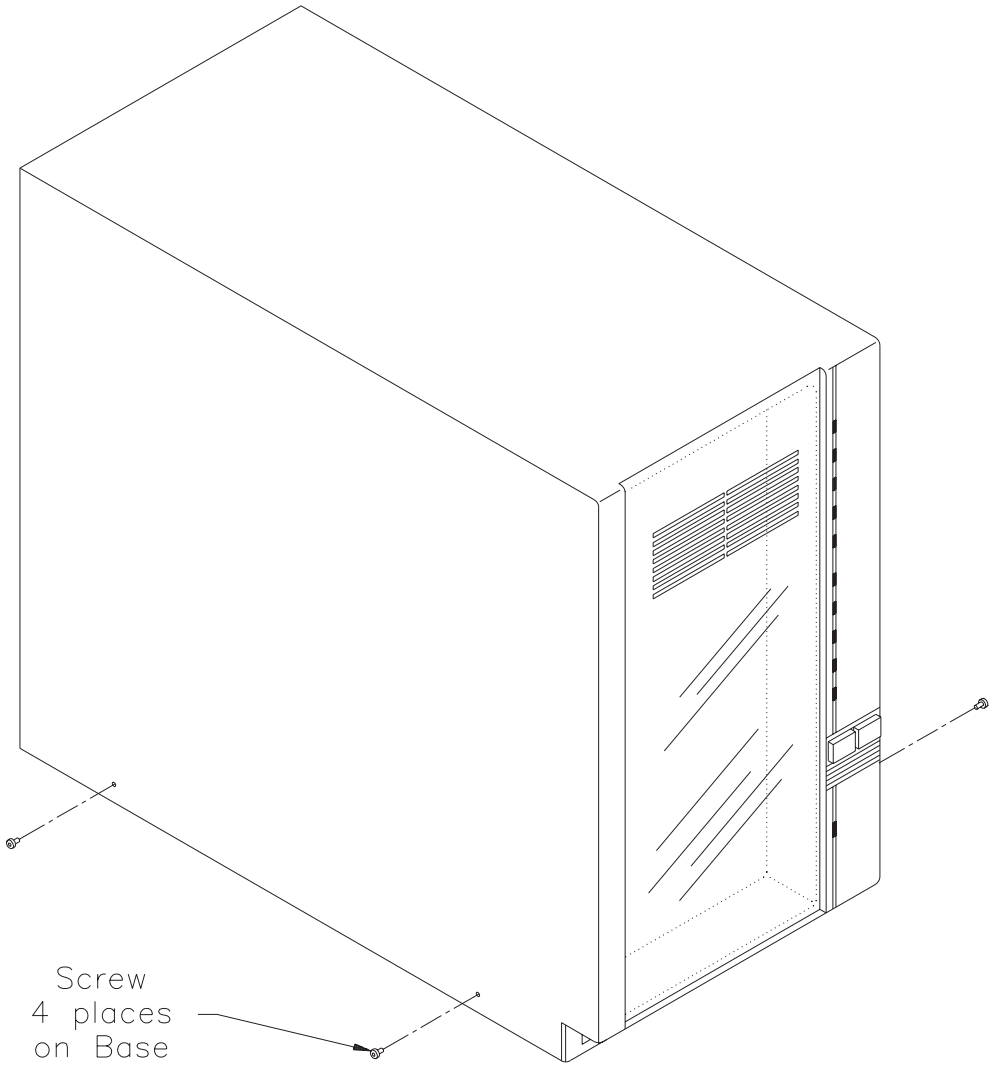

Figure 8-2 Screws at the base of the CHS

4. After removing all seven screws, grasp the cover by the lower, front corners and spread the sides away from the bezel, as shown in Figure 8-3.

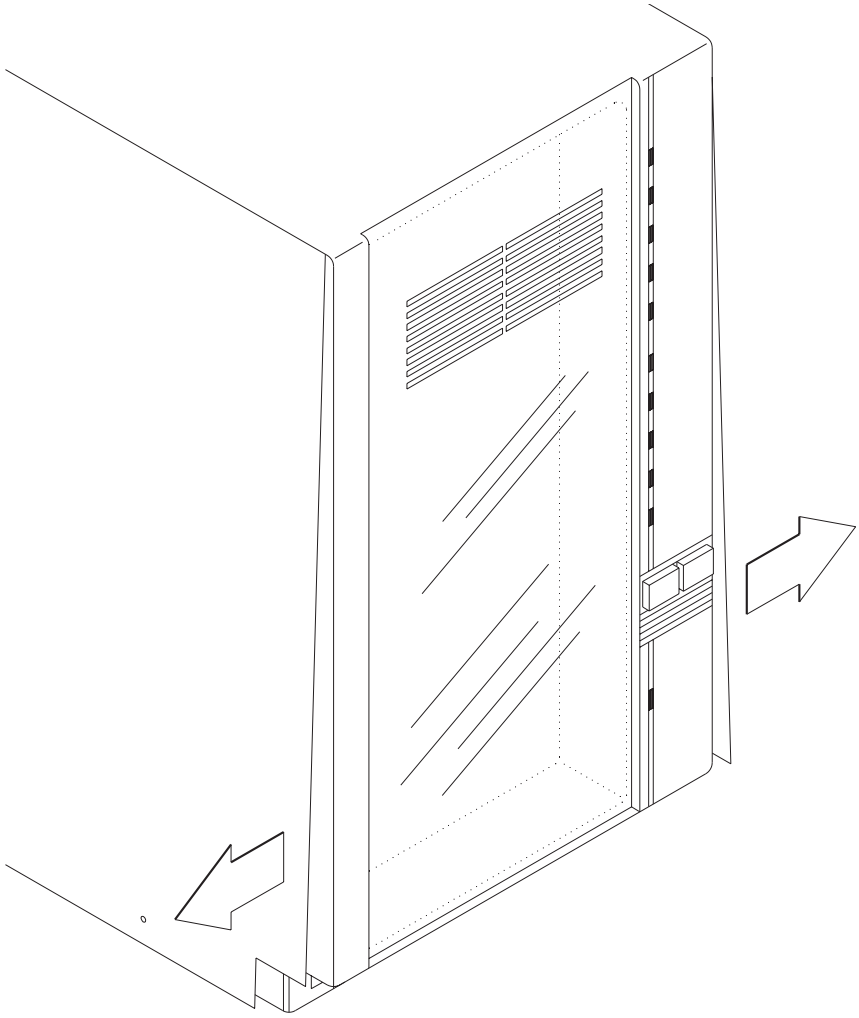

Figure 8-3 Spreading the cover's sides away from the bezel

5. Lift the cover straight up and set it aside. Be careful not to disturb any of the CHS cables.

8.3 Replacing the Cover

WARNING

When replacing the cover, check to make sure that none of the cables are caught between the CHS's chassis and the cover. Do not connect the power cord or attempt to turn the CHS on unless the cover is installed properly.

To replace the cover, follow these steps:

1. Before replacing the cover, make certain that all cables are properly connected to the VMC card. (See Figure 14-1 in Section 14.2 for an illustration of cable connections.)

2. Grasping the cover by the sides, position it over the CHS and lower it until the cover rests on the CHS's frame. Make certain the flange on the rear of the cover fits inside the back of the CHS's frame.

3. Using a T-10 bit, replace the three black screws on the back cover. Figure 8-1 shows the location of these screws. Tighten each screw to 12.0 inch-pounds of torque (13.8 kg-cm).

4. Using a T-10 bit, replace the four white screws on the sides. Figure 8-2 shows the location of these screws. Tighten the screws to 12.0 inch-pounds of torque (13.8 kg-cm).

5. Reconnect the SCSI cables and the power cord on the back of the CHS.

9

Upper Bezel and Front Door Replacement

This chapter describes how to remove and replace the upper bezel, which is the faceplate located on the front of the cover assembly and serves as the frame for the front door. To access some internal components, you must remove the upper bezel. This chapter also describes how to remove and replace the front door.

9.1 Preliminary Procedures

Before removing the upper bezel or the front door, follow the instructions in this section.

Required Tools

Make certain you have the tools listed below.

Upper Bezel

- ✓ Torque limiting screwdriver
- ✓ T-10 TORX driver bit
- ✓ $^{5}/_{16}$-inch wrench (for units with a ground cable)

Front Door

- ✓ Torque limiting screwdriver
- ✓ T-10 TORX driver bit

ESD Requirements

Make certain you protect the CHS from electrostatic discharge (ESD). Refer to Section 2.1 for more information.

9.2 Removing the Upper Bezel

To remove the upper bezel, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Remove the cover assembly (see Section 8.2).

3. Locate the upper bezel, as shown in Figure 9-1. Using a T-10 TORX driver bit, loosen (but do not remove) the single screw located on the inside lip of the door threshold, which is at the base of the upper bezel.

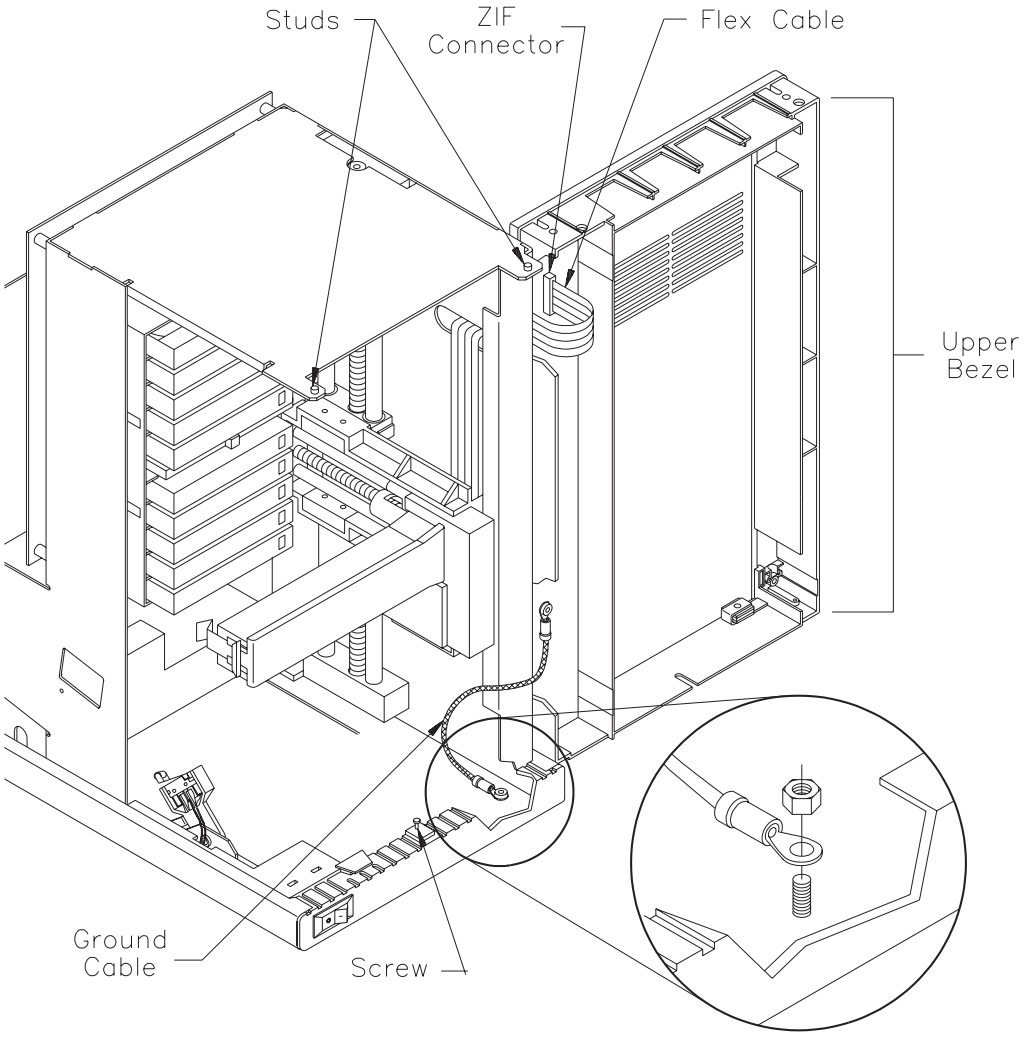

Figure 9-1 Upper bezel removal

CAUTION

The upper bezel is attached to the CHS chassis by a flat flex cable; and in some units, the bezel is also attached by a ground cable at the bottom. (See Figure 9-1.) Be careful not to damage these cables when you slide the bezel off the chassis. Do not let the bezel hang from the flat flex cable.

4. Once the screw is loosened, slide the bottom of the upper bezel away from the screw (toward you, if you are facing the front of the CHS). Lift the upper bezel off the two studs at the top of the CHS.

5. Disconnect the flex cable, which is attached to the ZIF connector on the top of the VDISPLAY card behind the LEDs, as shown in Figure 9-1. To do this, grasp the tab on the top and bottom of the connector with your thumb and forefinger. Gently pull on the connector clip until the cable slides away from the connector.

6. If the upper bezel is also attached to the base of the CHS by a ground cable, detach this cable from the base. To do this, use a $^{5}/_{16}$-inch wrench to remove the nut from the ground stud, as shown in Figure 9-1, and slide the cable off of the stud.

9.3 Replacing the Upper Bezel

To replace the upper bezel, follow these steps:

1. If the CHS has a ground cable attached at the base, attach it to the upper bezel. To do this, position the cable as shown in Figure 9-1 and replace the screw. Using a T-10 bit, tighten the screw to 12.0 inch-pounds (13.8 kg-cm) of torque.

2. Connect the flex cable to the VDISPLAY card, located behind the LEDs on the upper bezel. To do this, make certain the connector is open by pulling out on the tabs and push the cable into the connector until it is seated squarely against the back of the connector. Slide the connector's clip into place, ensuring that both sides of the clip are locked and fully seated.

   To check the cable's seating, firmly grasp the flex cable and gently tug on it. If the cable moves or disconnects from the connector, try connecting it again until it is firmly seated. Also make certain that the cable is flat against the chassis. If it is not, grasp the loop of the cable by the VMC connector and gently pull the cable back.

3. Align the two holes on the top of the upper bezel with the two studs at the top of the CHS.

4. Align the groove on the bottom of the upper bezel with the screw on the front base of the CHS.

5. Using a T-10 bit, tighten the single screw at the base of the upper bezel.

6. Replace the cover assembly (see Section 8.3).

7. Reconnect the SCSI cables and the power cord on the back of the CHS.

9.4 Removing the Front Door

To remove the front door, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Remove the cover assembly (see Section 8.2).

3. Remove the upper bezel (see Section 9.2).

4. Locate the four screws that hold the door in place on the upper bezel, as shown in Figure 9-2. Two screws are located deep inside the top of the upper bezel where the door hinges and the other two screws are located on the bottom of the bezel. These screws hold on the door and two brackets.

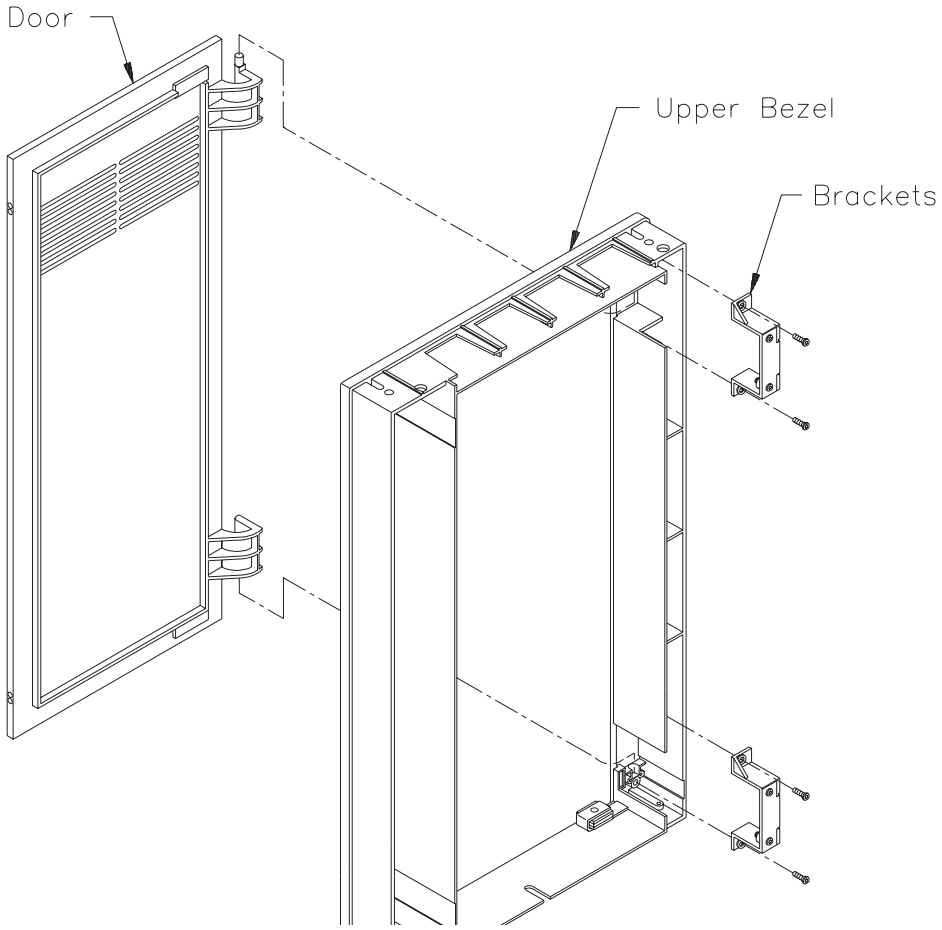

Figure 9-2 Front door (removed from the upper bezel)

5. While holding the door steady with one hand, use a T-10 TORX driver bit with your other hand to remove the two screws on the top bracket and the two screws on the lower bracket. After you remove the screws, the door and the brackets slide out of the bezel.

9.5 Replacing the Front Door

To replace the front door, follow these steps:

1. From the front of the upper bezel, insert the front door so that the hinges on the door snap into the upper bezel.

2. From the back of the upper bezel, insert one of the brackets and align it over the two screw holes on the top of the upper bezel. Using a T-10 bit, replace two of the screws. Tighten the screws to 3.4 inch-pounds of torque (3.9 kg-cm).

3. In the same manner, replace the remaining bracket and two screws on the bottom of the upper bezel. Tighten to 3.4 inch-pounds of torque (3.9 kg-cm).

4. Replace the upper bezel (see Section 9.3).

5. Replace the cover assembly (see Section 8.3).

6. Reconnect the SCSI cables and the power cord on the back of the CHS.

Notes:

10

CTS Replacement

This chapter describes how to remove and replace the cartridge tape subsystem (CTS).

10.1 Preliminary Procedures

Before removing the CTS, follow the instructions in this section.

Required Tools

Make certain you have the tools listed below.

- ✓ Torque limiting screwdriver
- ✓ T-10 TORX driver bit (for removing the cover and upper bezel)
- ✓ T-15 TORX driver bit
- ✓ ⅛-inch flat-blade screwdriver

ESD Requirements

Make certain you protect the CHS from electrostatic discharge (ESD). Refer to Section 2.1 for more information.

10.2 Removing the CTS

To remove the CTS, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.
2. Remove the cover assembly (see Section 8.2).
3. Remove the upper bezel (see Section 9.2).
4. Make certain the cartridge handling mechanism (CHM) is not blocking the CTS. If it is, raise the CHM by using a ⅛-inch flat-blade screwdriver to turn the vertical lead screw clockwise. See Figure 10-1 for the location of this screw.

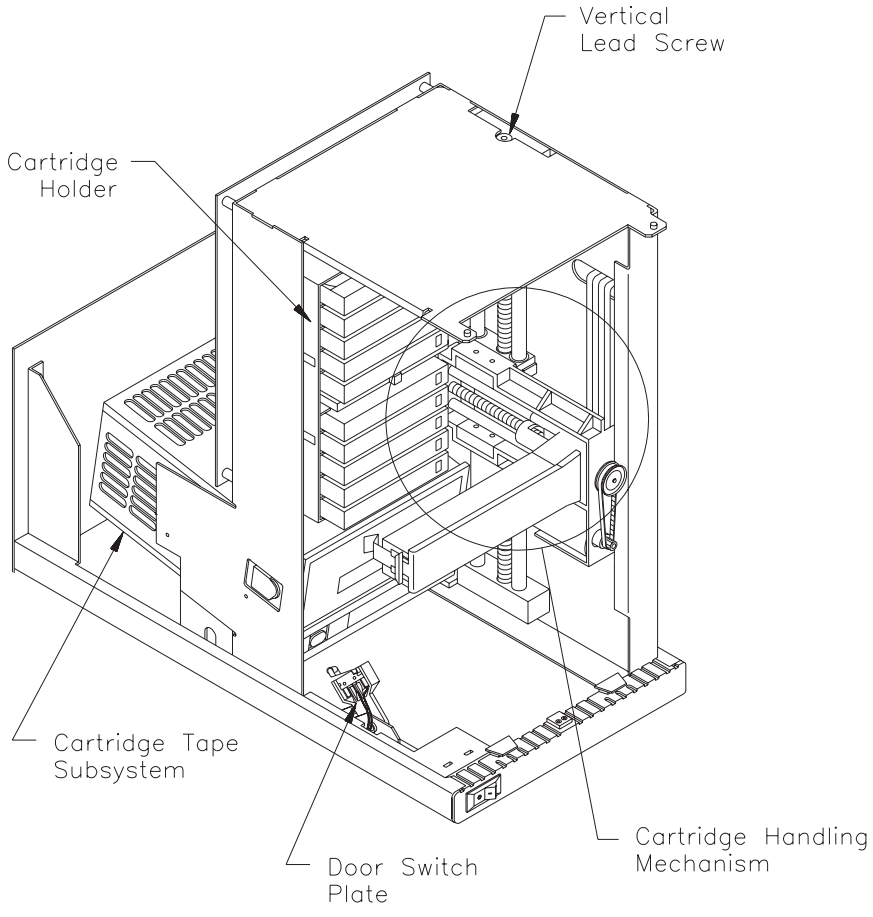

Figure 10-1 Cartridge Tape Subsystem (CTS) and vertical lead screw

5. Using a T-15 TORX driver bit, remove the screw that holds the door switch plate in place, as shown in Figure 10-2. Move the switch down and toward the front of the CHS; do not disconnect the cable still attached to the switch.

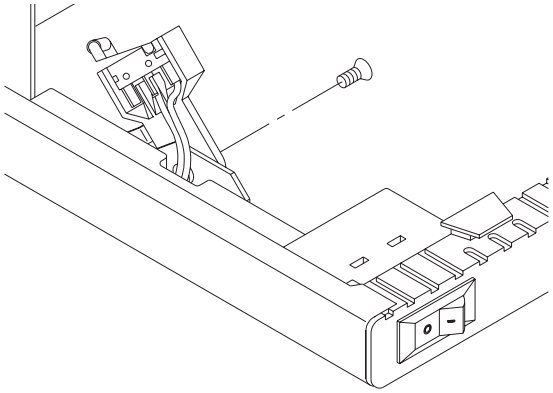

Figure 10-2 Door switch plate

6. Using a T-15 bit, remove the three screws that hold the CTS in place. See Figure 10-3 for the location of these screws.

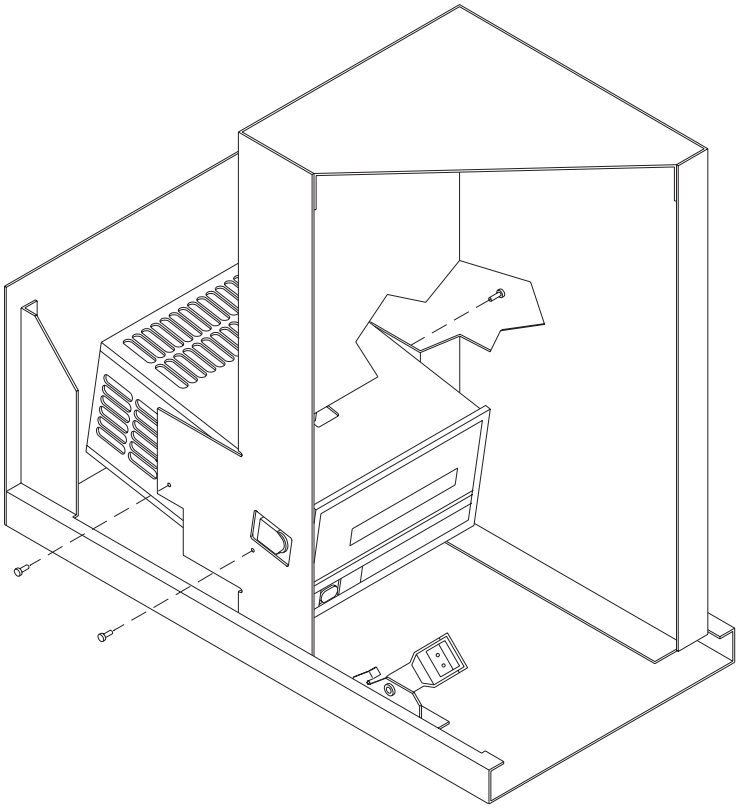

Figure 10-3 CTS mounting screws

7. If your CHS has a metal plate that attaches to the inner frame and to the CTS on the right side of the CHS (shown in Figure 10-4), use a T-15 TORX driver bit to loosen the two screws that hold the plate onto the inner frame (shown by the arrow).

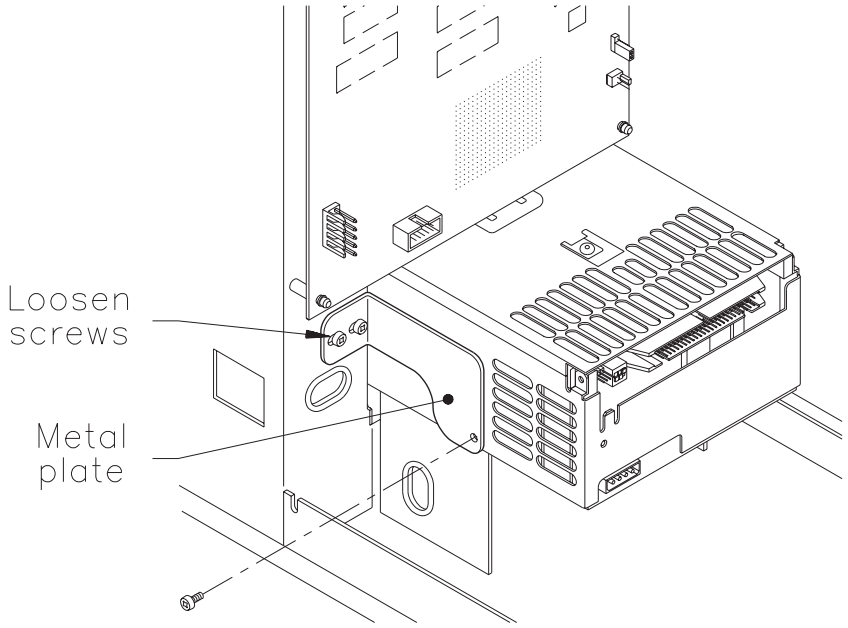

Figure 10-4 Loosening the screws on the metal plate

8. Slide the CTS forward so you can access the cables and connectors on the back.

9. Disconnect the following CHS cables from the connectors on the back of the CTS:

   - 50-pin SCSI cable
   - 6-pin remote SCSI ID cable (if one is connected)
   - 4-pin diagnostics cable
   - Power cable

   See Figure 10-6 and Figure 10-7 for the connector locations.

10. Grasp the CTS by the top and bottom at the front, then slide it out of the CHS enclosure.

10.3 Replacing the CTS

To replace the CTS, follow these steps:

1. If the CTS includes an interface card with resistor terminators (R-packs), use flat-nose wiring pliers to remove them from the back of the CTS.

2. Hold the CTS by the top and bottom. From the front of the CHS, slide the CTS into the CHS enclosure, so that the bottom of the CTS rests on the platform in the center of the CHS, as shown in Figure 10-5.

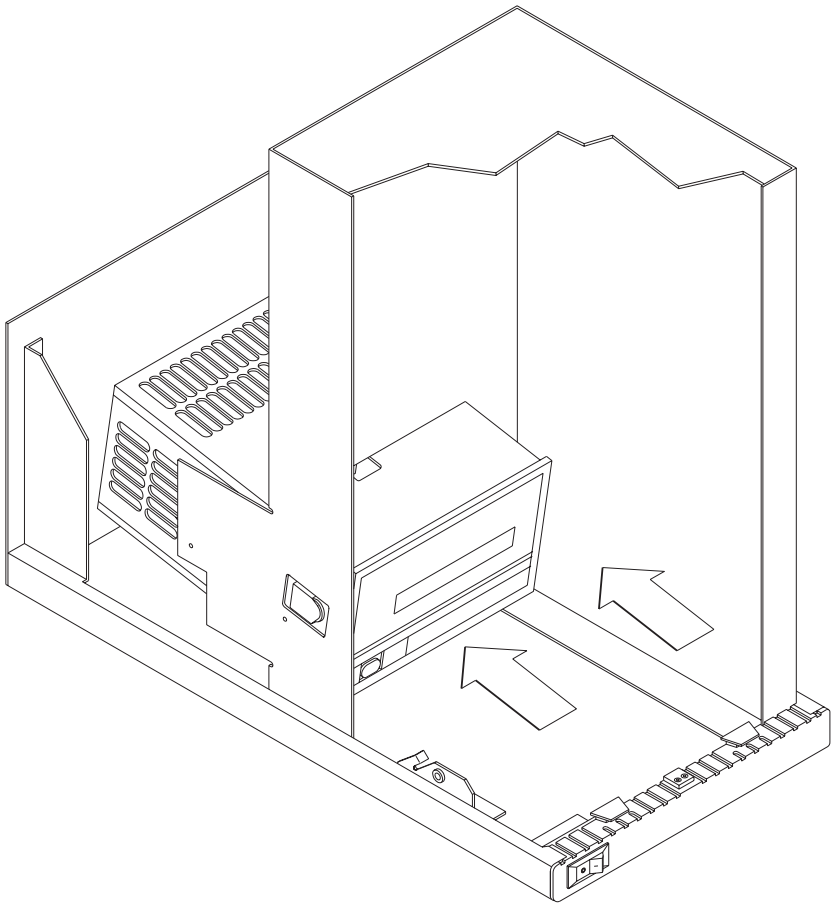

Figure 10-5 Installing the CTS

3. Connect each of the CHS cables as described below. The locations of the connectors on the backs of the EXB-8200 and the EXB-8500 are shown in the figures on the next page.

   - Connect the CHS's internal power cable (the 4-wire connector labeled "Drive P1") to the 4-pin power connector on the back of the CTS.

   - Connect the CHS's internal 4-pin diagnostic cable (the four-wire connector labeled "Drive P2" on the EXB-8200 and labeled "Drive P1" on the EXB-8500) to the Monitor (maintenance) port on the back of the CTS.

   - Connect the CHS's internal 50-pin SCSI cable (the ribbon cable with the 50-pin connector) to the SCSI bus connector on the back of the CTS.

   - If the CTS has a remote connector for the SCSI ID, attach the internal 6-pin connector for the CHS's SCSI ID remote switch to the remote connector on the back of the CTS. Ensure that pin 1 of the six-pin connector (labeled with a white mark on the top of the connector) is connected to pin 1 of the remote connector on the back of the CTS. If necessary, refer to the documentation for your CTS to determine the pin assignments for the remote connector.

   Notes:

   - Some versions of the EXB-8200's interface card (for example, the DB card and earlier versions of the DS card) do not provide a remote connector for setting the SCSI ID. When using an EXB-8200 with one of these cards, set the SCSI ID using the DIP switches on the back of the CTS (for instructions, refer to the documentation for the EXB-8200). Remember that you will need to remove the CHS's cover to change the SCSI ID.

   - If you are using the CHS's remote switch to set the SCSI ID and the CTS's interface card also includes DIP switches (for example, the EXB-8200's DS3 card and the EXB-8500's interface card), be sure that the DIP switches on the back of the CTS are set to address 0 (all three switches set to the off position).

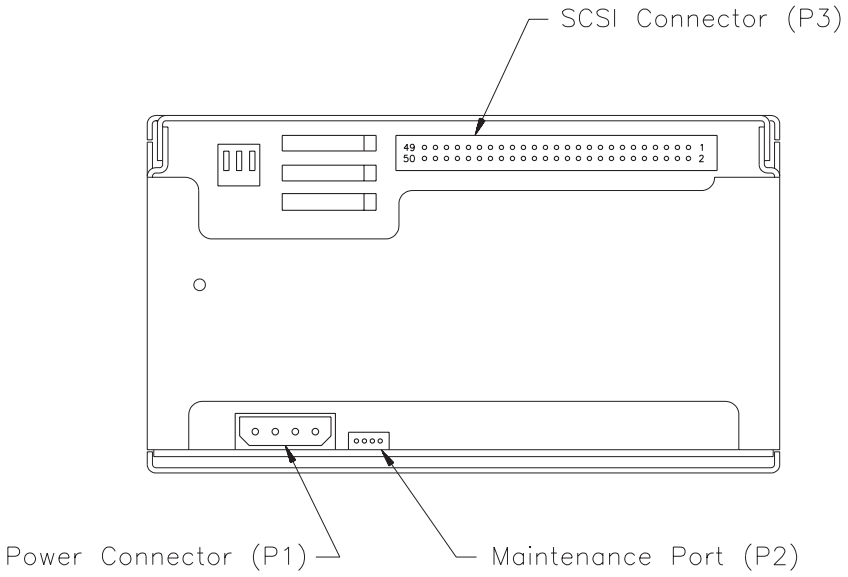

Figure 10-6 Connectors on the back of the EXB-8200/EXB-8200SX

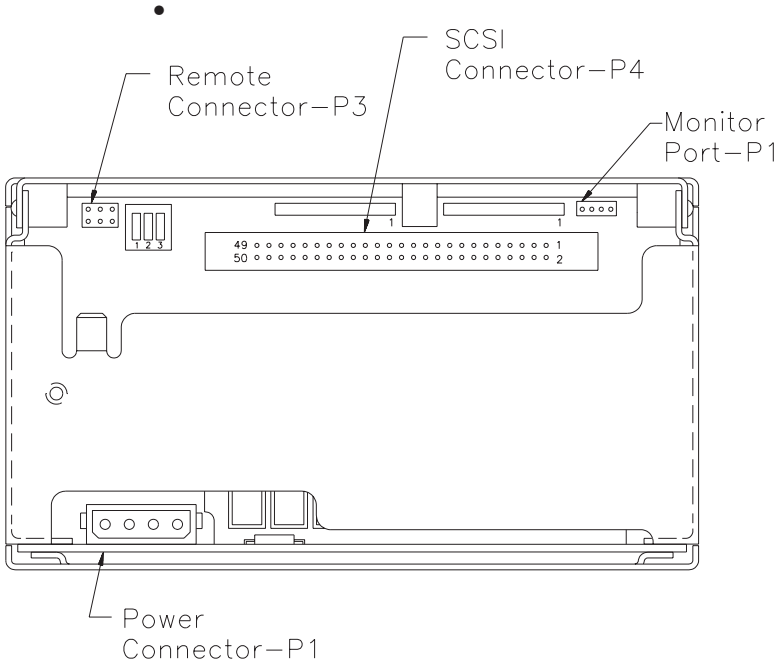

Figure 10-7 Connectors on the back of the EXB-8500/EXB-8500c

4. After connecting all cables, align the mounting holes in the CTS with the three holes in the CHS, as shown in Figure 10-8. Push the CTS down so that it is flat on the sheet metal shelf.

5. To properly position the CTS in the enclosure, place one hand on the top, back of the CTS and press down. Use a T-15 bit with your other hand to replace the two screws on the left side of the CTS. Then replace the screw on the right. Tighten the screws to 12.0 inch-pounds of torque (13.8 kg-cm).

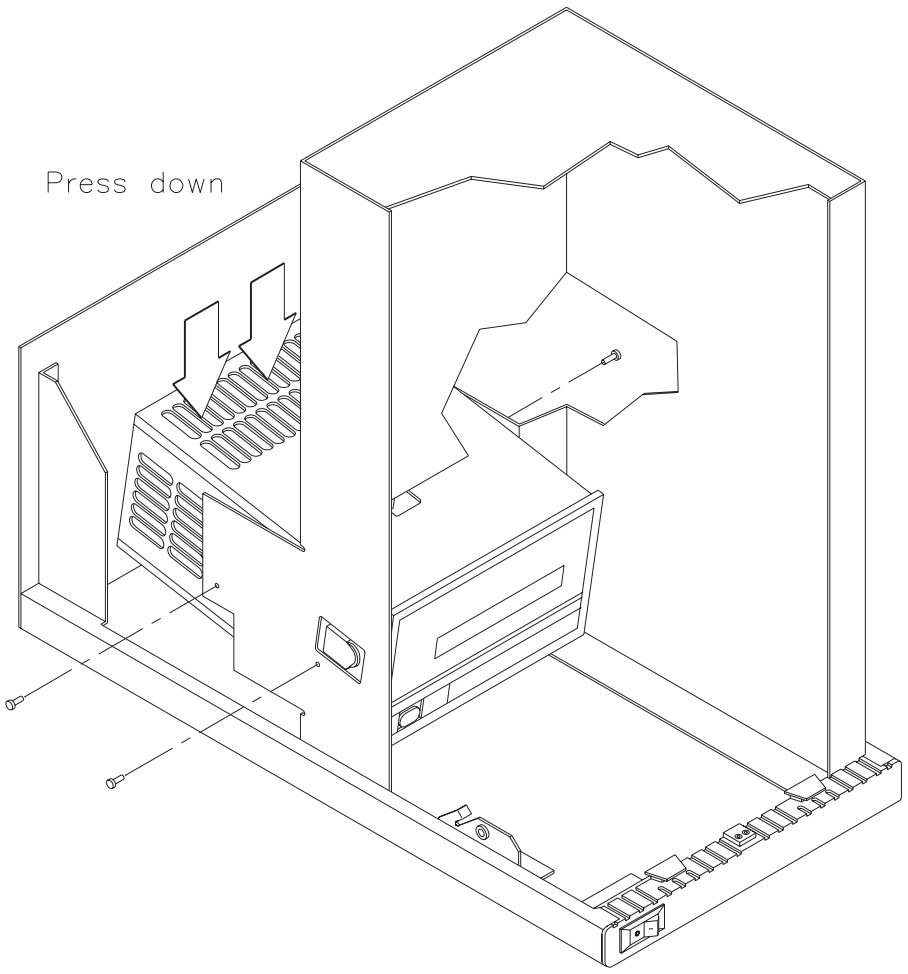

Figure 10-8 Inserting the screws and pressing down on the back, top of the CTS

6. If the CTS has a metal plate that attaches to the inner frame (shown in Figure 10-9), tighten the two screws (shown by the arrow) to 12.0 inch-pounds (13.8 kg-cm) of torque.

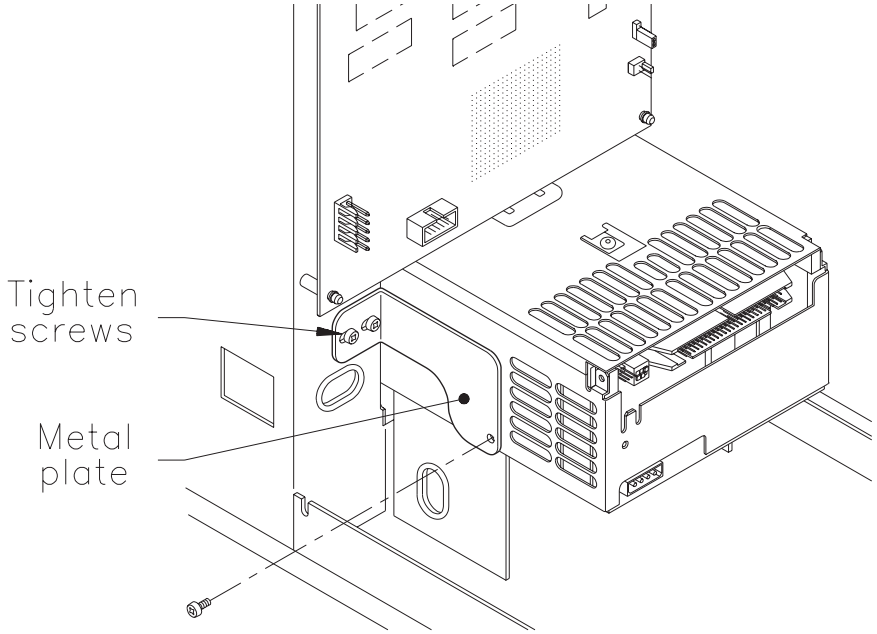

Figure 10-9 Metal plate on the right side of the CTS

7. Ensure that all cables are connected correctly. Also make certain that the cables are not in the direct path of the cooling fan.

8. Replace the door switch plate to its original position. Rotate it toward the CTS until it comes in contact with the stop. Using a T-15 bit, replace the screw that holds the door switch in place (#6-32 × 0.25 pan-head machine screw). Tighten the screw to 12.0 inch-pounds of torque (13.8 kg-cm).

9. Replace the upper bezel (see Section 9.3).

10. Replace the cover assembly (see Section 8.3).

11. Calibrate the CTS position by following the instructions in Appendix B.

11

CHM Replacement

This chapter describes how to remove and replace the cartridge handling mechanism (CHM), the robotic assembly that moves vertically and horizontally to load and unload cartridges automatically. The CHM contains the grab base (which grips the cartridges), the horizontal and vertical lead screws (the axes on which the grab base moves), the VY card, the horizontal and vertical motors, and the vertical motor cables.

You must remove the CHM to replace the following components:

- Horizontal motor
- Vertical belt and motor
- Vertical flex cable

11.1 Preliminary Procedures

Before removing the CHM, follow the instructions in this section.

Required Tools

Make certain you have the tools listed below.

- ✓ Torque limiting screwdriver
- ✓ T-10 TORX driver bit
- ✓ ⅛-inch flat-blade screwdriver

ESD Requirements

Make certain you protect the CHS from electrostatic discharge (ESD). Refer to Section 2.1 for more information.

11.2 Removing the CHM

To remove the CHM, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Remove the cover assembly (see Section 8.2).

3. Remove the upper bezel (see Section 9.2).

4. Make certain the grab base is positioned above the CTS. To move the grab base up, use a ⅛-inch flat-blade screwdriver to turn the vertical lead screw clockwise. Figure 11-1 shows the location of the CHM, the grab base, the horizontal belt, and the vertical lead screw.

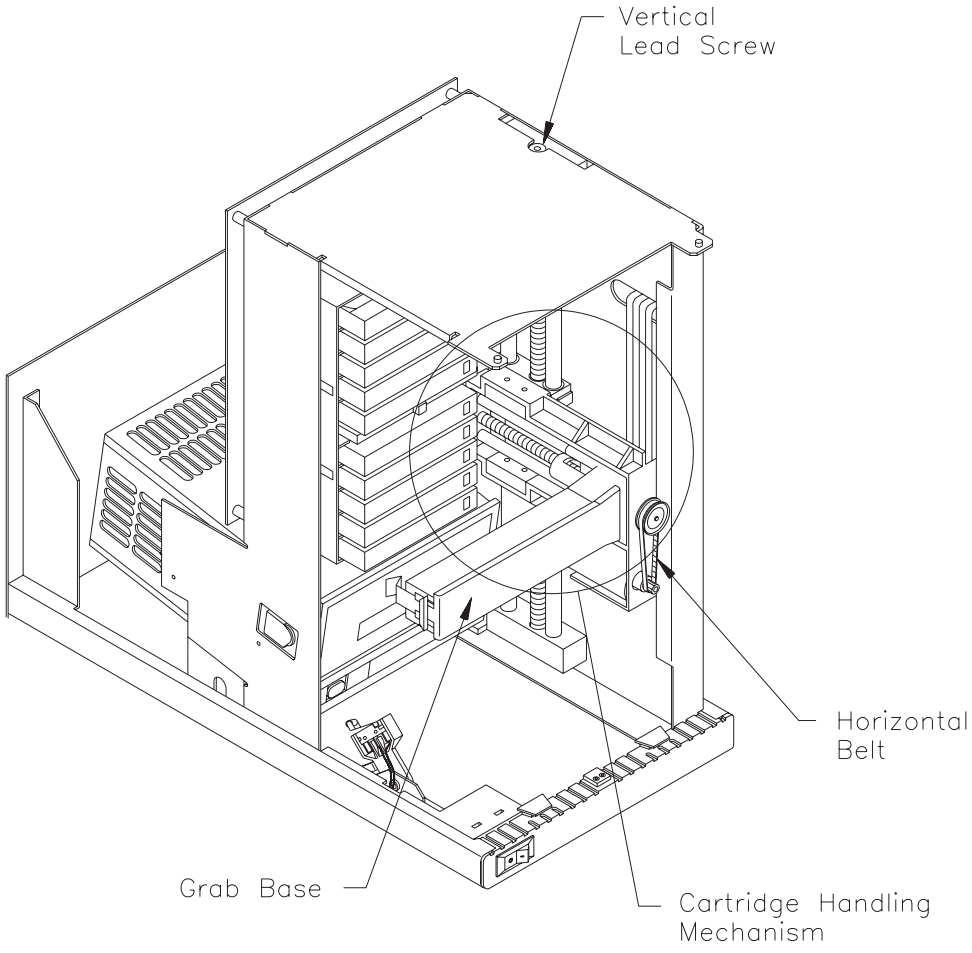

Figure 11-1 Grab base, CHM, horizontal belt, and vertical lead screw

5. Move the grab base to the outermost position. To do this, insert your index finger inside the loop of the horizontal belt and turn the belt to the right (clockwise). This motion moves the grab base out.

6. Detach the vertical motor's cables from the VMC card, located on the back side of the chassis wall. The blue ribbon cable is attached to the connector labeled "J8"; the black power lead cable is attached to the connector labeled "J7." Pull the cables through the bottom slot in the back of the chassis wall. See Figure 14-1 in Section 14.2 for an illustration of these connections.

7. While holding the CHM steady with one hand, use a T-10 TORX driver bit with your other hand to remove the four screws that hold the CHM in place. These screws are located on the outside of the chassis, as shown in Figure 11-2.

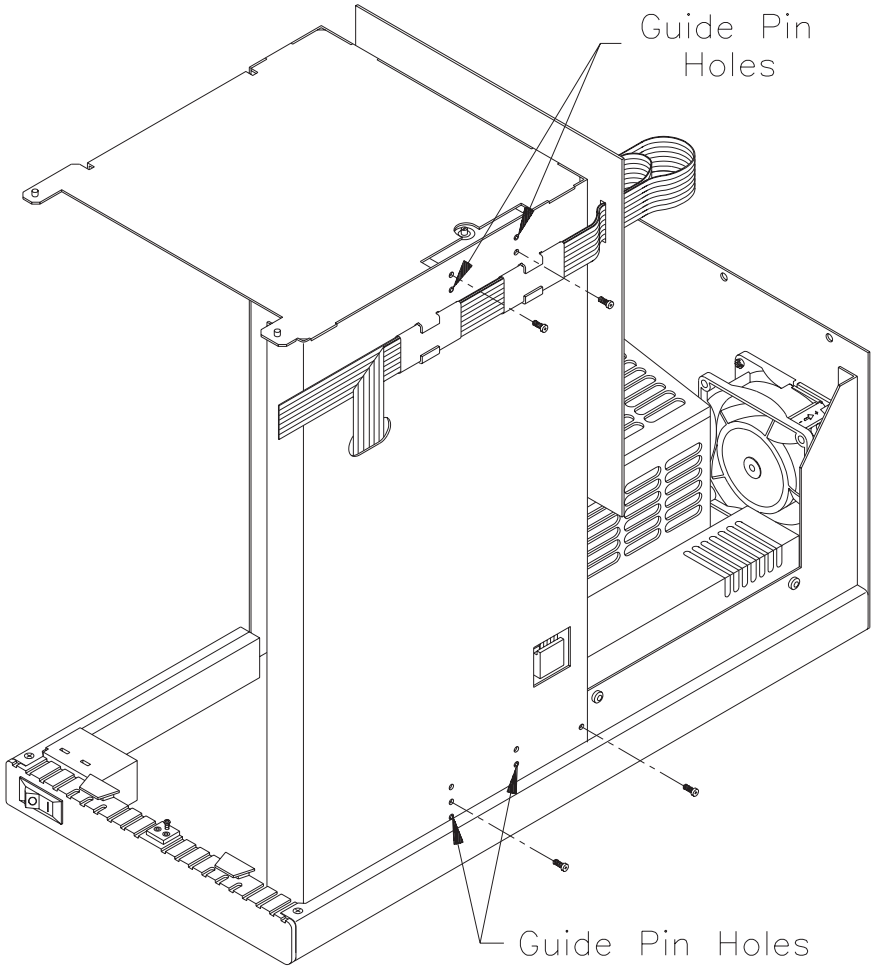

Figure 11-2 CHM screws and guide pin holes

8. Remove the CHM, as follows:

   a. Pull the CHM away from the four guide pin holes on the side of the chassis. Two guide pins are located on the upper mount of the CHM and two guide pins are located on the lower mount, as shown in Figure 11-2.

   b. Push the CHM toward the back of the CHS so that the orange idler roller (shown in Figure 11-4) clears from the metal idler roller guide.

9. Detach the vertical flex cable from the connector labeled “J1” on the VY card, as shown in Figure 11-3. To do this, grasp the clip on each side of the connector with your thumb and forefinger. Pull on the connector clip until the cable slides away from the connector.

   Note: On some CHSs, the vertical flex cable is also connected to the horizontal motor by a screw. If your CHS has this connection, use a T-8 bit to remove the screw and the cable connection.

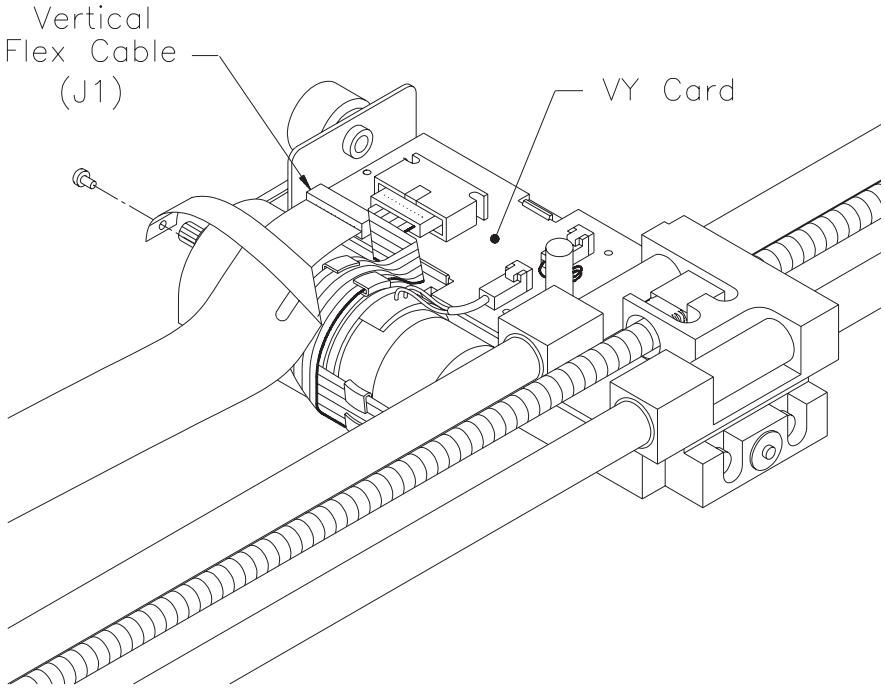

Figure 11-3 Vertical flex cable connection on the VY card

10. Pull the CHM out of the chassis. Lay the CHM flat, with the grab base pointing up, as shown in Figure 11-4.

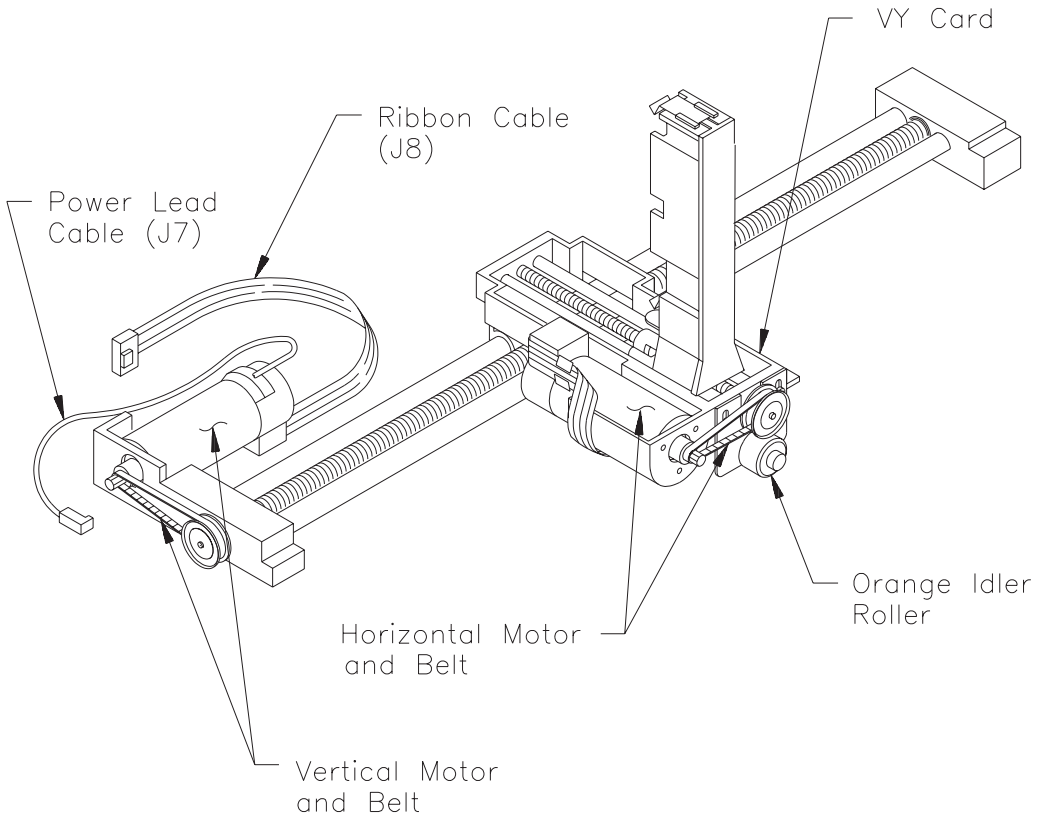

Figure 11-4 CHM removed from the CHS

11.3 Replacing the CHM

To replace the CHM, follow these steps:

1. Make certain that all the cable connections to the VY card are fully seated.

2. Position the CHM halfway inside the CHS, so that you can easily connect the cables.

3. Insert the two cables attached to the vertical motor through the bottom slot in the back of the chassis wall. Do not connect them yet.

4. Connect the vertical flex cable to the connector labeled "J1" on the VY card. To do this, push the cable into the connector until it is seated squarely against the back of the connector. Slide the connector's clip into place, ensuring that both sides of the clip are squarely locked.

   Note: Some vertical flex cables have an additional connection for the horizontal motor. If your cable has this connection, align the hole in the cable with the screw hole in the horizontal motor. Use a T-8 bit to replace the screw and tighten it to 2.0 inch-pounds of torque (2.3 kg-cm).

5. Position the CHM so that the orange idler roller rests in the metal idler roller guide.

6. Align the guide pins on the CHM (two on the upper mount; two on the lower mount) with the mounting holes on the side of the chassis. Insert the four guide pins in the mounting holes. The guide pin holes are shown in Figure 11-2.

7. Use a T-10 bit to replace each of the four screws (#4-40 $\times$ 0.25 crestcup machine screws). Tighten each screw to 3.0 inch-pounds of torque (3.5 kg-cm). See Figure 11-2 for the location of the screw holes.

8. Connect the blue ribbon cable to the connector labeled "J8" and the black power lead cable to the connector labeled "J7" on the VMC card. See Figure 14-1 in Section 14.2 for an illustration.

9. Replace the upper bezel (see Section 9.3).

10. Replace the cover assembly (see Section 8.3).

11. Reconnect the SCSI cables and the power cord on the back of the CHS.

12. Because you replaced the CHM, recalibrate the cartridge sensor position, the eject position, and the CTS position. (See Appendixes A and B.)

12

Horizontal Belt and Motor Replacement

This chapter describes how to remove and replace the horizontal belt and the horizontal motor. The horizontal belt and motor perform the horizontal movements of the cartridge handling mechanism (CHM).

12.1 Preliminary Procedures

Before removing the horizontal belt or motor, follow the instructions in this section.

Required Tools

Make certain you have the tools listed below.

Horizontal Belt

- ✓ Torque limiting screwdriver
- ✓ T-10 TORX driver bit (for removing the cover)

Horizontal Motor

- ✓ Torque limiting screwdriver
- ✓ T-10 TORX driver bit (for removing the cover and CHM)
- ✓ T-8 TORX driver bit

ESD Requirements

Make certain you protect the CHS from electrostatic discharge (ESD). Refer to Section 2.1 for more information.

12.2 Removing the Horizontal Belt

To remove the horizontal belt, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Remove the cover assembly (see Section 8.2).

3. If desired, remove the upper bezel (see Section 9.2).

4. Locate the horizontal belt on the CHM, as shown in Figure 12-1. Insert your index finger inside the loop of the belt. Gently roll the belt to the left and gradually slip the belt off the tip of the motor pulley (the smaller pulley attached to the motor).

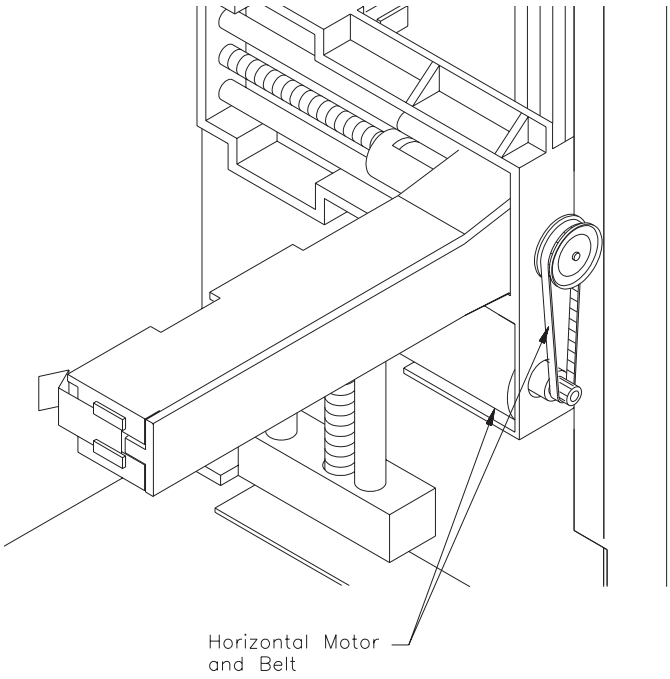

Figure 12-1 Horizontal belt

5. When you have successfully rolled the belt off the motor pulley, remove the other side of the belt from the lead-screw pulley (the larger pulley attached to the horizontal lead screw).

12.3 Replacing the Horizontal Belt

To replace the horizontal belt, follow these steps:

1. Place one end of the belt around the lead-screw pulley (the larger pulley attached to the lead screw).
2. Slide the other end of the belt around the tip of the motor pulley. Insert your index finger inside the loop of the belt. Gently turn the belt to the right and gradually push it back until it is secure on the pulley.

   To check the belt's tension, use your thumb and forefinger to lightly pinch the belt together in the middle. There should be a ¼-inch gap in the middle. If you need to adjust the tension, tighten the screws as necessary or reposition the motor.
3. If you removed the upper bezel, replace it (see Section 9.3).
4. Replace the cover assembly (see Section 8.3).
5. Reconnect the SCSI cables and the power cord on the back of the CHS.

12.4 Removing the Horizontal Motor

To remove the horizontal motor, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.
2. Remove the cover assembly (see Section 8.2).
3. Remove the upper bezel (see Section 9.2).
4. Remove the CHM and detach the vertical flex cable (see Section 11.2).
5. Remove the horizontal belt (see Section 12.2).
6. Locate the horizontal motor on the CHM, as shown in Figure 12-2. Using a T-8 TORX driver bit, remove the three screws that hold the motor in place. These screws are located around the motor pulley.

Note: On some CHSs, the vertical flex cable is also connected to the horizontal motor by one of the three screws.

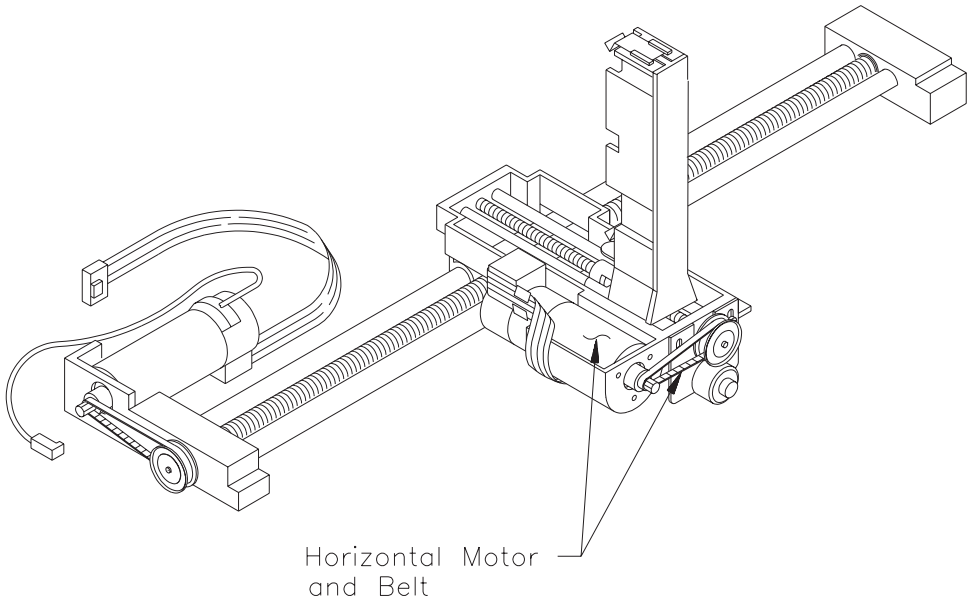

Figure 12-2 Horizontal motor (CHM removed from the CHS)

7. Detach the motor's power lead from the connector labeled "J2" on the VY card. Next, detach the blue ribbon cable from the connector labeled "J3" on the VY card. See Figure 12-3 for the location of the cable connectors on the VY card.

8. Unclamp the two metal tabs from the cable and remove them from the motor.

9. Remove the motor by sliding it backward and out of its housing. Be careful not to damage the cables that are still connected to the motor.

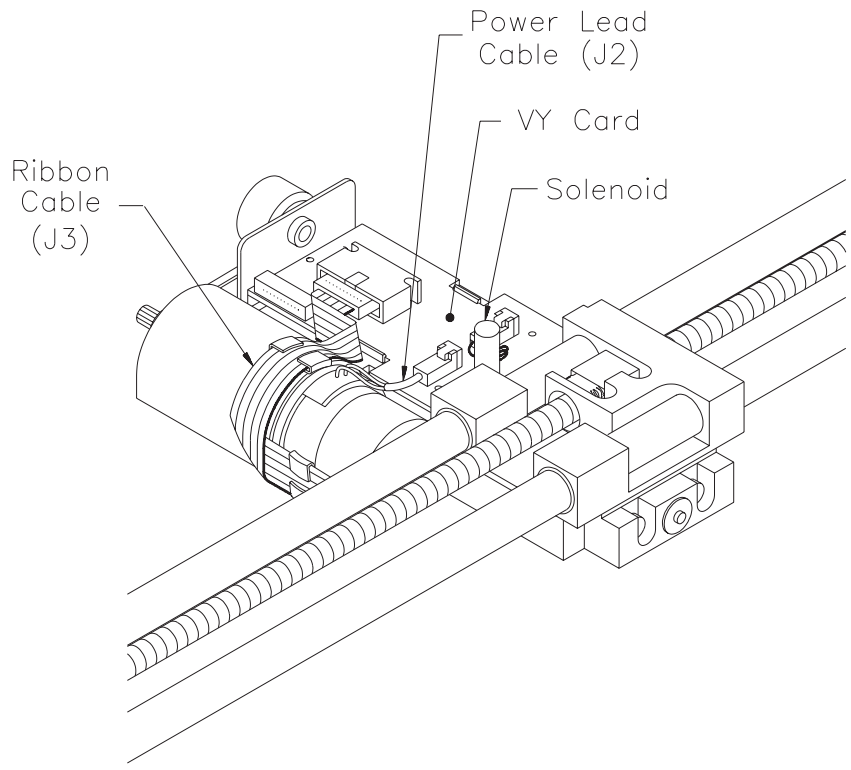

Figure 12-3 Horizontal motor and cable connections (horizontal motor still in its housing)

12.5 Replacing the Horizontal Motor

To replace the horizontal motor, follow these steps:

1. Slide the motor (pulley first) into its housing on the CHM. The correct position of the motor is shown in Figure 12-2 .
2. Align the screw holes on the motor with the screw holes on the CHM.

   Note: Some vertical flex cables have an additional connection for the horizontal motor. If your cable has this connection, wrap the cable around the motor housing and align the hole in the cable with the nearest screw hole in the horizontal motor.

3. Replace the screws, but do not tighten them yet.

4. Replace the cables by following these steps:

   a. Using two new sets of metal tabs, remove the adhesive backing from the tabs and position them on the motor, as shown in Figure 12-3 and Figure 12-2.

   b. Wrap the vertical flex cable around the motor housing and connect it to the "J3" connector on the VY card, as shown in Figure 12-3.

   c. Clamp the metal tabs over the blue ribbon cable.

   d. Attach the power lead cable to the "J2" connector on the VY card.

5. Using your index finger, push the motor fully into its housing. With your other hand, use a T-8 bit to tighten the three screws (#2-56 × 0.38 screws). Tighten each screw to 2.0 inch-pounds of torque (2.3 kg-cm).

6. Replace the horizontal belt (see Section 12.3).

7. Replace the CHM (see Section 11.3).

8. Replace the upper bezel (see Section 9.3).

9. Replace the cover assembly (see Section 8.3).

10. Reconnect the SCSI cables and the power cord on the back of the CHS.

11. Because you replaced the CHM, recalibrate the cartridge sensor position, the eject position, and the CTS position, as described in Appendixes A and B.

Notes:

13

Vertical Belt and Motor Replacement

This chapter describes how to remove and replace the vertical belt and the vertical motor. The vertical belt and motor perform all the vertical movements of the cartridge handling mechanism (CHM).

13.1 Preliminary Procedures

Before removing the vertical belt or motor, follow the instructions in this section.

Required Tools

Make certain you have the tools listed below.

Vertical Belt

- ✓ Torque limiting screwdriver
- ✓ T-10 TORX driver bit (for removing the cover, bezel, and CHM)

Vertical Motor

- ✓ Torque limiting screwdriver
- ✓ T-10 TORX driver bit (for removing the cover, bezel, and CHM)
- ✓ T-8 TORX driver bit

ESD Requirements

Make certain you protect the CHS from electrostatic discharge (ESD). Refer to Section 2.1 for more information.

13.2 Removing the Vertical Belt

To remove the vertical belt, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.
2. Remove the cover assembly (see Section 8.2).
3. Remove the upper bezel (see Section 9.2).
4. Remove the CHM (see Section 11.2).
5. Locate the vertical belt at the base of the CHM, as shown in Figure 13-1. Insert your index finger into the loop of the belt. Gently turn the belt to the left and gradually slip the belt off the tip of the motor pulley (the smaller pulley attached to the motor).

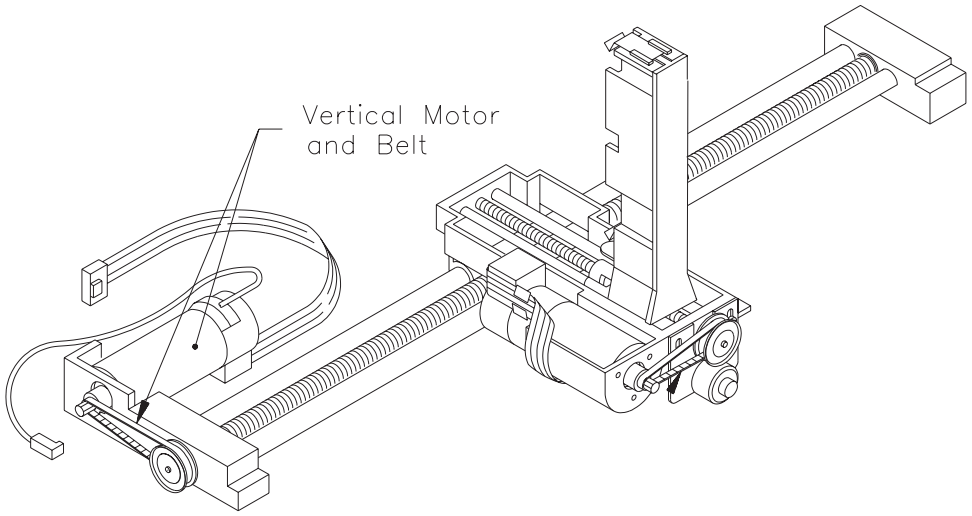

Figure 13-1 Vertical belt and vertical motor (CHM removed from the CHS)

6. When you have successfully removed the belt from the motor pulley, remove the other side of the belt from the lead-screw pulley (the larger pulley attached to the vertical lead screw).

13.3 Replacing the Vertical Belt

To replace the vertical belt, follow these steps:

1. Place one end of the belt around the lead-screw pulley (the larger pulley attached to the lead screw).

2. Slide the other end of the belt around the tip of the motor pulley. Insert your index finger into the loop of the belt. Gently roll the belt to the right and gradually push it back until it is secure on the pulley.

   To check the belt's tension, use your thumb and forefinger to lightly pinch the belt together in the middle. There should be a ¼-inch gap in the middle. If you need to adjust the tension, tighten the screws as necessary or reposition the motor.

3. Replace the CHM (see Section 11.3).

4. Replace the cover assembly (see Section 8.3).

5. Replace the upper bezel (see Section 9.3).

6. Reconnect the SCSI cables and the power cord on the back of the CHS.

7. Because you replaced the CHM, recalibrate the cartridge sensor position, the eject position, and the CTS position, as described in Appendixes A and B.

13.4 Removing the Vertical Motor

To remove the vertical motor, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.
2. Remove the cover assembly (see Section 8.2).
3. Remove the upper bezel (see Section 9.2).
4. Remove the CHM (see Section 11.2).
5. Remove the vertical belt (see Section 13.2).
6. Locate the vertical motor, as shown in Figure 13-1. Using a T-8 TORX driver bit, remove the three screws that hold the motor on the CHM. These screws are located around the motor pulley. Remove the motor by sliding it out of its housing.

13.5 Replacing the Vertical Motor

To replace the vertical motor, follow these steps:

1. Slide the motor (pulley first) into its housing on the CHM. The correct position of the motor is shown in Figure 13-1.
2. Align the screw holes on the motor with the screw holes on the CHM. Replace the screws, but do not tighten them yet.
3. Replace the vertical belt (see Section 13.3).
4. Using your index finger, push the motor fully into its housing. With your other hand, use a T-8 bit to tighten the three screws (#2-56 $\times$ 0.38 screws). Tighten each screw to 2.0 inch-pounds of torque (2.3 kg-cm).
5. Replace the CHM (see Section 11.3).
6. Replace the upper bezel (see Section 9.3).
7. Replace the cover assembly (see Section 8.3).

8. Reconnect the SCSI cables and the power cord on the back of the CHS.

9. Because you replaced the CHM, recalibrate the cartridge sensor position, the eject position, and the CTS position, as described in Appendixes A and B.

14

CHS Card Replacement

This chapter describes how to remove and replace these CHS cards:

- The VMC card, located on the chassis wall behind the cartridge holder, acts as the “mother board” for all CHS operations.

  Note: The EXB-10 uses a VMCS card; the EXB-10i uses a VMCR card.

- The VDIAG card, located behind the CTS on the back of the CHS, is used as a connection for a VT-100 terminal or PC, so you can perform CHS or CTS diagnostics.

- The VDISPLAY card, located in the upper bezel and behind the LEDs, controls the LED display.

14.1 Preliminary Procedures

Before removing any of the cards, follow the instructions in this section.

Required Tools

Make certain you have the tools listed below.

VMC Card

- ✓ Torque limiting screwdriver
- ✓ T-10 TORX driver bit (for removing the cover)

VDIAG Card

- ✓ Torque limiting screwdriver
- ✓ T-10 TORX driver bit (for removing the cover)
- ✓ T-15 TORX driver bit

VDISPLAY Card

- ✓ Torque limiting screwdriver
- ✓ T-10 TORX driver bit

ESD Requirements

Make certain you protect the CHS from electrostatic discharge (ESD). Refer to Section 2.1 for more information.

14.2 Removing the VMC Card

To remove the VMC card, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Remove the cover assembly (see Section 5.2).

3. Locate the VMC card behind the chassis wall. (The VMCS card for the EXB-10 is shown in Figure 14-1; the VMCR card for the EXB-10i is shown in Figure 14-2.) Disconnect all the cables from the VMC card. These cables are connected to “J1” through “J9”; “J5” is not used.

   If you have a VMCR card (EXB-10i only), also disconnect the following cables:

   - The SCSI cable that is connected to one of the following connectors: “J10a” or “J10b.”

   - The SCSI ID switch cable that is connected to the “P2” connector.

4. Locate each of the four retainer clips and plastic washers, as shown in Figure 14-1 and Figure 14-2. Remove the clips by using a flat-blade screwdriver to pry off each one.

5. Remove the VMC card from the five lugs, as follows:

   a. Locate the two top lugs that hold the card in place. Place your right thumb over the right lug and your left thumb over the left lug.

   b. Place several fingers behind the card. While applying pressure with your thumbs over each lug, use your fingers to gently pull the card toward you until the card snaps off of the two top lugs.

   c. In a similar manner, remove the card from the middle lug and the two bottom lugs.

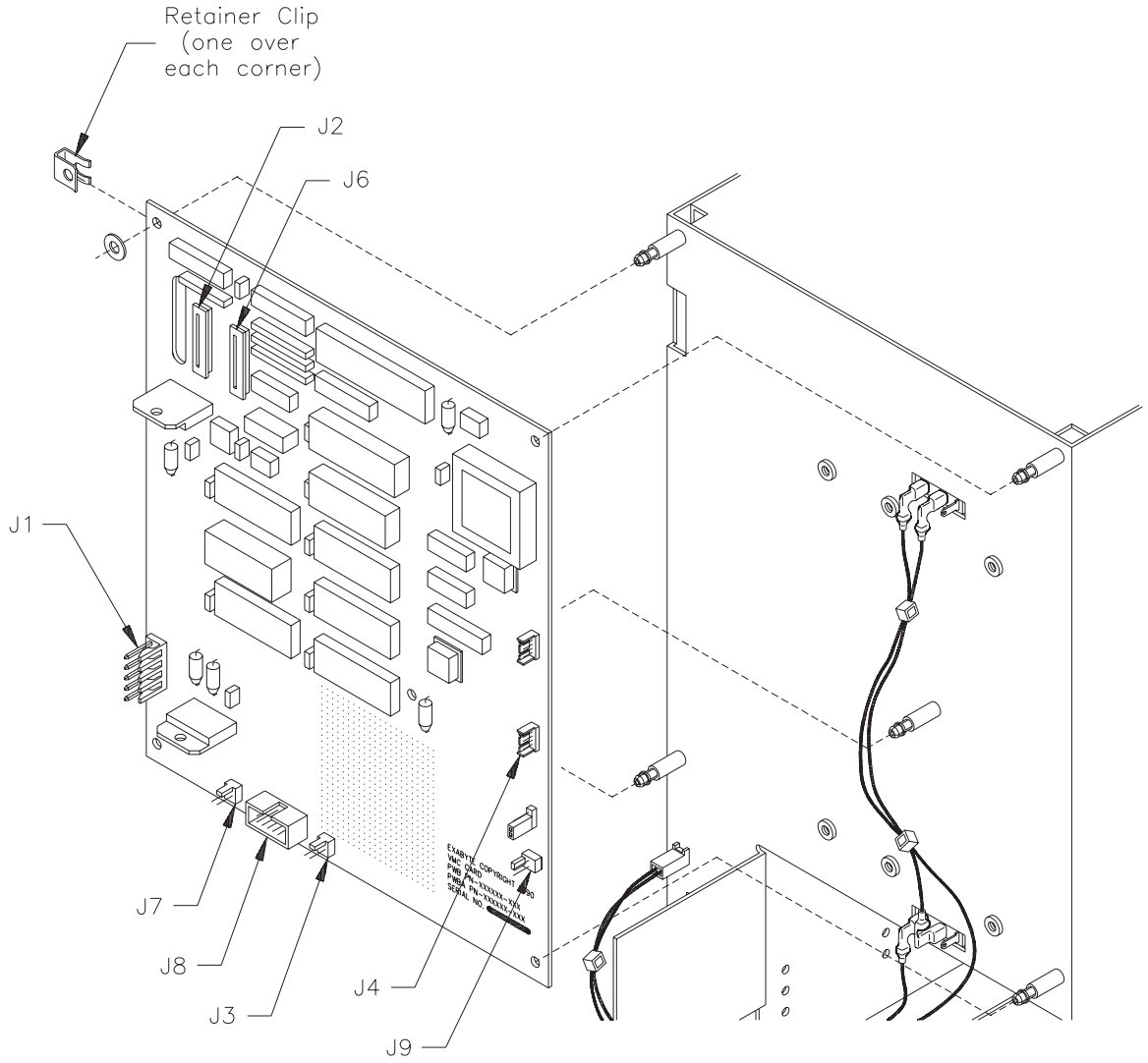

Figure 14-1 VMCS card for the EXB-10

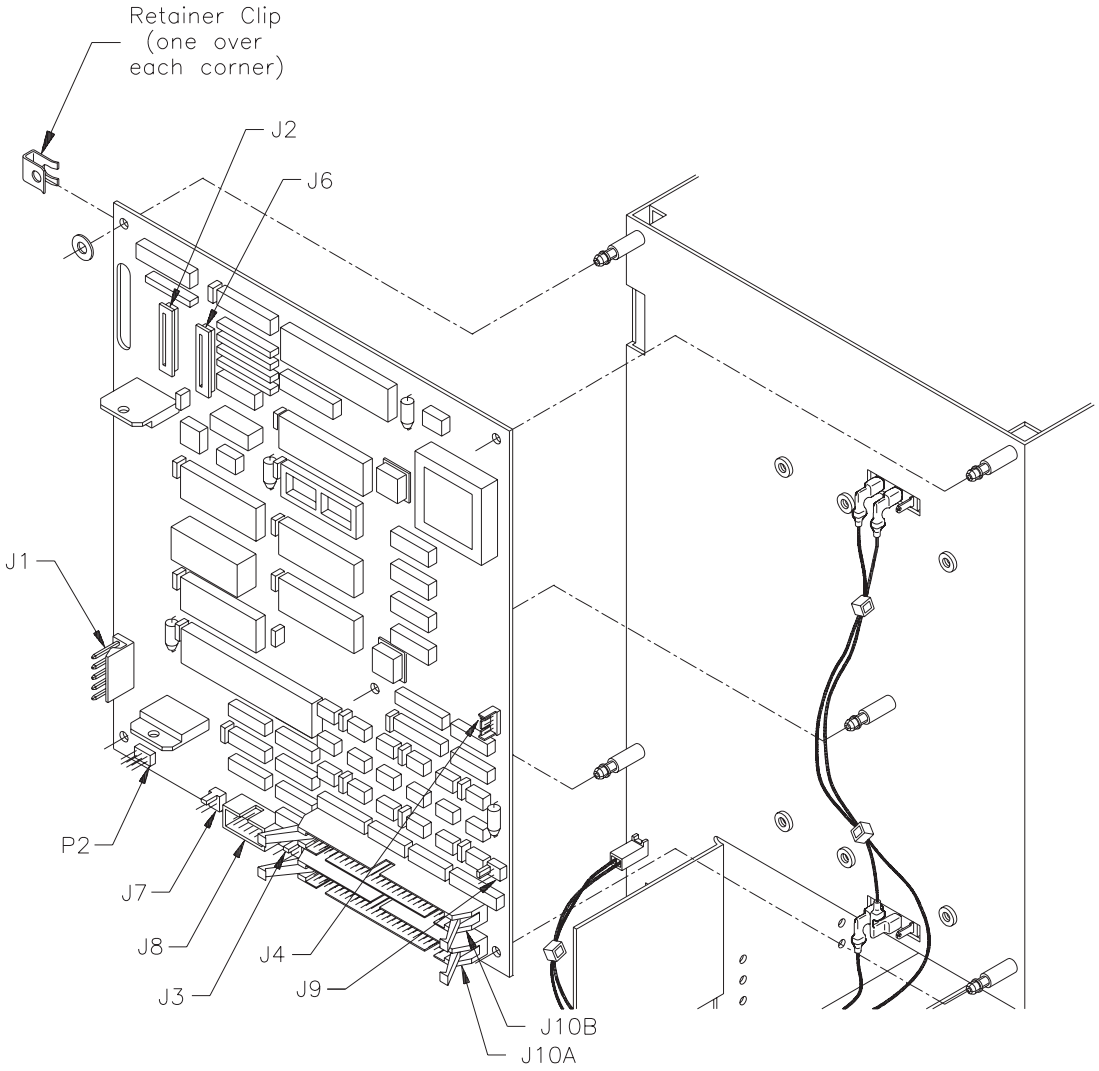

Figure 14-2 VMCR card for the EXB-10i

14.3 Replacing the VMC Card

To replace the VMC card, follow these steps:

1. Align the five lug holes on the card with the five lugs on the chassis wall. Make certain the components on the card are facing out. The correct position of the VMC card is shown in Figure 14-1.

2. Use your thumbs to snap each lug over its corresponding lug hole.

3. Replace the plastic washers and retainer clips on each of the four corner lugs.

4. Connect all of the cables to the VMC card, as indicated below. Each of the connector labels is shown in Figure 14-1 for the VMCS card and in Figure 14-2 for the VMCR card.

   - The flat flex cable leading from the VDISPLAY card attaches to the ZIF connector labeled “J2” on the VMC card. To connect this cable, insert it through the oval slot on the VMC card. Position the cable so that the exposed metal on the clip is in contact with the exposed metal on the connector. Push the cable into the connector until it is seated squarely against the back of the connector. Slide the connector’s clip into place, ensuring that both sides of the clip are squarely locked.

   - The vertical flex cable leading from the VY card attaches to the ZIF connector labeled “J6” on the VMC card. To connect this cable, insert it through the oval slot on the VMC card. Position the cable so that the exposed metal on the clip is in contact with the exposed metal on the connector. Push the cable into the connector until it is seated squarely against the back of the connector. Slide the connector’s clip into place, ensuring that both sides of the clip are squarely locked.

   - The DC power cable labeled “VMC J1” attaches to the connector labeled “J1” on the VMC card.

   - The blue ribbon cable leading from the vertical motor attaches to the connector labeled “J8” on the VMC card.

   - The VMC VTENPCK cable labeled “VMC J3” attaches to the connector labeled “J3” on the VMC card.

   - The power lead cable leading from the vertical motor attaches to the connector labeled “J7” on the VMC card.

- The cable leading from the door switch plate attaches to the connector labeled “J9” on the VMC card.
- The VMC / VDIAG cable labeled “VMC J4” attaches to the connector labeled “J4” on the VMC card.
- If you have a VMCR card (EXB-10i only), make the following connections:
  - The 50-pin SCSI connector attaches to “J10a” for differential SCSI and “J10b” for single-ended SCSI.
  - The SCSI ID switch’s cable attaches to “P2.” Make certain that pin 1 (marked “1” on the upper left corner of the switch) connects to the upper left pin on the P2 connector.

5. Replace the cover assembly (see Section 8.3).
6. Reconnect the SCSI cables and the power cord on the back of the CHS.
7. Because you replaced the VMC card, recalibrate the cartridge sensor position, the eject position, and the CTS position, as described in Appendixes A and B.

14.4 Removing the VDIAG Card

To remove the VDIAG card, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Remove the cover assembly (see Section 8.2).

3. To reach the card more easily, remove the CTS and disconnect the SCSI cable (see Section 10.2).

4. Locate the VDIAG card in the back of the CHS. This card is directly behind the maintenance port, as shown in Figure 14-3. Disconnect the two sets of cables, labeled “VDIAG J1” and “VDIAG J2,” from the VDIAG card.

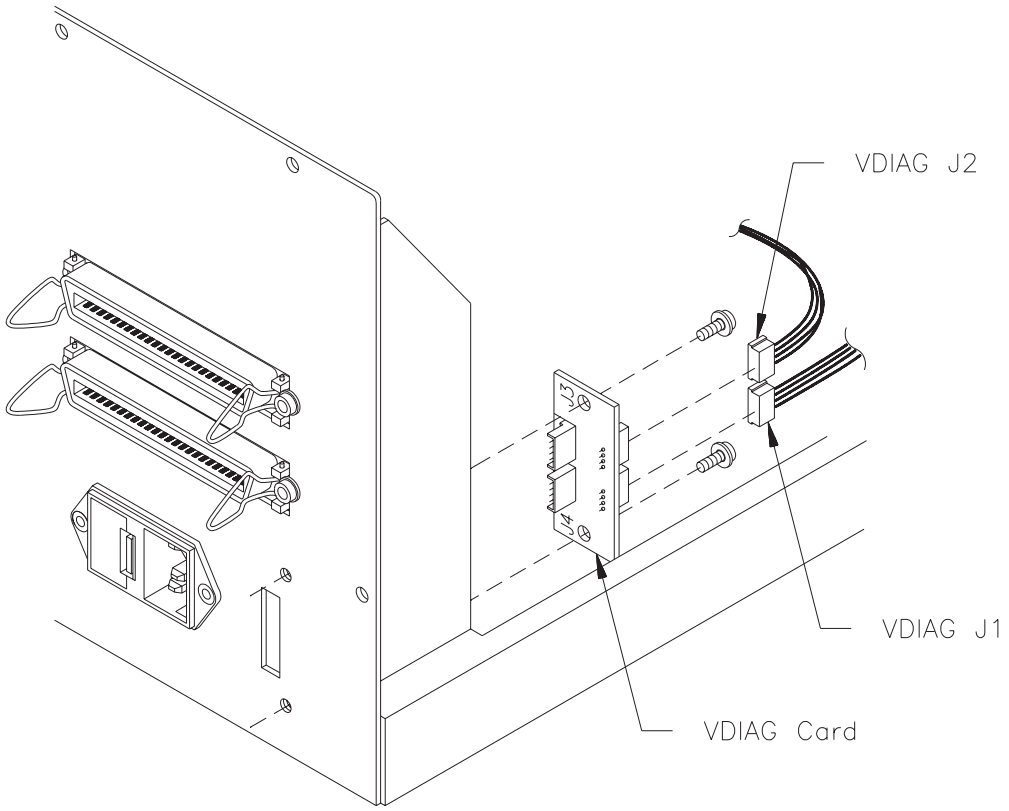

Figure 14-3 VDIAG card (removed from the CHS)

5. Using a T-15 TORX driver bit, remove the two screws that hold the card in place and remove the old VDIAG card.

14.5 Replacing the VDIAG Card

To replace the VDIAG card, follow these steps:

1. Align the screw holes on the VDIAG card with the screw holes on the chassis. See Figure 14-3 for the location of the screw holes. Using a T-15 bit, replace the two screws (#6-32 × 0.25 pan-head machine screws). Tighten to 12.0 inch-pounds of torque (13.8 kg-cm).

2. Connect the two sets of cables, as indicated below:

   - "VDIAG J1" attaches to the connector labeled "J1" on the VDIAG card.

   - "VDIAG J2" attaches to the connector labeled "J2" on the VDIAG card.

3. Replace the CTS (see Section 10.3).

4. Replace the cover assembly (see Section 8.3).

5. Reconnect the SCSI cables and the power cord on the back of the CHS.

6. Because you moved the CTS, recalibrate the CTS position by following the instructions in Appendix B.

14.6 Removing the VDISPLAY Card

To remove the VDISPLAY card, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Remove the cover assembly (see Section 8.2).

3. Remove the upper bezel and detach the flat flex cable (see Section 9.2).

4. Locate the VDISPLAY card on the inside of the upper bezel, as shown in Figure 14-4. Using a T-10 bit, remove the four screws that hold the VDISPLAY card in the bezel.

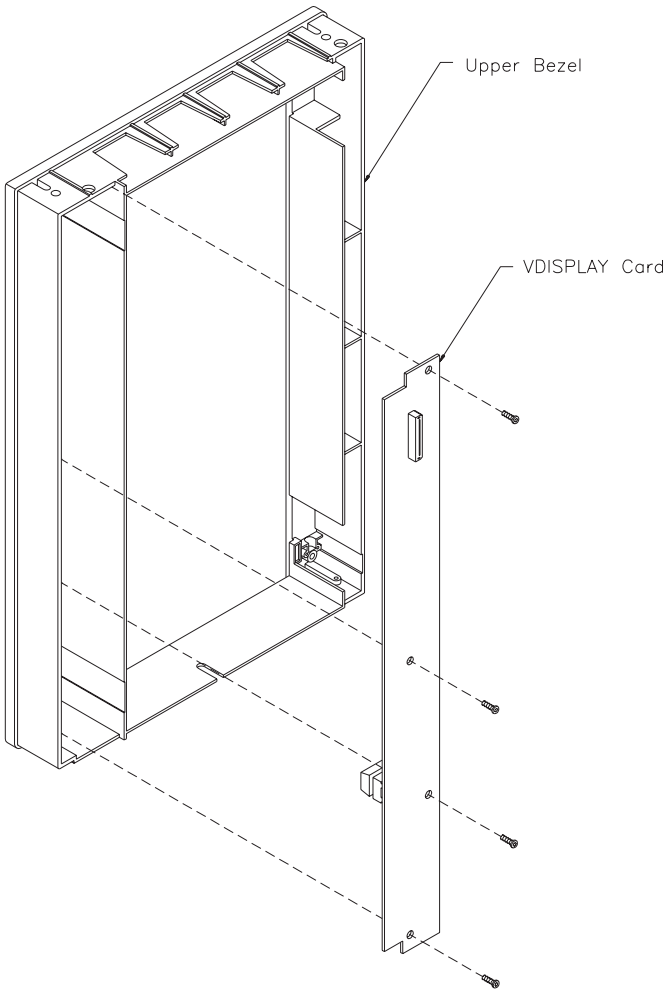

Figure 14-4 VDISPLAY card

14.7 Replacing the VDISPLAY Card

To replace the VDISPLAY card, follow these steps:

1. Place the VDISPLAY card in the upper bezel so that the LEDs on the card face inside the bezel and the SEL and INCR switches fit through the slot in the front of the upper bezel.
2. Using a T-10 bit, replace the four screws. Tighten the screws to 3.4 inch-pounds of torque (3.9 kg-cm).
3. Replace the upper bezel and attach the flex cable (see Section 9.3).
4. Replace the cover assembly (see Section 8.3).
5. Reconnect the SCSI cables and the power cord on the back of the CHS.

Notes:

15

Power Supply Replacement

This chapter describes how to remove and replace the power supply, which is located in the back of the CHS.

15.1 Preliminary Procedures

Before removing the power supply, follow the instructions in this section.

Required Tools

Make certain you have the tools listed below.

- ✓ Torque limiting screwdriver
- ✓ T-10 TORX driver bit (for removing the cover)
- ✓ T-15 TORX driver bit
- ✓ ⅛-inch flat blade screwdriver

ESD Requirements

Make certain you protect the CHS from electrostatic discharge (ESD). Refer to Section 2.1 for more information.

15.2 Removing the Power Supply

To remove the power supply, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.
2. Remove the cover assembly (see Section 8.2).
3. Remove the CTS (see Section 10.2).
4. Locate the power supply, as shown in Figure 15-1. Using a T-15 TORX driver bit, remove the two screws that hold the power supply in place.

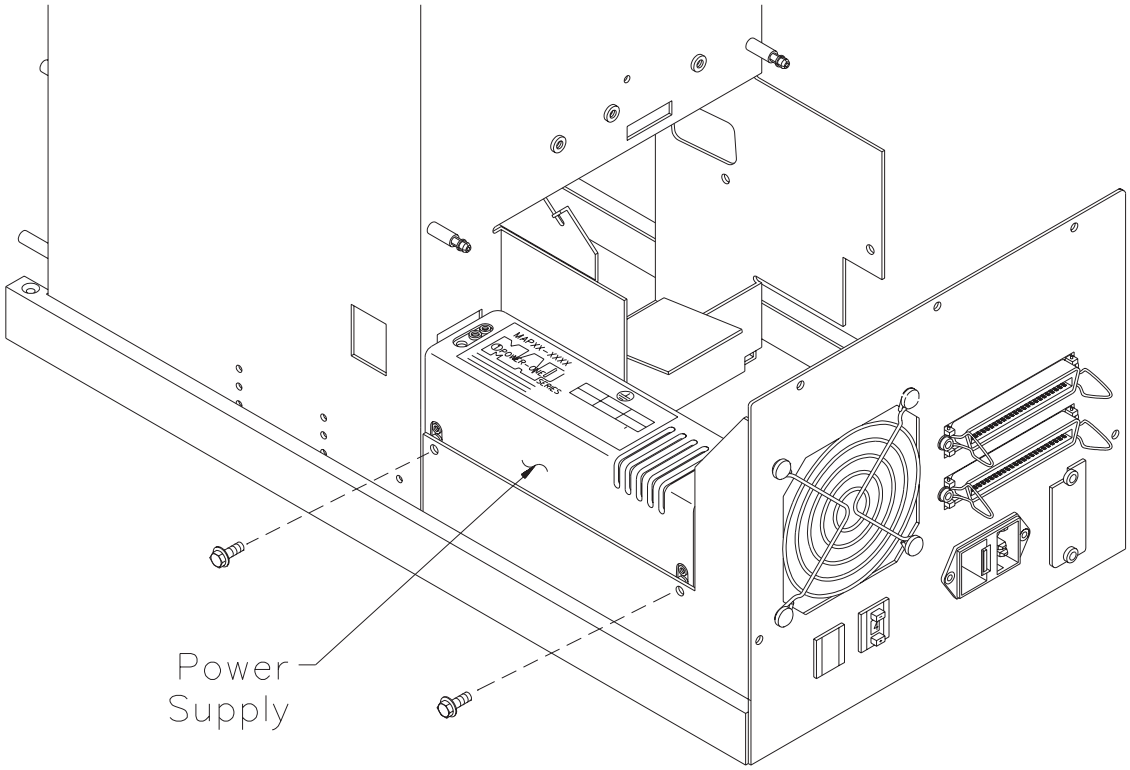

Figure 15-1 Power supply

5. Follow the steps below to remove the 7-pin connector (inserted through an opening at the base of the CTS's mounting frame) and the rubber grommet (positioned in the opening). The 7-pin connector is shown in Figure 15-2.

   a. Remove the rubber grommet by grasping it with your fingers and pulling it down and outward.

   b. Slide the grommet onto the cable.

   c. Detach the 7-pin connector from the power supply.

   Note: If you are unable to access the 7-pin connector through the opening at the base of the CTS's mounting frame, try removing the fan (as described in Section 16.2), then lifting the power supply out of the chassis with the 7-pin connector still attached, as shown in Figure 15-2.

6. Carefully pull the power supply out of the CHS. Do not damage the cables that are still attached.

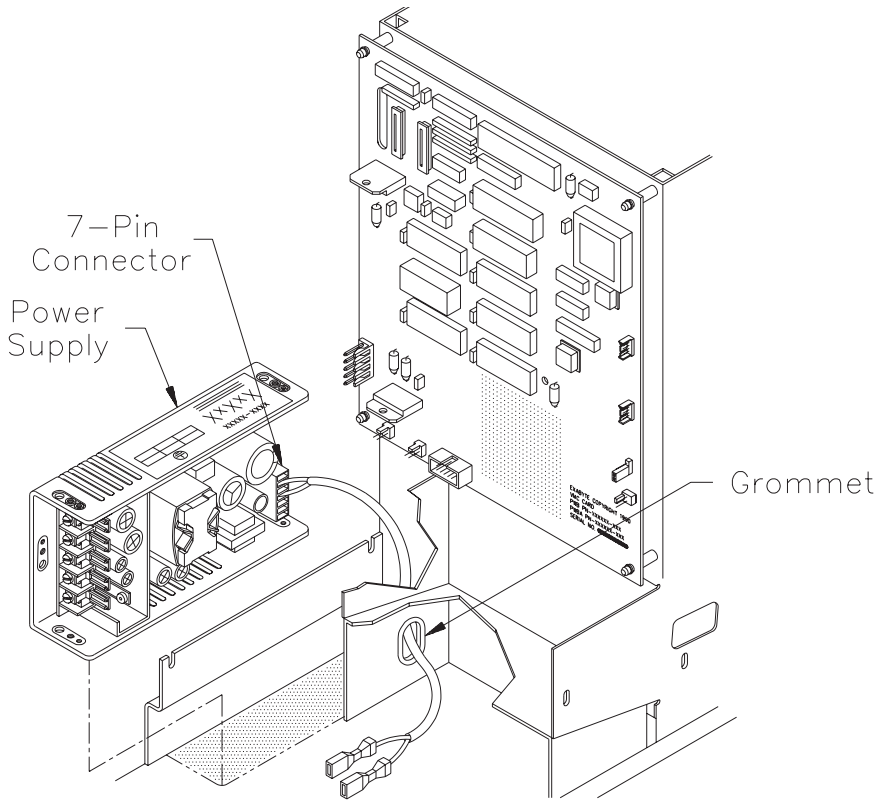

Figure 15-2 7-pin connector on the power supply

7. Detach the two sets of wire clips connected to lug #4 on the power supply. To do this, use a ⅛-inch flat-blade screwdriver to turn the lug screw counterclockwise two or three times. (There is no need to remove the screw.) When the screw is loosened, slip the wire clips away from the lug screw.

8. Detach the cable with the 10-pin connector from "TB2."

   The power supply cable connections are shown in Figure 15-3.

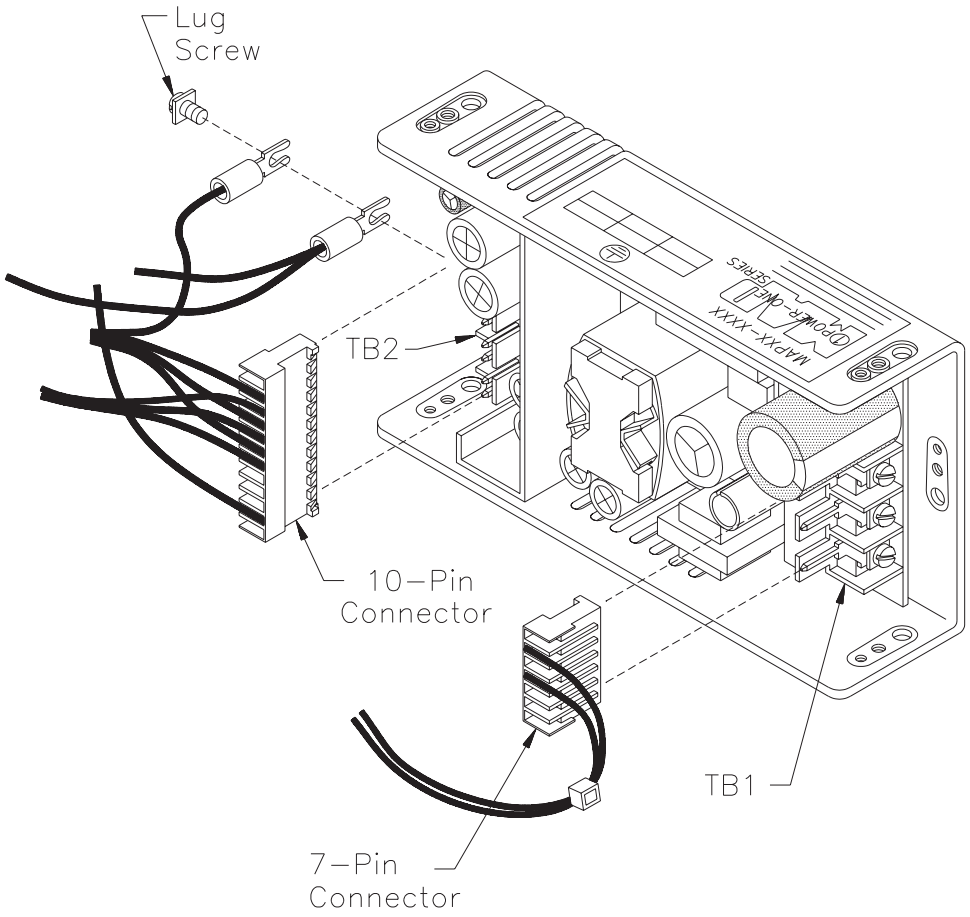

Figure 15-3 Power supply cable connections

15.3 Replacing the Power Supply

To replace the power supply, follow these steps:

1. Replace the wire clips as follows (refer to Figure 15-3):
   a. Insert the two sets of wire clips into the lug screw (screwed into lug #4, the second lug from the left).
   b. Place the single-wire clip on top of the double-wire clip, with the flat sides touching.
   c. Use a ⅛-inch flat-blade screwdriver to turn the lug screw clockwise two or three times, so that the wires are securely attached.
2. Attach the 10-pin cable connector to "TB2."
3. Insert the new power supply into the CHS, as shown in Figure 15-1. The label with the blue writing on the power supply should face up; the black label should face down. Make certain that no wires are caught between the power supply and the chassis.
4. Replace the 7-pin connector as follows:
   a. Insert the 7-pin connector through the hole at the base of the CTS's mounting frame.
   b. Connect the 7-pin connector to "TB1" on the power supply.

   Note: It may be difficult to connect the 7-pin connector to the power supply. The top side of the connector must be fully against the power supply's large capacitor.

   c. Position the rubber grommet back in the opening.
5. Using a T-15 bit, replace the two screws on the side of the chassis (#6-32 × 0.25 pan-head machine screws). Tighten the screws to 12.0 inch-pounds of torque (13.8 kg-cm).
6. Replace the CTS (see Section 10.3).
7. Replace the cover assembly (see Section 8.3).
8. Reconnect the SCSI cables and the power cord on the back of the CHS.
9. Because you moved the CTS, recalibrate the CTS position by following the instructions in Appendix B.

16

Fan Replacement

This chapter describes how to remove and replace the fan, located on the back of the CHS.

16.1 Preliminary Procedures

Before removing the fan, follow the instructions in this section.

Required Tools

Make certain you have the tools listed below.

- ✓ Torque limiting screwdriver
- ✓ T-10 TORX driver bit (for removing the cover)
- ✓ Flat-blade screwdriver

ESD Requirements

Make certain you protect the CHS from electrostatic discharge (ESD). Refer to Section 2.1 for more information.

16.2 Removing the Fan

To remove the fan, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.
2. Remove the cover assembly (see Section 8.2).
3. Remove the plastic rivets, as follows:
   a. Locate the fan and the four plastic rivets that hold it in place, as shown in Figure 16-1.
   b. Place the tip of a flat-blade screwdriver under the head of any fan rivet.
   c. Gently pry the rivet out.
   d. Using the same procedure, remove the remaining three rivets.

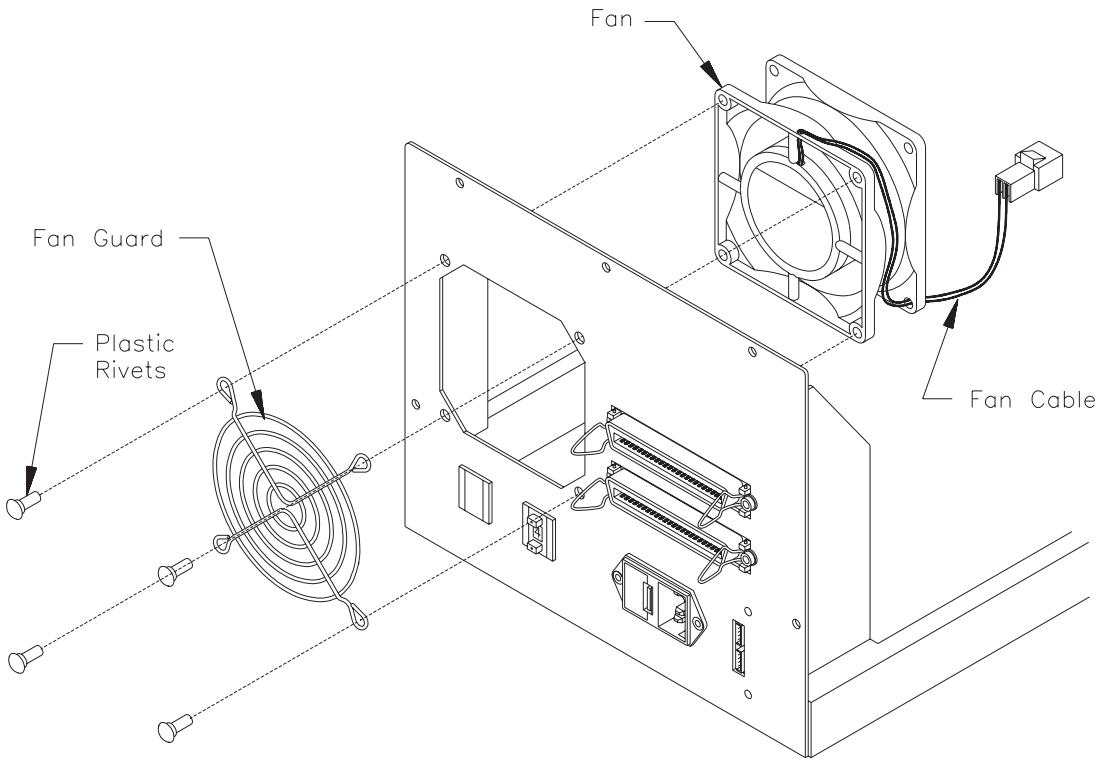

Figure 16-1 Fan (rear view of the CHS)

4. Carefully lift out the fan. Do not damage the cable that is still attached to the fan.

5. Detach the fan cable from the connection *between* the fan and the power supply, as shown in Figure 16-2. Do not disconnect the cable from the power supply.

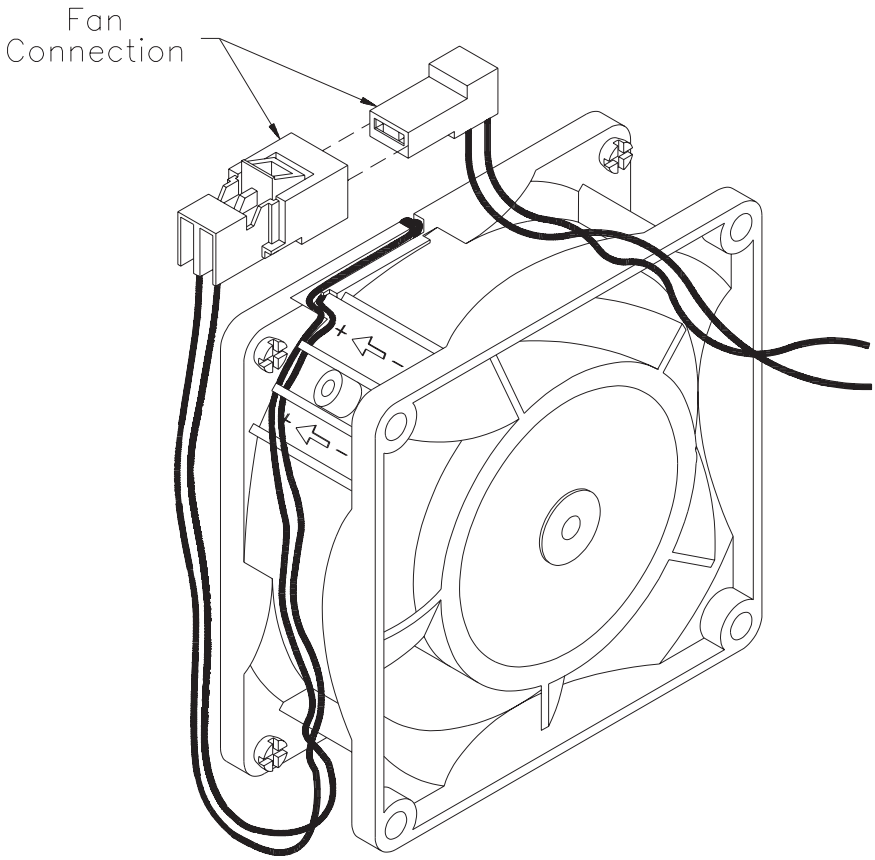

Figure 16-2 Fan connector location

16.3 Replacing the Fan

To replace the fan, follow these steps:

1. Connect the fan cable to the connection between the fan and the power supply, as shown in Figure 16-2.
2. Insert the fan into the chassis, so that the air-flow arrows point to the outside, back of the CHS. The air-flow arrows are located on the side of the fan, as shown in Figure 16-2.
3. Place the fan guard on the back of the CHS, as shown in Figure 16-1, and align it with the fan.
4. From the back of the CHS, replace four new rivets through the corner slots in the fan guard by using your finger to push in each one.
5. Replace the cover assembly (see Section 8.3).
6. Reconnect the SCSI cables and the power cord on the back of the CHS.

Notes:

17

SCSI ID Switch Replacement

This chapter describes how to remove and replace the SCSI ID switch, located on the back of the CHS. (For information on setting the SCSI ID, refer to *EXB-10 Cartridge Handling Subsystem Installation and Operation* or the *EXB-10i Cartridge Handling Subsystem User's Manual*.)

Note: The EXB-10 has one SCSI ID switch that connects to the CTS. The EXB-10i has two SCSI ID switches: the switch labeled "Drive" connects to the CTS and the switch labeled "Mech" connects to the VMC card.

17.1 Preliminary Procedures

Before removing the SCSI ID switch, follow the instructions in this section.

Required Tools

Make certain you have the tools listed below.

- ✓ Torque limiting screwdriver
- ✓ T-10 TORX driver bit (for removing the cover)
- ✓ Flat-blade screwdriver (for removing the fan)
- ✓ T-15 driver bit (for removing the ESD cover plate)

ESD Requirements

Make certain you protect the CHS from electrostatic discharge (ESD). Refer to Section 2.1 for more information.

17.2 Removing the Switch

To remove the SCSI ID switch, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Remove the cover assembly (see Section 8.2).

3. To reach the SCSI ID switch more easily, move the fan. To do this, use a flat-blade screwdriver to remove the four plastic rivets that hold the fan in place (see Figure 16-1). Set the fan aside. You do not need to disconnect the fan cable.

4. Some CHS models include an ESD cover plate that shields the SCSI ID switches, as shown in Figure 17-1. If your CHS has this plate, use a T-15 TORX driver bit to remove the single screw and remove the plate. If your CHS model also has a nut behind the screw, hold the nut with a hex nut driver and then use the T-15 bit to remove the screw.

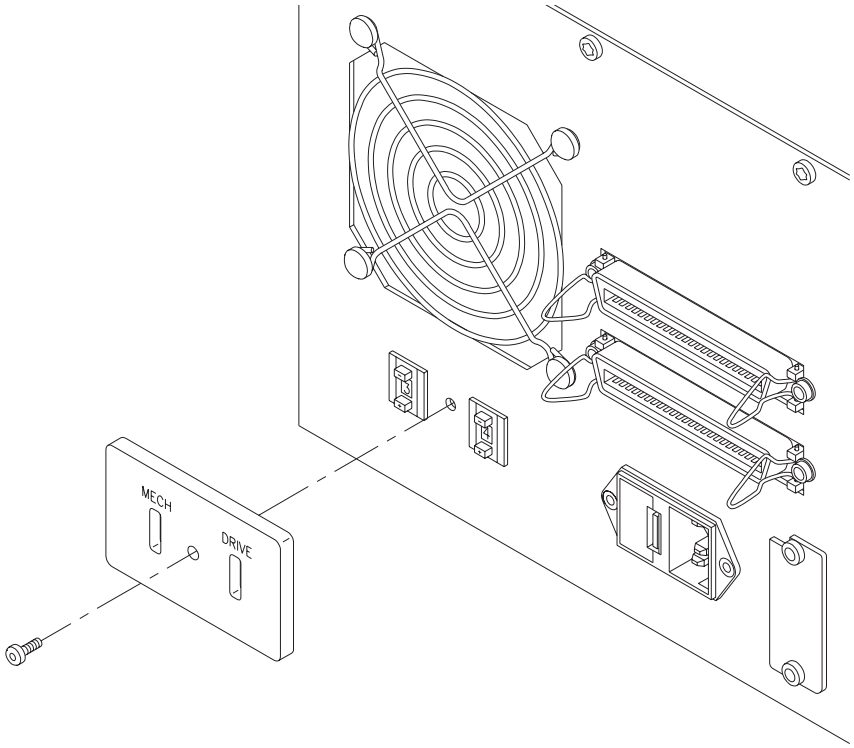

Figure 17-1 ESD cover plate

5. Locate the SCSI ID switch on the back of the CHS. Figure 17-2 shows the SCSI ID switch removed from the CHS. Disconnect the cable from the interface card, which is located on the back of the CTS.

   Note: If you have an EXB-10i, there are two SCSI ID switches: the switch labeled “Drive” attaches to the CTS and the switch labeled “Mech” attaches to the VMC card.

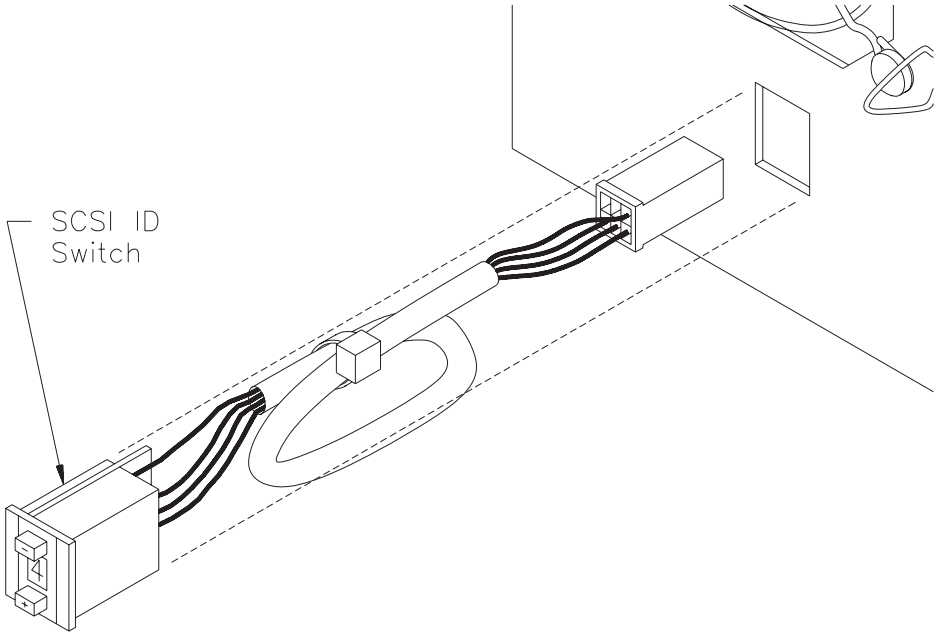

Figure 17-2 SCSI ID switch (removed from the CHS)

6. Using your fingers, depress all four clips on the corners of the SCSI ID switch and apply pressure to the back of the switch until it slips through the chassis. Be careful not to damage the cable that is still attached to the switch.

17.3 Replacing the Switch

To replace the SCSI ID switch, follow these steps:

1. From the outside of the CHS, insert the SCSI ID switch so that the number setting is facing right-side up, as shown in Figure 17-2.

2. Slide the switch into its slot until the switch snaps securely into place.

3. If you are replacing the SCSI ID switch for the CTS (labeled "Drive"), connect the SCSI ID switch's cable to the remote connector on the interface card located on the back of the CTS.

   If you have an EXB-10i and are replacing the SCSI ID switch for the CHM (labeled "Mech"), remove the cable tie by using wire clippers. Connect the SCSI ID cable to the connector labeled "P2" on the VMCR card. Make certain that pin 1 (marked "1" on the upper left corner of the switch) connects to the upper left pin on the P2 connector. Make certain that all six pins are connected properly.

4. If your CHS includes an ESD cover plate, replace the plate and single screw. Use a T-15 bit to tighten the screw to 12.0 inch-pound torque (13.8 kg-cm).

5. Replace the fan by placing it back in its mounting hole. Replace four new rivets by using your finger to push in each one.

6. Replace the cover assembly (see Section 8.3).

7. Replace the SCSI cables and the power cord on the back of the CHS.

Notes:

18

Fuse Replacement

This chapter describes how to remove and replace the fuse, located in the back of the CHS. The CHS uses a 5 × 20 mm, 1.6 amp, 250-volt, 3AG, slow-blow fuse. An extra fuse is located in the fuse drawer at the back of the CHS.

18.1 Preliminary Procedures

Make certain you protect the CHS from electrostatic discharge (ESD). Refer to Section 2.1 for more information.

No tools are required for replacing the fuse.

18.2 Removing the Fuse

To remove the fuse, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Locate the fuse drawer at the back of the CHS. Figure 18-1 shows the fuse drawer removed from the CHS.

3. Grasp the sides of the fuse drawer with your thumb and forefinger. Depress the release clip on the right side of the drawer and pull the fuse drawer out.

4. Remove the old fuse from the top slot in the fuse drawer and check to see if it has blown.

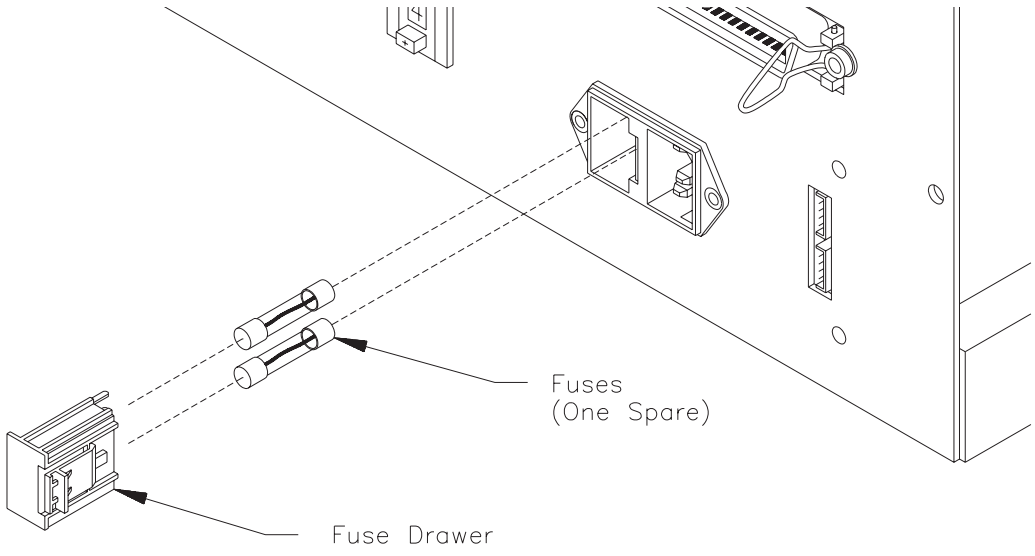

Figure 18-1 Fuse drawer (rear view of the CHS)

18.3 Replacing the Fuse

To replace the fuse, follow these steps:

1. If the old fuse has blown, replace it with the spare fuse in the bottom slot of the fuse drawer.

2. Insert the open end of the fuse drawer into its slot, with the release clip on the right. The release clip will snap into place when the fuse drawer is inserted properly.

3. Reconnect the SCSI cables and the power cord on the back of the CHS. Turn on the power switch.

Notes:

19

Power Entry Module Replacement

This chapter describes how to remove and replace the power entry module, located on the back of the CHS.

19.1 Preliminary Procedures

Before removing the power entry module, follow the instructions in this section.

Required Tools

Make certain you have the tools listed below.

- ✓ Torque limiting screwdriver
- ✓ T-10 TORX driver bit (for removing the cover)
- ✓ T-8 TORX driver bit
- ✓ $^{5}/_{16}$-inch socket on a torque driver

ESD Requirements

Make certain you protect the CHS from electrostatic discharge (ESD). Refer to Section 2.1 for more information.

19.2 Removing the Power Entry Module

To remove the power entry module, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Remove the cover assembly (see Section 8.2).

3. To access the module more easily, move the CTS forward. To do this, use a T-15 TORX driver bit to remove the three screws that hold the CTS in place. See Figure 10-3 for the location of these screws. Slide the CTS forward until you can easily access the cable connections.

4. Locate the power entry module on the back of the CHS, as shown in Figure 19-1. Using a T-8 TORX driver bit, remove the two screws that secure the power entry module in the CHS. One screw is located on the right and one screw is located on the left of the module.

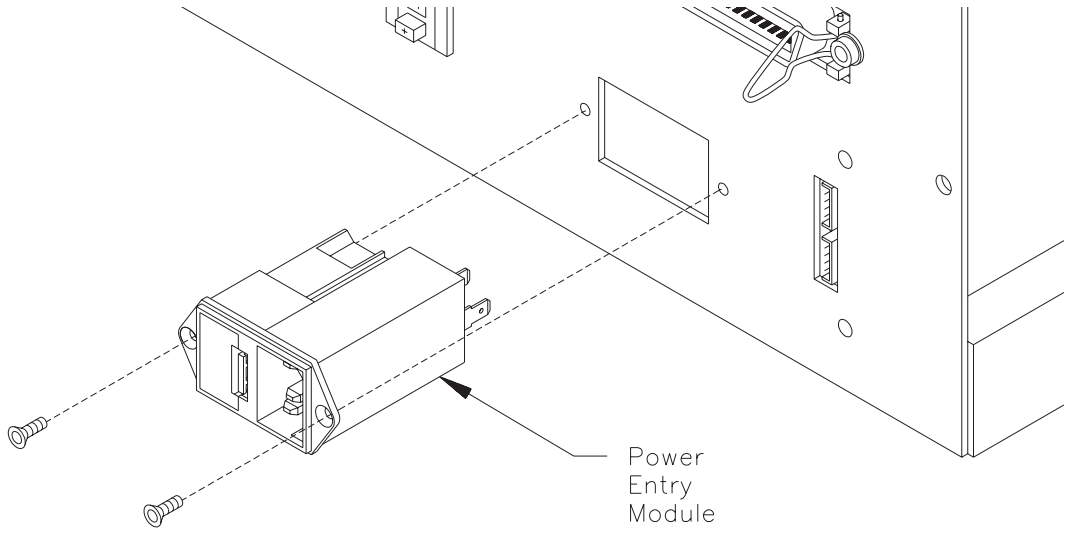

Figure 19-1 Power entry module (cables not shown)

5. Detach each of the four cables from the power entry module. The fifth cable, which is the ground lug cable, is soldered onto the power entry module. Figure 19-2 shows the location of this cable.

   You must remove the ground lug cable from its ground connection by removing the lock nut and star washer, as shown in Figure 19-2. To remove the lock nut, use a $^{5}/_{16}$-inch socket on a torque driver. Once the lock nut is removed, remove the star washer and slip the cable off the ground stud.

6. Once you have removed all the cable connections, pull out the power entry module and the attached ground lug cable.

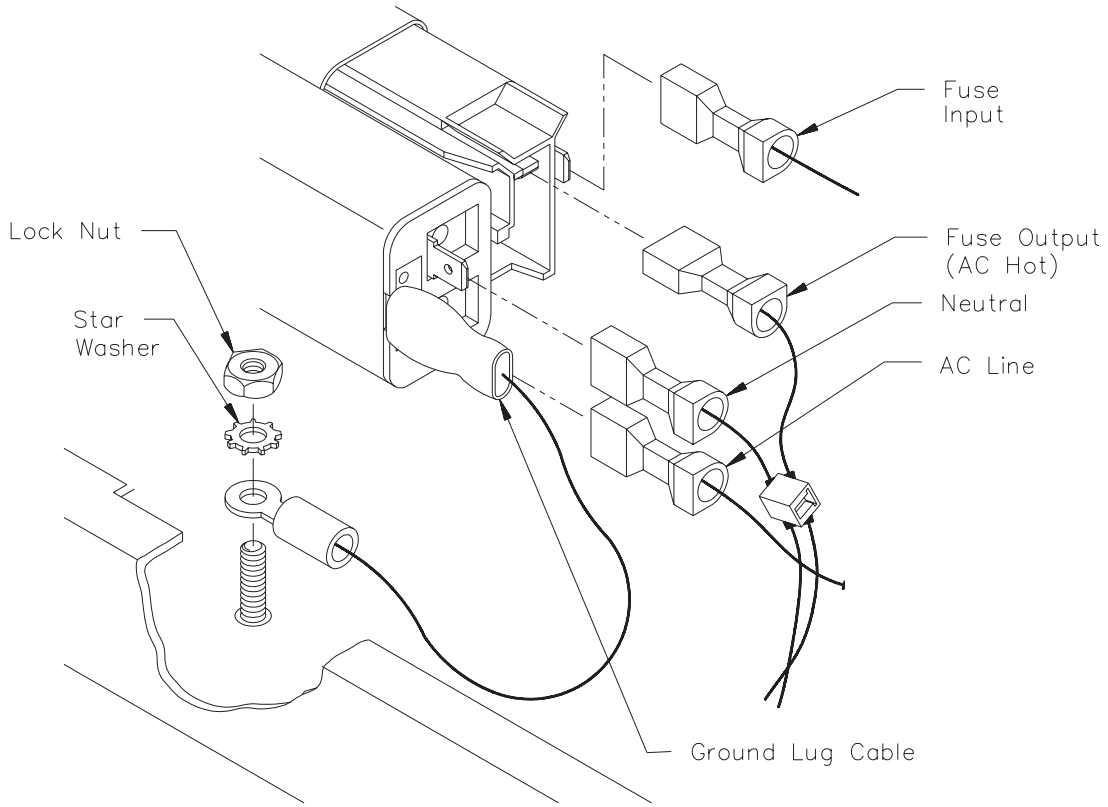

Figure 19-2 Cable connectors on the power entry module

19.3 Replacing the Power Entry Module

To replace the power entry module, follow these steps:

1. Insert the new power entry module into its slot on the back of the chassis, so that the power entry chamber is closest to the maintenance port and the fuse drawer cover is closest to the SCSI ID switch.

2. Attach each of the five cables as indicated below. See Figure 19-2 for an illustration of the cable connections on the back of the power entry module. (There are no labels on the module.)

   - "Power Entry Module AC Line" attaches to the left, bottom connector "AC Line" on the power entry module.

   - "Pwr Entry Module Fuse Input" attaches to the connector "Fuse Input" on the power entry module.

   - "Pwr Entry Mod Fuse Output (AC Hot)" attaches to the horizontal connector "Fuse Output (AC Hot)" on the power entry module.

   - "Pwr Entry Module Neutral" attaches to the connector "Neutral" on the power entry module.

   - "Earth ground" (the ground lug cable soldered onto the power entry module) attaches to the ground connection at the base of the chassis. Replace the star washer and nut using a $^{5}/_{16}$-inch socket on a torque driver. Tighten the nut to 12.0 inch pounds of torque.

3. Replace the two screws and tighten them with a T-8 bit (#4-40 × .25 flathead machine screws). Tighten each screw to 3.0 inch-pounds of torque (3.5 kg-cm).

4. Replace the CTS by moving it backward to align the screw holes in the side of the CTS with the screw holes in the chassis. While using one hand to push down on the back of the CTS so it is flat on the sheet metal shelf, use a T-15 bit to replace the two screws on the left side of the CTS (#6-32 × 0.38 crest cup screws). Then replace the one screw on the right (#6-32 × 0.38 crest cup screw). See Figure 10-3 for the location of these screws. Tighten each screw to 12.0 inch-pounds of torque (13.8 kg-cm).

5. Replace the cover assembly (see Section 8.3).

6. Reconnect the SCSI cables and the power cord on the back of the CHS.

20

Switch Sensor Replacement

This chapter describes how to remove and replace the switch sensors. The two switch sensors, located on the top and bottom of the mounting plate, detect whether a cartridge holder is installed.

20.1 Preliminary Procedures

Before removing the switch sensors, follow the instructions in this section.

Required Tools

Make certain you have the tools listed below.

- ✓ Torque limiting screwdriver
- ✓ T-10 TORX driver bit
- ✓ T-15 TORX driver bit
- ✓ T-8 TORX driver bit

ESD Requirements

Make certain you protect the CHS from electrostatic discharge (ESD). Refer to Section 2.1 for more information.

20.2 Removing the Switch Sensors

To remove the switch sensors, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.
2. Remove the cover assembly (see Section 8.2).
3. Remove the upper bezel (see Section 9.2).
4. Remove the cartridge holder by pulling it straight out.
5. Remove the VMC card (see Section 14.3).
6. Locate the VMC VTENPCK cable, which is attached to the switch sensors on the back of the mounting plate, as shown in Figure 20-1. Two wire connectors are located on the top of the plate; two are located on the bottom. Detach these four wires from the switch sensors.

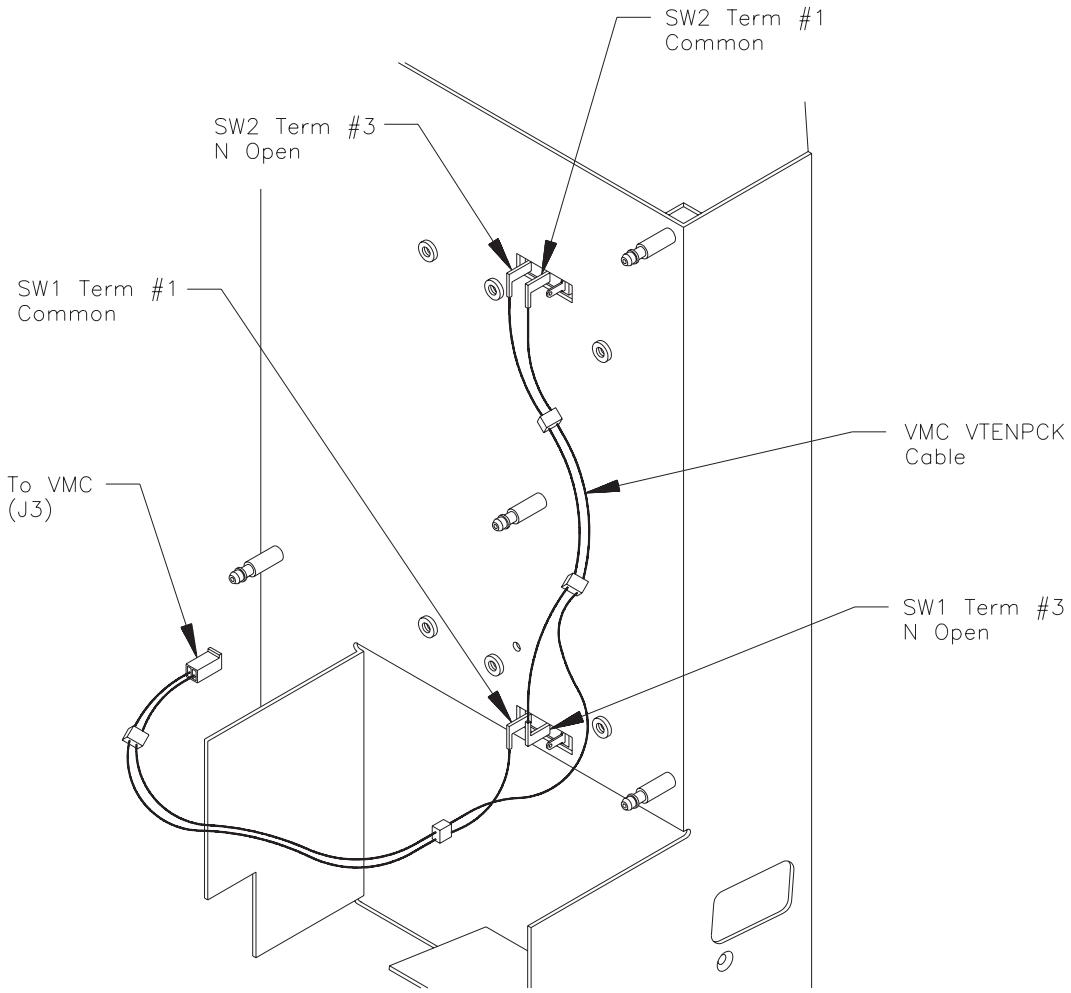

Figure 20-1 VMC VTENPCK cable connections (rear view of the chassis wall; VMC card removed)

7. Locate the mounting plate on the opposite side of the chassis wall. Using a T-15 TORX driver bit, remove the four screws that hold the mounting plate in place. See Figure 20-2 for the location of these screws.

8. Locate the two switch sensors on the top and bottom of the mounting plate. See Figure 20-2 for the switch sensor locations. Using a T-8 TORX driver bit, remove the four screws that hold the switch sensors on the mounting plate. Two screws are located on the top sensor and two are located on the bottom sensor, as shown in Figure 20-2.

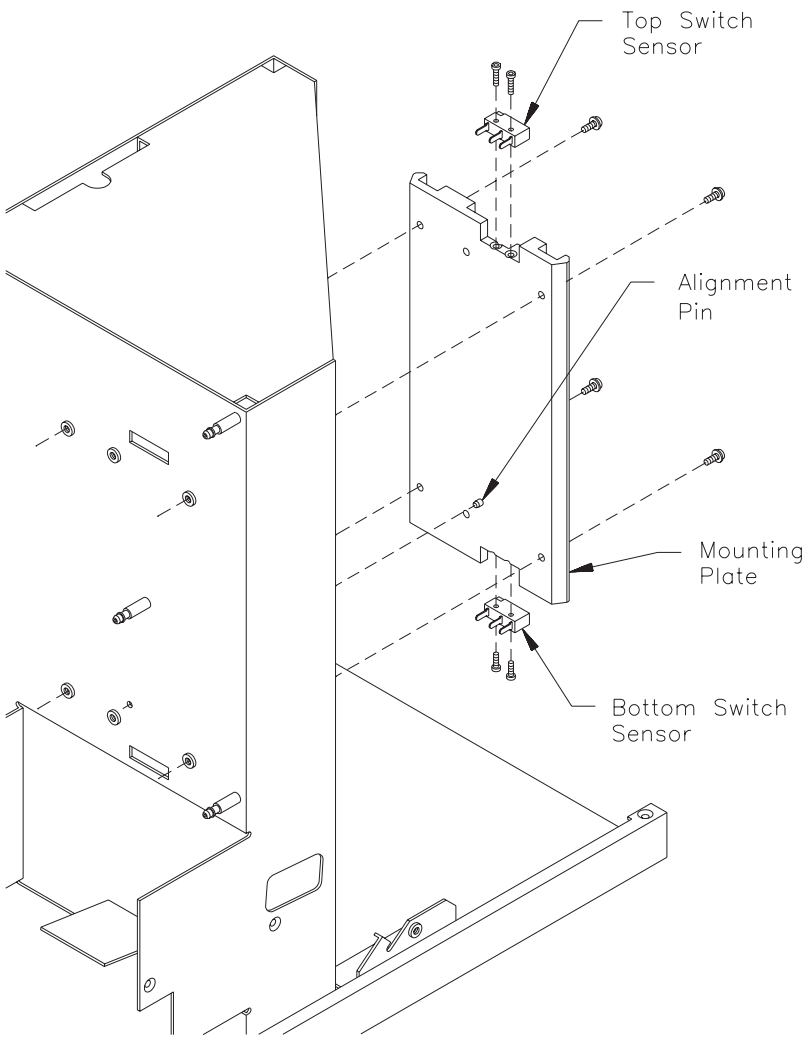

Figure 20-2 Mounting plate and switch sensors (removed from the CHS)

20.3 Replacing the Switch Sensors

To replace the switch sensors, follow these steps:

1. Insert the switch sensors, as follows:
   a. Insert one switch sensor into the bottom of the mounting plate, as shown in Figure 20-1.
   b. Using a T-8 bit, replace the two screws (#4-19 × ½-inch machine screws).
   c. Insert the second sensor into the top of the plate. Using a T-8 bit, replace the two screws.
   d. Tighten all four screws to 3.0 inch-pounds of torque (3.5 kg-cm).
2. Align the screw holes on the mounting plate with the screw holes on the chassis wall. Figure 20-2 shows the locations of the screw holes. Use a T-15 bit to replace the four screws (#6-32 × ⅜-inch crest cup machine screws). Tighten the screws to 12.0 inch-pounds of torque (13.8 kg-cm).
3. Attach the four wires to the switch sensors on the back of the mounting plate, as indicated below. (See Figure 20-1.)
   - "SW1 Term #1 Common" and "SW1 Term #3 N Open" attach to the bottom connectors on the bottom switch sensor. (The "Common" and "Open" ends can be connected to either bottom connector.)
   - "SW2 Term #3 N Open" and "SW2 Term #1 Common" attach to the top connectors on the top switch sensor. (The "Common" and "Open" ends can be connected to either top connector.)
4. Replace the VMC card (see Section 14.3).
5. Replace the cartridge holder by aligning the mounting hole on the back of the cartridge holder with the alignment pin on the mounting plate. Push in the cartridge holder.
6. Replace the upper bezel (see Section 9.3).
7. Replace the cover assembly (see Section 8.3).
8. Reconnect the SCSI cables and the power cord on the back of the CHS.

21

Door Switch Plate Replacement

This section describes how to remove and replace the door switch plate, which is located at the base of the CHS just in front of the CTS door. This switch detects when the CTS door opens and triggers the CHS's pick-and-place cycle.

21.1 Preliminary Procedures

Before removing the door switch plate, follow the instructions in this section.

Required Tools

Make certain you have the tools listed below.

- ✓ Torque limiting screwdriver
- ✓ T-10 TORX driver bit (for removing the cover)
- ✓ T-15 TORX driver bit

ESD Requirements

Make certain you protect the CHS from electrostatic discharge (ESD). Refer to Section 2.1 for more information.

21.2 Removing the Door Switch Plate

To remove the door switch plate, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Remove the cover assembly (see Section 8.2).

3. Remove the upper bezel (see Section 9.2).

4. Locate the door switch plate at the base of the CHS, as shown in Figure 21-1. Detach the plate's cable from the connector labeled "J9" on the VMC card, which is located behind the chassis wall. (See Figure 14-1 for an illustration of the VMC card connections.) Leave the cable attached to the door switch plate.

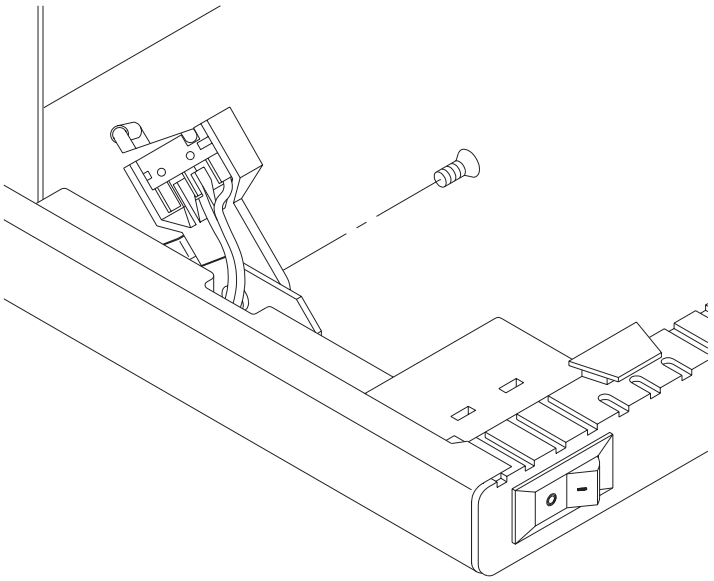

Figure 21-1 Door switch plate

5. Using a T-15 TORX driver bit, remove the single screw that holds the plate in place.

6. Locate the power switch cover. This is a black, plastic cover that shields the power switch and the VPOWER switch cable, as shown in Figure 22-1. Remove the power switch cover by following these steps:

   a. Push the cover back (away from you if you are facing the front of the CHS) approximately ⅛ of an inch, until it will not move any farther.

   b. Lift up on the front of the cover and pull it up approximately one inch.

   c. Twist the cover to the left.

   d. Remove the retaining tab from the slot in the chassis.

7. Remove the door switch plate and pull the attached cable through the side of the chassis.

21.3 Replacing the Door Switch Plate

To replace the door switch plate, follow these steps:

1. Route the plate's cable between the chassis base and the chassis left panel.

2. Attach the cable to the connector labeled "J9" on the VMC card.

3. Align the screw hole on the door switch plate with the screw hole on the chassis.

4. Rotate the plate so it rests on the metal stop near the CTS, as shown in Figure 21-1. Using a T-15 bit, replace the screw (#6-32 × ⅜-inch crest cup machine screw). Tighten the screw to 8.0 inch-pounds of torque (9.2 kg-cm).

5. Replace the power switch cover by inserting the tab on the back of the cover into the wire channel on the lower left of the chassis, then snapping the front of the cover into the lower bezel. Make certain that no cables are caught under the cover.

6. Replace the cover assembly (see Section 8.3).

7. Reconnect the SCSI cables and the power cord on the back of the CHS.

22

Power Switch Replacement

This chapter describes how to remove and replace the power switch, located in the lower bezel.

22.1 Preliminary Procedures

Before removing the power switch, follow the instructions in this section.

Required Tools

Make certain you have the tools listed below.

- ✓ Torque limiting screwdriver
- ✓ T-10 TORX driver bit (for removing the cover and bezels)
- ✓ Flat-blade screwdriver

ESD Requirements

Make certain you protect the CHS from electrostatic discharge (ESD). Refer to Section 2.1 for more information.

22.2 Removing the Power Switch

To remove the power switch, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Remove the cover assembly (see Section 8.2).

3. Remove the upper bezel (see Section 9.2).

4. Locate the power switch cover. This is a black, plastic cover that shields the power switch and the VPOWER switch cable, as shown in Figure 22-1. Remove the power switch cover by following these steps:

   a. Push the cover back (away from you if you are facing the front of the CHS) approximately ⅛ of an inch, until it will not move any farther.

   b. Lift up on the front of the cover and pull it up approximately one inch.

   c. Twist the cover to the left.

   d. Remove the retaining tab from the slot in the chassis.

5. Locate the lower bezel, as shown in Figure 22-1. Using a T-10 TORX driver bit, remove the two screws (one on each side) that hold the bezel in place.

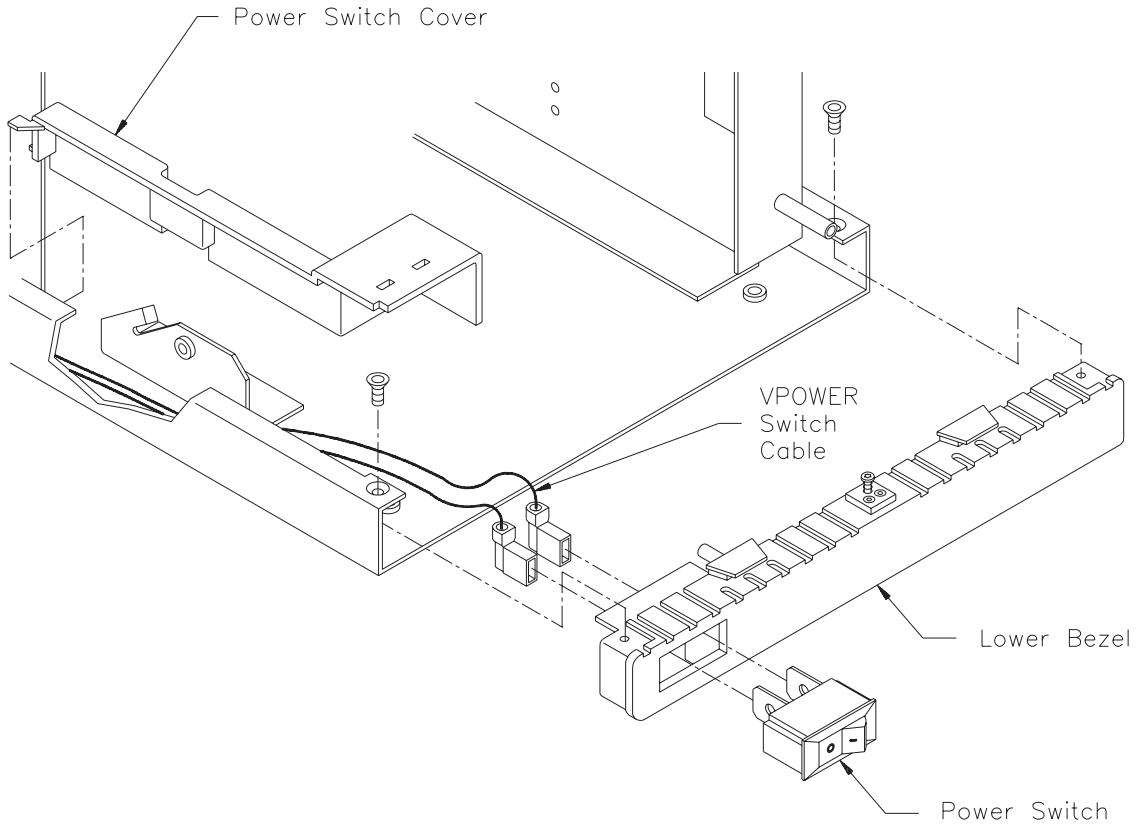

Figure 22-1 Power switch removed from the lower bezel

6. From the front of the CHS, slide the bezel toward you and away from the CHS. Be careful not to damage the cable that is still attached.

7. Detach the VPOWER switch cable from the power switch on the bezel. Figure 22-1 shows the location of the cable.

8. From the inside of the lower bezel, use a flat-blade screwdriver to press the retaining tab on one side of the power switch. Then depress the retaining tab on the other side until the power switch pops out of the bezel.

22.3 Replacing the Power Switch

To replace the power switch, follow these steps:

1. Snap the power switch into the lower bezel, so that the “0” on the switch is on the left.

2. Reconnect the VPOWER switch cable, as indicated below:

   - “Pwr Switch Pin #1, Silver Common” attaches to the silver-colored connector, “#1 Silver,” on the lower bezel.

   - “Pwr Switch Pin #2, Gold Output” attaches to the gold-colored connector, “#2 Gold,” on the lower bezel.

3. Insert the lower bezel (with the black power switch facing out) into the bottom of the CHS. See Figure 22-1 for the correct location of the lower bezel. Using a T-10 bit, replace the two screws (#4-20 × .38 pan-head plastite screws). Tighten the screws to 8.0 inch-pounds of torque (9.2 kg-cm).

4. Replace the power switch cover by inserting the tab on the back of the cover into the wire channel on the lower left of the chassis, then snapping the front of the cover into the lower bezel. Make certain that no cables are caught under the cover.

5. Replace the cover assembly (see Section 8.3).

6. Reconnect the SCSI cables and the power cord on the back of the CHS.

Notes:

23

Cable Replacement

This chapter describes how to remove and replace each of the cables listed in Table 23-1.

23.1 Preliminary Procedures

Before removing the cables, follow the instructions in this section.

Required Tools

For a list of tools, refer to Table 23-1.

Table 23-1 Tools required for replacing CHS cables

To replace this cable . . .	You will need the following tools . . .		
	T-10 TORX driver bit*	T-15 TORX driver bit*	Flat-blade screwdriver
DC power cable	✔	✔	✔
Flat flex cable	✔		
Power entry cable	✔	✔	
SCSI cable	✔		
VDIAG cable	✔	✔	
Vertical flex cable	✔	✔	
VMC/VDIAG cable	✔	✔	
VMC VTENPCK cable	✔		
VPOWER switch cable	✔	✔	

* All TORX driver bits must be used with a torque limiting screwdriver.

ESD Requirements

Make certain you protect the CHS from electrostatic discharge (ESD). Refer to Section 2.1 for more information.

23.2 Replacing the VMC VTENPCK Cable

To remove the VMC VTENPCK cable, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.
2. Remove the cover assembly (see Section 8.2).
3. Remove the VMC card and detach all cable connections (see Section 14.2).
4. Locate the VMC VTENPCK cable on the back of the chassis wall, as shown in Figure 23-1. This cable has connections to the VMC card and to the mounting plate's switch sensors.

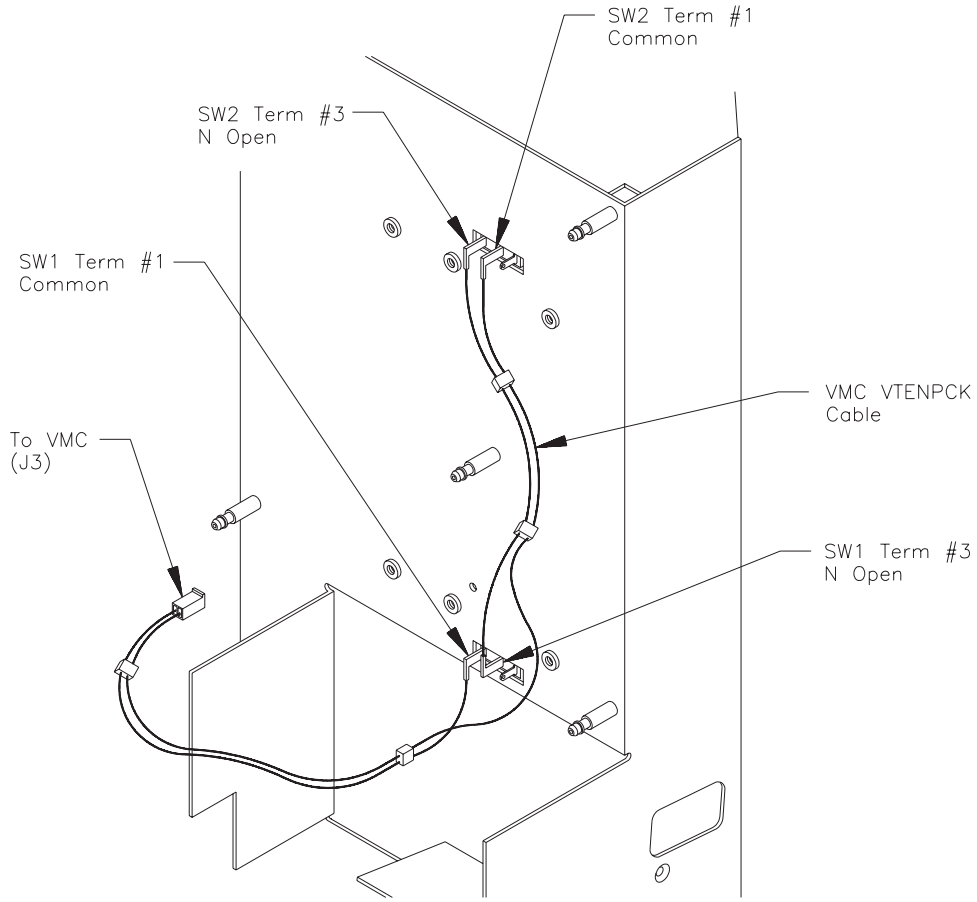

Figure 23-1 VMC VTENPCK cable and connector labels (rear view of the chassis wall)

5. Disconnect the cable from each of the four connectors on the switch sensors. Two connectors are on the top switch sensor and two connectors are on the bottom switch sensor.

To replace the VMC VTENPCK cable, follow these steps:

1. Connect the VMC VTENPCK cable, as indicated below:
   - "SW1 Term #1 Common" and "SW1 Term #3 N Open" attach to the bottom switch sensor. (The "Common" and "Open" ends of the cable can be connected to either connector on the bottom switch sensor.)
   - "SW2 Term #3 N Open" and "SW2 Term #1 Common" attach to the top switch sensor. (The "Open" and "Common" ends of the cable can be connected to either connector on the top switch sensor.)
2. Replace the VMC card (see Section 14.3). Make certain all cables are properly connected.
3. Replace the cover assembly (see Section 8.3).
4. Reconnect the SCSI cables and the power cord on the back of the CHS.

23.3 Replacing the VPOWER Switch Cable

To remove the VPOWER switch cable, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Remove the cover assembly (see Section 8.2).

3. Remove the upper bezel (see Section 9.2).

4. Locate the power switch cover, which is the black, plastic cover that shields the power switch and the VPOWER switch cable, as shown in Figure 23-2. Remove the power switch cover by following these steps:

   a. Push the cover back (away from you if you are facing the front of the CHS) approximately ⅛ of an inch, until it will not move any farther.

   b. Lift up on the front of the cover and pull it up approximately one inch.

   c. Twist the cover to the left.

   d. Remove the retaining tab from the slot in the chassis.

5. Remove the lower bezel, shown in Figure 23-2. To do this, use a T-10 TORX driver bit to remove the two screws (one on each side) that hold the bezel in place. From the front of the CHS, slide the bezel toward you and away from the CHS. Be careful not to damage the cable that is still attached.

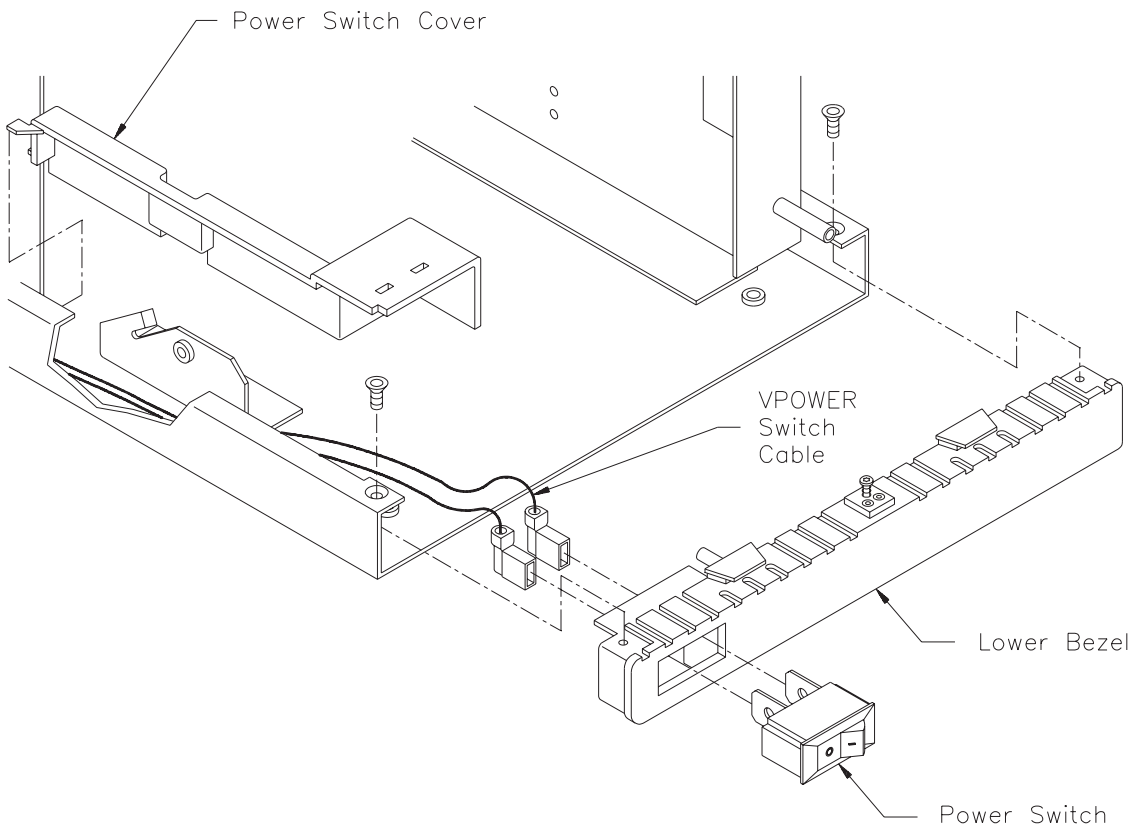

Figure 23-2 VPOWER switch cable (lower bezel and power switch removed)

6. Locate the VPOWER switch cable, which is the black cable connected to the power switch on the lower bezel. The cable runs along the left side of the chassis to the power entry module in the back of the CHS. Figure 23-2 shows the VPOWER switch cable and the lower bezel.

7. To access the cable's power entry module connection more easily, move the CTS forward. To do this, use a T-15 TORX driver bit to remove the three screws that hold the CTS in place. See Figure 10-3 for the location of these screws. Slide the CTS forward until you can easily access the cable connection.

8. Disconnect the end of the cable labeled "Power Entry Module AC Line" and "Power Entry Module Fuse Input" from the power entry module. The location of the "AC Line" and "Fuse Input" connector on the power entry module is shown in Figure 19-2.

To replace the VPOWER switch cable, follow these steps:

1. Route the cable through the lower left of the chassis from the power switch to the power entry module. Connect the VPOWER switch cable, as indicated below:

   - "Pwr Switch Pin #1, Silver Common" attaches to the silver-colored connector, "#1 Silver," on the power switch; "Pwr Switch Pin #2, Gold Output" attaches to the gold-colored connector, "#2 Gold," on the power switch. See Figure 23-2 for an illustration of the power switch connectors.

   - "Power Entry Module AC Line" attaches to "AC Line" on the power entry module; "Pwr Entry Module Fuse Input" attaches to "Fuse Input" on the power entry module. Refer to Figure 19-2 for the location of "AC Line" and "Fuse Input" on the power entry module. (There are no connector labels on the power entry module.)

2. Replace the CTS by moving it backward to align the screw holes in the side of the CTS with the screw holes in the chassis. While using one hand to push down on the top, back of the CTS so it is flat on the sheet metal shelf, use a T-15 bit to replace the two screws on the left side of the CTS (#6-32 × 0.38 crest cup screws). Then replace the screw on the right (#6-32 × 0.38 crest cup screw). See Figure 10-3 for the location of these screws. Tighten each screw to 12.0 inch-pounds of torque (13.8 kg-cm).

3. Replace the lower bezel by inserting it in the bottom of the CHS (with the black power switch facing out). Using a T-10 bit, replace the two screws (#4-20 × 0.25 pan head plastite screws). Tighten the screws to 8.0 inch-pounds of torque (9.2 kg-cm).

4. Replace the power switch cover by inserting the tab on the back of the cover into the wire channel on the lower left of the chassis, then snapping the front of the cover into the lower bezel. Make certain that no cables are caught under the cover.

5. Replace the upper bezel (see Section 9.3).

6. Replace the cover assembly (see Section 8.3).

7. Reconnect the SCSI cables and the power cord on the back of the CHS.

8. Because you moved the CTS in this procedure, you must recalibrate the CTS position as described in Appendix B.

23.4 Replacing the VDIAG cable

To remove the VDIAG cable, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Remove the cover assembly (see Section 8.2).

3. Locate the VDIAG cable, which is connected to the VDIAG card in the back of the CHS and the maintenance port on the CTS. Figure 14-3 shows the location of the VDIAG cable.

4. To access the cable more easily, move the CTS forward. To do this, use a T-15 TORX driver bit to remove the three screws that hold the CTS in place. See Figure 10-3 for the location of these screws. Slide the CTS forward until you can easily access the cable.

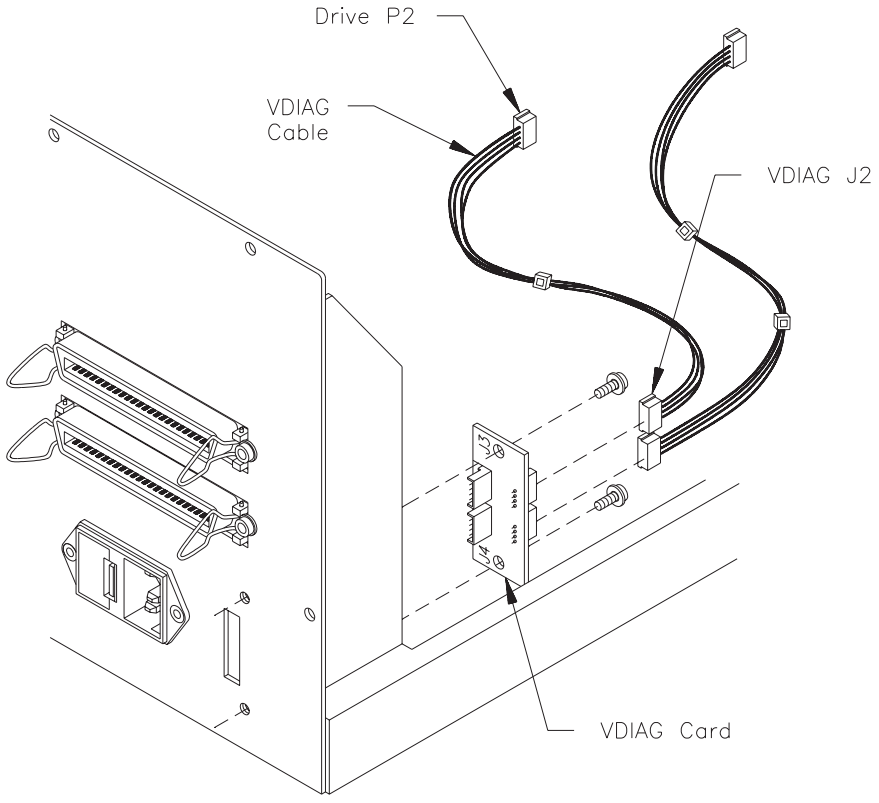

Figure 23-3 VDIAG cable (card and cable removed)

5. Disconnect the VDIAG cable from “J2” on the VDIAG card and from the maintenance port on the CTS.

To replace the VDIAG cable, follow these steps:

1. Reconnect the VDIAG cable in the following manner:

   - “VDIAG J2” attaches to “J2” on the VDIAG card.
   - “DRIVE P2” attaches to the maintenance port on the CTS.

2. Replace the CTS by moving it backward to align the screw holes in the CTS with the screw holes on the chassis. While using one hand to push down on the top, back of the CTS so it is flat on the sheet metal shelf, use a T-15 bit to replace the two screws on the left side of the CTS (#6-32 × 0.38 crest cup screws). Then replace the screw on the right (#6-32 × 0.38 crest cup screw). See Figure 10-3 for the location of these screws. Tighten each screw to 12.0 inch-pounds of torque (13.8 kg-cm).

3. Replace the cover assembly (see Section 8.3).

4. Reconnect the SCSI cables and the power cord on the back of the CHS.

5. Because you moved the CTS in this procedure, you must recalibrate the CTS position as described in Appendix B.

23.5 Replacing the VMC/VDIAG cable

To remove the VMC / VDIAG cable, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Remove the cover assembly (see Section 8.2).

3. Locate the VMC / VDIAG cable, which is connected to the VDIAG card and the VMC card in the back of the CHS. Figure 23-4 shows the location of the VMC / VDIAG cable.

4. To access the cable more easily, move the CTS forward. To do this, use a T-15 TORX driver bit to remove the three screws that hold the CTS in place. See Figure 10-3 for the location of these screws. Slide the CTS forward until you can easily access the cable.

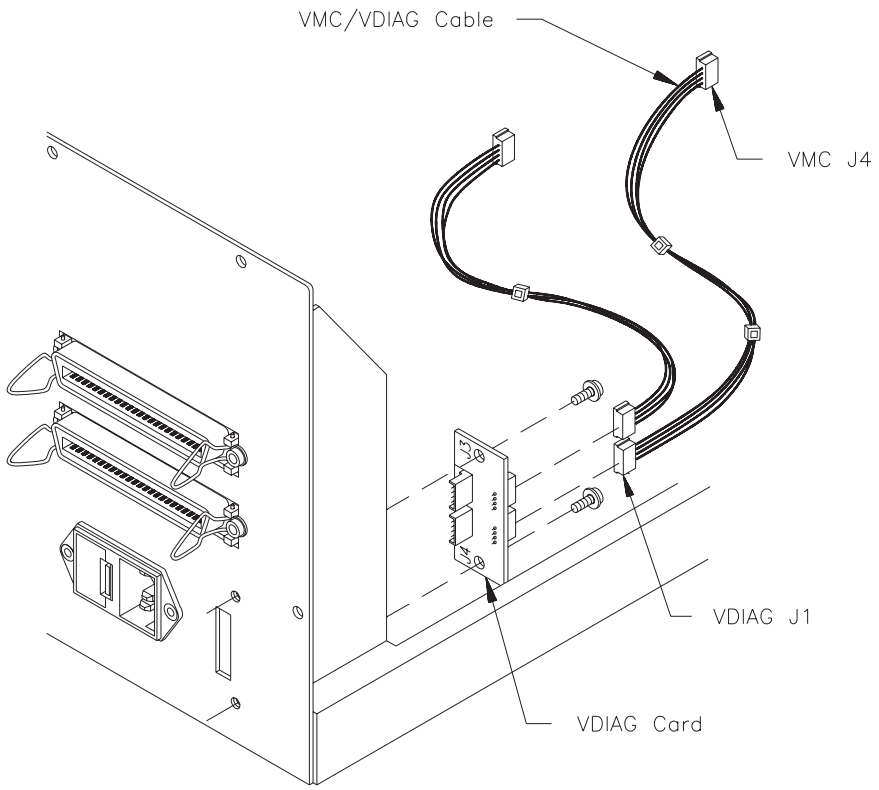

Figure 23-4 VMC/VDIAG cable (card and cable removed)

5. Disconnect the VMC / VDIAG cable from “J1” on the VDIAG card and from “J4” on the VMC card.

To replace the cable, follow these steps:

1. Connect the VMC / VDIAG cable, as indicated below:

   - “VDIAG J1” attaches to “J1” on the VDIAG card.
   - “VMC J4” attaches to “J4” on the VMC card.

2. Replace the CTS by moving it backward to align the screw holes in the CTS with the screw holes on the chassis. While using one hand to hold down the CTS so it is flat on the sheet metal shelf, use a T-15 bit to replace the two screws on the left side of the CTS (#6-32 × 0.38 crest cup screws). Then replace the screw on the right (#6-32 × 0.38 crest cup screw). See Figure 10-3 for the location of these screws. Tighten each screw to 12.0 inch-pounds of torque (13.8 kg-cm).

3. Replace the cover assembly (see Section 8.3).

4. Reconnect the SCSI cables and the power cord on the back of the CHS.

5. Because you moved the CTS in this procedure, you must recalibrate the CTS position as described in Appendix B.

23.6 Replacing the DC Power Cable

To remove the DC power cable, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Remove the cover assembly (see Section 8.2).

3. Locate the DC power cable, which has main connectors to the power supply and additional connectors to the VMC card, the CTS, and the fan. Figure 23-5 shows the DC power cable and power supply.

4. To access the cable connectors more easily, move the CTS forward. To do this, use a T-15 TORX driver bit to remove the three screws that hold the CTS in place. See Figure 10-3 for the location of these screws. Slide the CTS forward until you can easily access the cable.

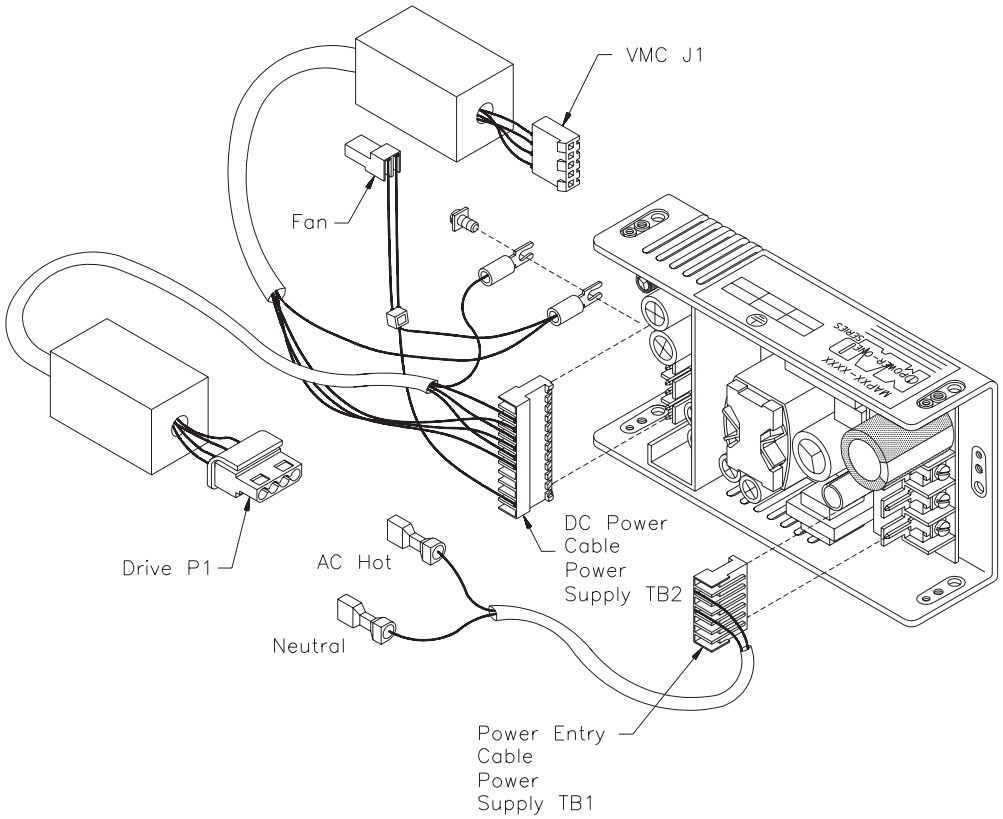

Figure 23-5 DC Power cable, Power Entry cable, and power supply

5. To access the main connector on the power supply more easily, remove the power supply and disconnect the 7-pin connector from "TB1," as described in Section 15.2.

6. Disconnect the following DC power cable connections:

   - "Pwr Sup TB2" (10-pin connector) from the power supply.
   - "VMC J1" from the VMC card.
   - "Drive P1" from the CTS's power connector.
   - "Fan" from the middle connector to the fan.
   - The two wire clips from the lug screw (lug #4 on the power supply).

     To disconnect the wire clips, use a ⅛-inch flat-blade screwdriver to turn the lug screw two or three times counterclockwise. When the screw is loosened, slip the wire clips away from the lug screw.

To replace the DC power cable, follow these steps:

1. Connect the DC power cable, as indicated below:

   - "Pwr Sup TB1" attaches to "TB1" on the power supply. (See page 15-4 for further instructions.)
   - "Pwr Sup TB2" attaches to "TB2" on the power supply.
   - "VMC J1" attaches to "J1" on the VMC card.
   - "Drive P1" attaches to the CTS's 4-pin power connector.
   - "Fan" attaches to the middle "Fan" connector.
   - The two wire clips attach to the lug screw (lug #4 on the power supply).

     To attach the wire clips, insert the wires between the lug screw and the power supply. The single-wire clip must be on top of the double-wire clip, with the flat sides touching. Use a ⅛-inch flat-blade screwdriver to turn the screw clockwise so that the wires are securely attached.

2. Replace the power supply in its housing (see Section 15.2). Use a T-15 bit to replace the two screws (#6-32 × 0.38 crest cup screws). Be careful not to damage any of the cables. Tighten the screws to 12.0 inch-pounds of torque (13.8 kg-cm).

3. Replace the CTS by moving it backward to align the screw holes in the CTS with the screw holes on the chassis. While using one hand to press down on the top, back of the CTS so it is flat on the sheet metal shelf, use a T-15 bit to replace the two screws on the left side of the CTS (#6-32 × 0.38 crest cup screws). Then replace the screw on the right (#6-32 × 0.38 crest cup screw). See Figure 10-3 on page 10-4 for the location of these screws. Tighten each screw to 12.0 inch-pounds of torque (13.8 kg-cm).

4. Replace the cover assembly (see Section 8.3).

5. Reconnect the SCSI cables and the power cord on the back of the CHS.

6. Because you moved the CTS in this procedure, you must recalibrate the CTS position as described in Appendix B.

23.7 Replacing the Power Entry Cable

To remove the power entry cable, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Remove the cover assembly (see Section 8.2).

3. Remove the CTS (see Section 10.2).

4. Locate the power entry cable, which is connected to the power entry module and the power supply. Figure 23-5 shows the location of the power entry cable and the power supply. Figure 19-2 shows the location of the power entry cable's connectors ("AC Hot" and "Neutral") on the power entry module.

5. Disconnect the following power entry cable connectors:

   - "Pwr Entry Mod Fuse Output (AC Hot)" from the power entry module. See Figure 19-2 for the location of the "AC Hot" connector on the power entry module.

   - "Pwr Entry Module Neutral" from the power entry module. See Figure 19-2 for the location of the "Neutral" connector on the power entry module.

   - "Pwr Supply TB1" (7-pin connector) from the power supply. (See page 15-4 for further instructions.)

To replace the power entry cable, follow these steps:

1. Connect the power entry cable, as indicated below:

   - "Pwr Entry Mod Fuse Output (AC Hot)" attaches to "Fuse Output (AC Hot)" on the power entry module. Refer to Figure 19-2 for the location of "Fuse Output (AC Hot)" on the power entry module. (There are no connector labels on the power entry module.)

   - "Pwr Entry Module Neutral" attaches to "Neutral" on the power entry module. Refer to Figure 19-2 for the location of "Neutral" on the power entry module. (There are no connector labels on the power entry module.)

   - "Pwr Supply TB1" attaches to "TB1" on the power supply. (See page 15-4 for further instructions.)

2. Replace the CTS (see Section 10.3).

3. Replace the cover assembly (see Section 8.3).

4. Reconnect the SCSI cables and the power cord on the back of the CHS.

5. Because you moved the CTS in this procedure, you must recalibrate the CTS position. See Appendix B.

23.8 Replacing the Flat Flex Cable

To remove the flat flex cable, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Remove the cover assembly (see Section 8.2).

3. Locate the flat flex cable, which is connected to the VDISPLAY card on the CHS front panel and the VMC card on the back of the chassis wall. Figure 23-6 shows the location of the flat flex cable.

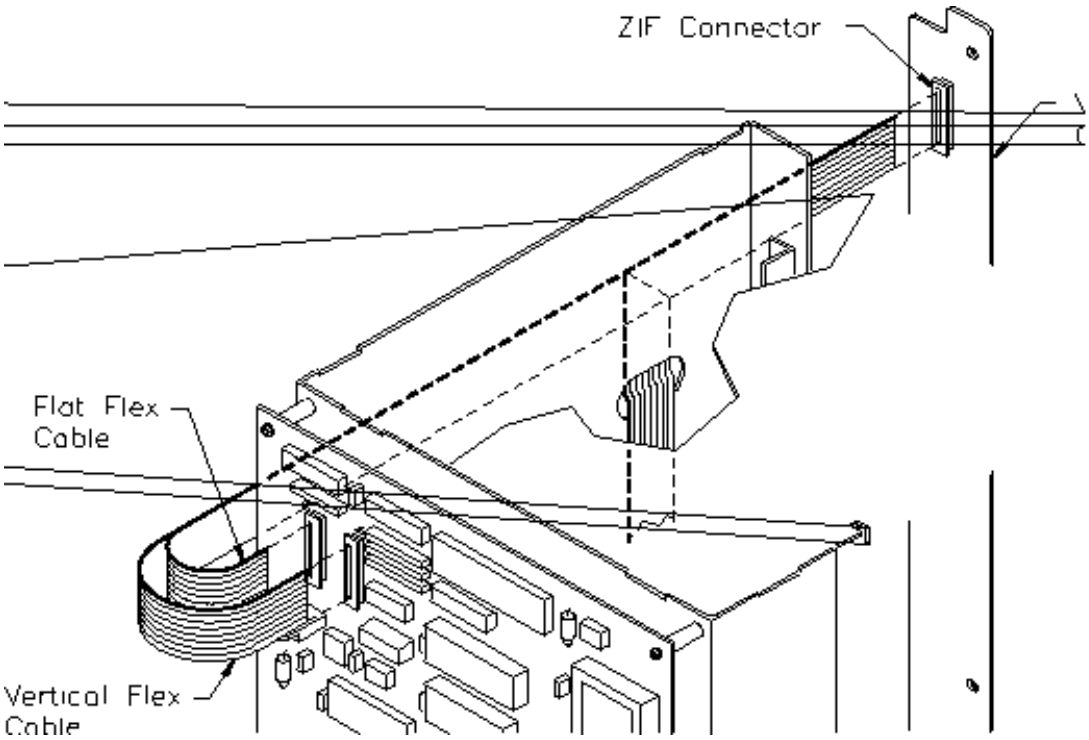

Figure 23-6 Flat flex cable and vertical flex cable

4. Remove the upper bezel (see Section 9.2).

5. Disconnect the flat flex cable from the “J1” ZIF connector on the VDISPLAY card and from the “J2” ZIF connector on the VMC card. To remove the cable from a ZIF connector, grasp the tab on the top and bottom of the connector with your thumb and forefinger. Pull on the connector clip until the cable slides away from connector.

6. Slide the flat flex cable out of the black cable shielding and the clips on the side of the chassis.

To replace the flat flex cable, follow these steps:

1. Slip the flat flex cable underneath the vertical flex cable in the cable shielding. Guide one end of the cable through the slot on the top corner of the VMC card. Guide the other end toward the VDISPLAY card, as shown in Figure 23-6.

2. Connect the flat flex cable to the “J2” ZIF connector on the VMC card. To do this, push the cable into the connector until it is seated squarely against the back of the connector. Slide the connector’s clip into place, ensuring that both sides of the clip are squarely locked.

   Using the same procedure described above, connect the flat flex cable to the “J1” ZIF connector on the VDISPLAY card.

3. Replace the upper bezel (see Section 9.3).

4. Replace the cover assembly (see Section 8.3).

5. Reconnect the SCSI cables and the power cord on the back of the CHS. Turn on the power switch.

23.9 Replacing the Vertical Flex Cable

To remove the vertical flex cable, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Remove the cover assembly (see Section 8.2).

3. Locate the vertical flex cable. This is a ribbon cable connected to the VY card on the CHM and to the VMC card on the back of the chassis wall. Figure 23-7 shows the location of the vertical flex cable.

4. Remove the CHM and disconnect the vertical flex cable from the VY card on the CHM (see Section 11.2).

   Note: Some vertical flex cables have an adhesive backing and either one or two screw holes for attachment to the inside of the chassis wall, as shown in Figure 23-7. Using a T-15 bit, remove the screws and peel the cable from the chassis.

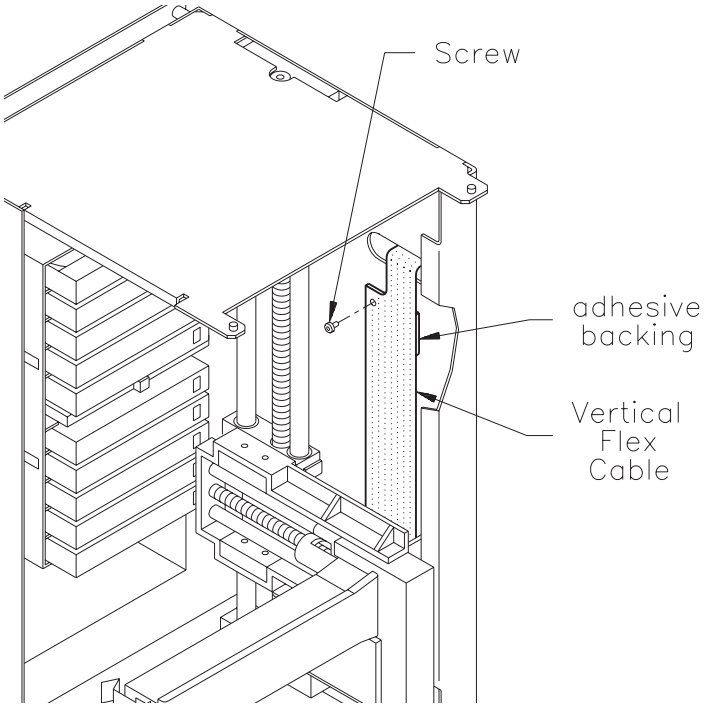

Figure 23-7 Vertical Flex cable connection on chassis wall

5. Disconnect the vertical flex cable from the “J6” ZIF connector on the VMC card. To remove the cable from a ZIF connector, grasp the tab on each side of the connector with your thumb and forefinger. Pull on the connector clip until the cable slides away from the connector.

To replace the vertical flex cable, follow these steps:

1. Position the cable so that one end leads through the slot in the VMC card and the other end leads through the slot in the side of the chassis, as shown in Figure 23-6.

2. Connect the vertical flex cable to the “J6” ZIF connector on the VMC card. To do this, push the cable into the connector until it is seated squarely against the back of the connector. Slide the connector’s clip into place, ensuring that both sides of the clip are squarely locked.

   Note: Some vertical flex cables have an adhesive backing and either one or two screw holes for attachment to the inside of the chassis wall. If your vertical flex cable has these connections, remove the adhesive backing and affix the cable to the chassis wall, as shown in Figure 23-7. Next, align the screw holes in the cable with the screw holes in the chassis. Replace the screws and tighten them with a T-15 bit to 12.0 inch-pounds of torque (13.8 kg-cm).

3. Reconnect the vertical flex cable to the VY card on the CHM and replace the CHM (see Section 11.3).

4. Replace the cover assembly (see Section 8.3).

5. Reconnect the SCSI cables and the power cord on the back of the CHS.

6. Because you replaced the CHM, recalibrate the cartridge sensor position, the eject position, and the CTS position as described in Appendixes A and B.

23.10 Replacing the SCSI Cable Assembly

To remove and replace the SCSI cable assembly, follow these steps:

1. Turn off the power switch, located on the lower-left front of the CHS. Disconnect the CHS power cord and SCSI cables from the back of the CHS.

2. Remove the cover assembly (see Section 8.2).

3. If desired, you can access the cable connectors more easily by moving the CTS forward. To do this, use a T-15 TORX driver bit to remove the three screws that hold the CTS in place. See Figure 10-3 for the location of these screws. Slide the CTS forward, until you can easily access the cable.

4. Locate the SCSI cable, which is the ribbon cable connected to the two SCSI connectors on the outside back of the CHS and connected to the back of the CTS. Figure 23-8 shows the SCSI cable assembly for the EXB-10. Figure 23-9 shows the SCSI cable assembly for the EXB-10i.

5. Disconnect the SCSI cable assembly from the CTS. If you have an EXB-10i, also disconnect the SCSI cable assembly from the VMCR card.

6. Using a T-10 TORX driver bit, remove the four screws that hold the SCSI connectors in place and remove the cable.

7. Remove the ferrite sleeve that is attached to the SCSI cable. To do this, use a flat-blade screwdriver or needle-nose pliers to pry off one of the clips that hold the sleeve in place. Set the sleeve and the clip aside.

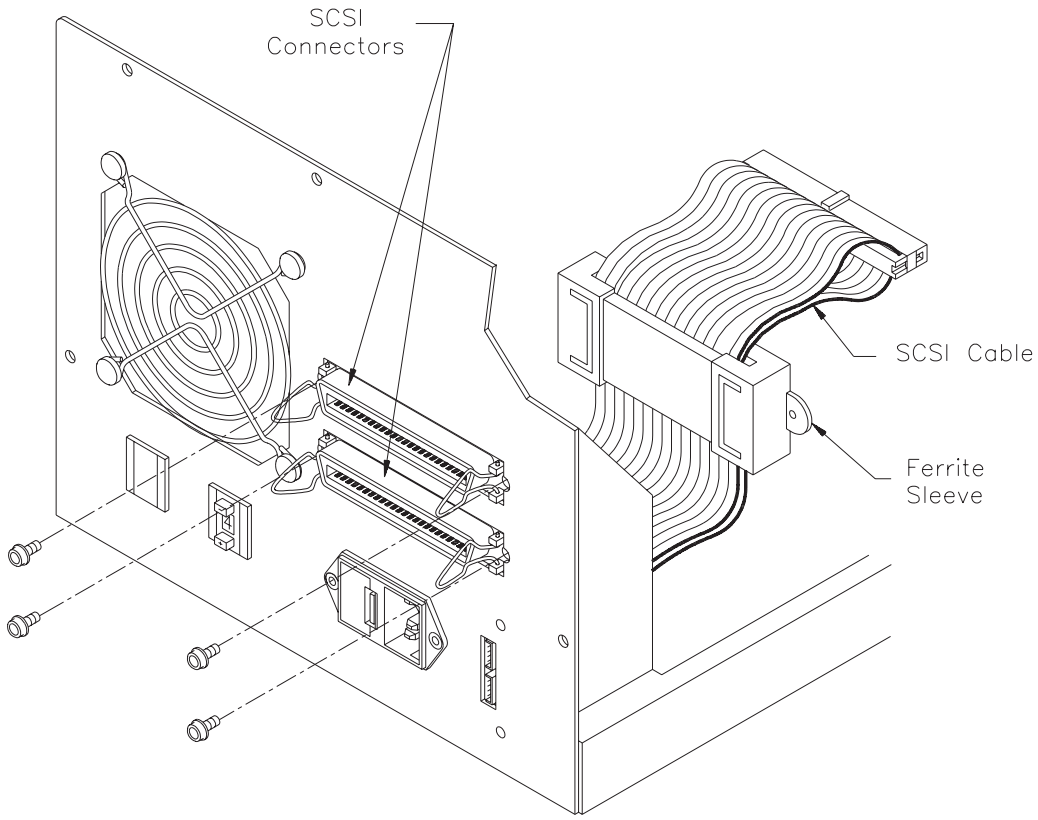

Figure 23-8 SCSI cable assembly for the EXB-10

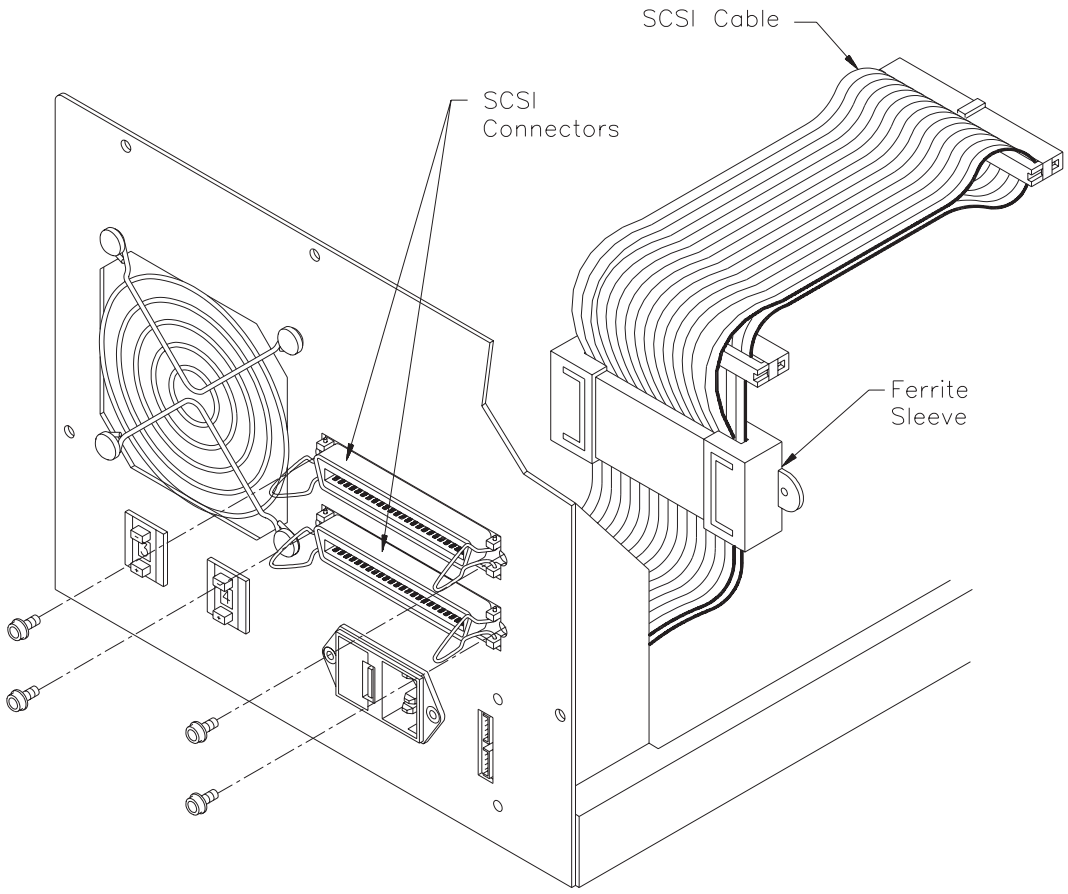

Figure 23-9 SCSI cable assembly for the EXB-10i

To replace the SCSI cable assembly, follow these steps:

1. Place the ferrite sleeve on the new SCSI cable so that it is closest to the outside back than to the VMC card. To do this, slide the ferrite sleeve over the middle of the cable. Snap on the clip.

2. Position the SCSI cable so that the key on the top, middle of the connector is facing up and the color coding on the cable is facing out.

3. Place the four screws in the connectors (#4-40 × 0.25 crest cup screws), then position the SCSI connectors in the slots. Using a T-10 bit, tighten the screws to 8.0 inch-pounds of torque (9.2 kg-cm).

4. Attach the SCSI cable assembly connector to the CTS. If you have an EXB-10i, attach the top SCSI cable connector the VMCR card, as indicated below.

   - For differential CTS configurations, attach the cable to “J10a” on the VMCR card.

   - For single-ended CTS configurations, attach the cable to “J10b” on the VMCR card.

5. Replace the cover assembly (see Section 8.3).

6. Reconnect the SCSI cables and the power cord on the back of the CHS.

A

Calibrating the Cartridge Sensor and Eject Position

This appendix describes how to perform the cartridge sensor calibration and the eject position calibration. During the *cartridge sensor calibration* process, the cartridge handling mechanism (CHM) correctly locates the cartridge sensor on the horizontal axis with the help of the cartridge sensor calibration block. During the *eject position calibration*, the CHS determines the exact position of the solenoid on the CHM. The solenoid is used to eject a cartridge on the grab base.

You only need to perform a cartridge sensor calibration or the eject position calibration in the following circumstances:

- When you remove and replace the CHM
- When you replace the VMC card
- When the CHS displays numerous 1Ch error codes
- When you upgrade to new firmware

There are two methods of performing these calibrations: using the LEDs on the front panel of the CHS or using the Diagnostics firmware. Both of these methods are described in the following sections.

Note: For this procedure, you must receive a calibration block from your vendor. You must also have an EXB-10 with a code version of 2.10 or greater, or an EXB-10i with a code version of 2.3 or greater.

Using the LEDs to Calibrate

To use the LEDs, follow these steps:

1. Turn off the CHS. Then press both the INCR and SEL buttons simultaneously while moving the power switch to the “on” position. (Figure A-1 shows the location of the INCR and SEL buttons.) After all LEDs turn on and then turn off (in approximately two seconds), wait another second and release the buttons.

   The CHS is now in option mode. LED 1 will be flashing.

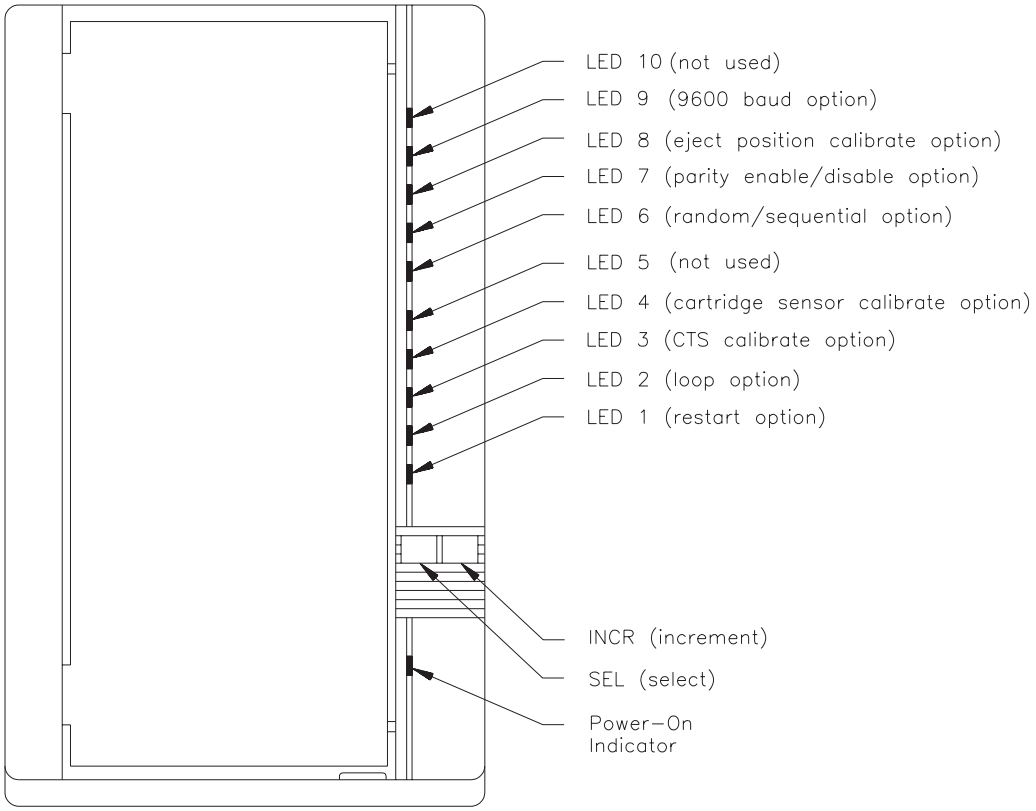

Figure A-1 LEDs on the front of the CHS (EXB-10i shown)

2. To turn on the calibrate cartridge sensor option, press the INCR button three times until LED 4 flashes. Once LED 4 is flashing, press the SEL button once. LED 4 remains illuminated. To turn on the eject position calibrate option, press the INCR button until LED 8 flashes. (If you have an EXB-10, LED 8 will already be flashing.)

   Note: If you also plan to perform CTS calibration, you should turn on LED 3. See Appendix B for more information about CTS calibration.

3. Exit option mode by pressing SEL and INCR simultaneously.

   The CHS first performs a power-on self-test, then flashes a 93h code on the LEDs. This code indicates that the CHS is ready for you to insert the calibration block.

4. Open the CHS door, place the calibration block in the grab base. Close the CHS door.

Note: When you open and close the door, the CHS assumes that you inserted the calibration block.

The CHS calibrates the sensor position (you may not see the CHM move), which takes 2 to 3 seconds. When finished, the CHS prompts you to remove the calibration block by flashing error code 9Ch on the LEDs.

5. Open the CHS door, remove the calibration block, and close the CHS door.

   After you remove the calibration block and close the door, cartridge sensor calibration is complete. If an error code appears, refer to Chapter 3.

   Next, the CHS performs the eject position calibration, which takes approximately 2 to 3 seconds. In this time, the CHM performs the following steps:

   - Moves to slot 1 of the cartridge holder
   - Moves towards the cartridge holder
   - Backs away from the cartridge holder

   After the CHS performs the steps above, the eject position calibration is complete. If an error code flashes on the LEDs during or after calibration, refer to Chapter 3 of this manual.

Using Diagnostics to Calibrate

To use Diagnostics to calibrate the cartridge sensor position, follow these steps:

1. Enter the Diagnostics firmware, as described in Chapter 5.

2. From the Diagnostics Main Menu, press **E** for CALIBRATION / SETUP. Before displaying the next menu, the CHS may wait a few moments for the current pick-and-place cycle to complete or until there is no more activity on the SCSI bus.

3. From the Calibration / Setup Functions Menu, press **C** for CARTRIDGE SENSOR CALIBRATION.

   The CHS prompts you to place the calibration block in the grab base and flashes error code 93h on the LEDs.

4. Open the CHS door, place the calibration block in the grab base, and close the CHS door.

   Note: When you open and close the door, the CHS assumes that you inserted the calibration block.

   The CHS begins the cartridge sensor calibration procedure (you may not see the CHM move), which takes 2 to 3 seconds. When finished, the CHS prompts you to remove the calibration block and flashes error code 9Ch on the LEDs.

5. Open the CHS door, remove the calibration block from the grab base, and close the CHS door.

   Cartridge sensor calibration is complete.

6. Press **E** for EJECT POSITION CALIBRATION.

   The CHS begins the eject position calibration, which takes approximately 2 to 3 seconds. In this time, the CHM performs the following steps:

   - Moves to slot 1 of the cartridge holder
   - Moves towards the cartridge holder
   - Backs away from the cartridge holder

After the CHS performs the steps above, the eject position calibration is complete. If an error code flashes on the LEDs during or after calibration, refer to Chapter 3 of this manual.

B

Calibrating the CTS Position

If you installed a new CTS or CHM, or moved the CTS or CHM in a maintenance procedure, you must calibrate the CTS position before powering on the CHS. This is necessary because the CHS needs to determine the CTS's exact vertical and horizontal position. Once the CTS position has been successfully calibrated, you will not need to calibrate it again, unless you replace or move the CTS or CHM again.

There are two methods of performing CTS calibration: using the LEDs on the front panel of the CHS or using the Diagnostics firmware. Both of these methods are described in the following sections.

Using the LEDs to Calibrate

Before you begin calibration, you must open the CTS door. To do this, follow these steps:

1. Make certain the CHS is turned off.
2. Open the CHS's door.
3. Leaving the door open, turn on the CHS by pushing the power switch on the front of the CHS to the "on" position.
4. Make certain there is no cartridge in the grab base.
5. Make certain at least one cartridge is located in a slot in the data cartridge holder (preferably the bottommost slot).
6. Open the CTS door by pressing the unload button located on the front of the CTS. Make certain that there is not a cartridge in the CTS and leave the CTS door open.
7. Stop CHS operation by pushing the CHS's power switch to the "off" position.
8. Close the CHS door.

To calibrate the CTS position using the LEDs, follow these steps:

1. After following the steps above, press both the INCR and SEL buttons simultaneously while moving the power switch to the "on" position. (Figure A-1 in Appendix A shows the location of the INCR and SEL buttons.) After all LEDs turn on and then turn off (in approximately two seconds), wait another second and release the buttons.

   The CHS is now in option mode. LED 1 will be flashing.

2. To turn on the CTS calibrate option, press the INCR button twice until LED 3 flashes. Once LED 3 is flashing, press the SEL button once. LED 3 remains illuminated and LED 4 will flash.
3. Exit option mode by pressing SEL and INCR simultaneously.

   The CHS performs the CTS calibration process, as described on the next page.

CTS Calibration Process

When you exit option mode, the CTS calibration begins. The following steps outline the calibration process:

- The grab base descends to the CTS, moves inward until it touches the CTS door, and then retracts. This move locates the horizontal position of the CTS.

  Note: Before the CHS begins calibration, it checks to make sure the CTS door is open and that the grab base is empty. If the door is closed, the CHS returns an 81h error code (LEDs 1 and 9, numbered from bottom to top). If there is a cartridge in the grab base, the EXB-10 returns an 82h error code (LEDs 2 and 9, numbered from bottom to top). To correct either error, make certain the CTS door is open and the grab base is empty, then press SEL and INCR simultaneously to restart calibration.

- The grab base picks a cartridge from the cartridge holder and places it in the CTS. If there are no cartridges in the cartridge holder, the CHS returns an 8Bh error code (LEDs 1, 2, 4, and 9, numbered bottom to top). To correct this error, install a cartridge in the cartridge holder and restart the calibration procedure by pressing SEL and INCR simultaneously.

- To locate the vertical position of the CTS, the grab base attempts to pick and place the cartridge successfully from the CTS ten times. If the grab base can pick and place the cartridge successfully with no more than one retry, the procedure is successful. If there was more than one retry, the CHS moves to another vertical position and reattempts the procedure. The CHS repeats this procedure until it has located a valid vertical position.

- When the CHS has successfully located a valid vertical position, the grab base returns the cartridge to its original slot.

Once the CTS calibration is successful, the CHS is ready to be powered on.

If two or more LEDs are flashing after calibration, an error has occurred. If this is the case, check to make certain that the CTS door is open and that there is no cartridge in the grab base. Power off the CHS and follow the previous instructions for calibrating the CTS position. If an error code still appears, reset the CHS by pressing the INCR and SEL buttons simultaneously for two seconds and then releasing the buttons. If an error is still flashing on the LEDs, refer to Chapter 3.

Using Diagnostics to Calibrate

When you use the Diagnostics firmware to calibrate the CTS position, the calibration performs immediately. No power-on self-test is required.

To use Diagnostics to calibrate the CTS position, follow these steps:

1. Enter the Diagnostics firmware, as described in Chapter 5.
2. From the Diagnostics Main Menu, press **E** for CALIBRATION SETUP. The CHS may wait a few moments for the current pick-and-place cycle to complete or until there is no more activity on the SCSI bus.
3. From the Calibration / Setup Functions Menu, press **S** for CTS CALIBRATION.

   The CHS performs the calibration process, as described on the previous page.

C

Example Diagnostic Data

This appendix contains examples of each page of diagnostic data that would result from a diagnostic dump. The CHS provides this diagnostic data as a flat ASCII file.

Note: If you have any questions about the diagnostic data, contact your vendor.

Mode Parameters and Sense Data (EXB-10i)

This page provides information about the mode parameters and the sense data for the EXB-10i. Table C-1 describes the headings on this page.

Table C-1 Diagnostic dump: mode parameters and sense data

Heading	Description
Current Mode Select Parameters	Displays the current MODE SELECT parameters. For more information, see Table 7-3.
Saved Mode Select Parameters	Displays the saved MODE SELECT parameters. For more information, see Table 7-3.
Unit Reservation Status	Lists the unit reservation status. For more information, see the *EXB-10i Cartridge Handling Subsystem User's Manual*.
SCSI Sense Data	Lists the sense bytes for each initiator. For more information, see Table 7-4.

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CURRENT MODE SELECT PARAMETERS:
CTS ADDRESS: 0
FIRST STORAGE ADDR: 1
CHM ADDRESS: 11
PARITY: 0

SAVED MODE SELECT PARAMETERS:
CTS ADDRESS: 0
FIRST STORAGE ADDR: 1
CHM ADDRESS: 11
PARITY: 0

UNIT RESERVATION STATUS:
RESERVED: FALSE
HOST ID: 255

SCSI SENSE DATA:

	INIT	KEY	ASC	ASCQ	SKSV	BPV	BP	FP
0		6	29	0	0	0	0	0
1		6	29	0	0	0	0	0
2		6	29	0	0	0	0	0
3		6	29	0	0	0	0	0
4		6	29	0	0	0	0	0
5		6	29	0	0	0	0	0
6		6	29	0	0	0	0	0
7		0	0	0	0	0	0	0

System Statistics and Options

These pages provide information about the CHS's system statistics and option settings. Table C-2 describes the headings on these pages.

Table C-2 Diagnostic dump: system statistics and options

Heading	Description
State Variables	Displays the internal state variables.
System Sensors/ Mechanism Position	Displays the status of the CHS's mechanical sensors and the CHM's mechanism position (coordinates). For more information refer to Table 5-2.
System Options	Lists each of the options and whether the option is turned on or off.
System Statistics	Displays a tally of grab base operations from the time the CHS was first powered up to the present. For more information, see Table 6-3.
Pick Retries	Displays the number of times the CHS attempted a pick operation. For more information, see Table 6-2.
Place Retries	Displays the number of times the CHS attempted a place operation. For more information, see Table 6-2.
Close Retries	Displays the number of times the CHS attempted a close operation. For more information, see Table 6-2.
CTS Pick Statistics	Displays the CHM's pick statistics from the CTS. For more information, see Section 6.7.

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STATE VARIABLES:

PS_SEQ	= 2	PS_SERVO	= 2
PS_POST	= 0	PS_OPTIONS	= 0
PS_DOOR	= 2	PS_SELECT	= 2
PS_BACKGROUND	= 3	PS_RECOVERY	= 2
PS_CALIB	= 2	PS_MOVE	= 2
PLACE	= 2	PICK	= 2
HOME_Y	= 2	HOME_Z	= 2
MOVE	= 2	MOVE LOGICAL	= 2
CLOSE	= 2	CTS CALIBRATE	= 2
SENSOR CALIBRATE	= 2		
PS_SCSI	= 3	PS_DISPATCH	= 2
MESSAGE	= 1	SCSI SELECT	= 1
COMMAND	= 1	RCV DATA	= 1
SND DATA	= 1	END SCSI	= 1
BUSY	= 1	RECONNECT	= 1
DISCONNECT	= 1		

CURRENT ERROR CODE: 00h
LAST ERROR CODE: 00h

SYSTEM SENSORS/MECHANISM POSITION

CARTRIDGE PRESENT:	0	CARTRIDGE HOLDER:	1
CTS DOOR:	1	CHS DOOR:	0
SELECT SWITCH	0	INCREMENT SWITCH	0
YHOME	0	ZHOME	0

MECHANISM POSITION

Y POSITION:	39
Z POSITION:	25
Z HOME SENSOR:	0

SYSTEM OPTIONS:

RESTART OPTION:	OFF
LOOP OPTION:	OFF
CALIBRATE CTS:	OFF
CALIBRATE SENSOR:	OFF
CALIBRATE EJECT:	OFF
RANDOM/SEQUENTIAL:	OFF
PARITY_CHECKING:	ON

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SYSTEM STATISTICS:

NUMBER OF PICKS = 467
NUMBER OF PLACES = 468
NUMBER OF Y MOVES = 1570
NUMBER OF CLOSES = 104
NUMBER OF Z HOMES = 809
NUMBER OF Y HOMES = 808
POWER ON HOURS = 69

PICK RETRIES:
ZERO_TO_SLOWDOWN = 0
SLOWDOWN_TO_PICK = 0
CTS = 0

PLACE RETRIES:
SOLENOID = 0
EJECT = 0
DROOP = 0
DROOP_CATCH = 0
CLEAR SOLENOID = 0

CLOSE RETRIES:
CLOSE DOOR = 0

CTS PICK STATISTICS:
CTS PICKS, NO RETRY = 0
CTS PICKS, ONE RETRY = 0
CTS PICKS, TWO RETRIES = 0
CTS PICKS, THREE RETRIES = 0
CTS PICKS, FOUR RETRIES = 0

Z AXIS CORRECTIONS = 0
HOME Z RETRIES = 0
MOVE Y RETRIES = 0

HOME FREQUENCY: 100

CALIBRATED POSITIONS:
CTS Y POSITION: -306500
CTS Z POSITION: 72900
SENSOR DIFFERENCE: 300
EJECT POSITION: 58850

Cartridge Inventory

This page describes the cartridge inventory for the EXB-10i. For more information about the cartridge inventory, refer to Section 6.8.

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EXB-10i CHS CARTRIDGE INVENTORY

INDEX	OCCUPIED/VALID	SOURCE/VALID	ADDRESS	RESERVED/RES_ID/HOST_ID
0	0/0	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	0/0	255/0	11	0/ 0 /255

EXB-10i RETRY HISTORY OF EVENTS

INDEX	TYPE	HISTORY INFORMATION	TIMESTAMP

CTS Pick History

This page displays a history of the CHS's attempts to pick and place the cartridge into the CTS. For more information about the CTS pick history, see Section 6.7.

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EXB-10i CHS PICK HISTORY

INDEX	TOTAL POSITION	PICKS	RETRIES 0	1	2	3	4	FAILED PICKS
0	-306500	0	0	0	0	0	0	0
1	-307000	0	0	0	0	0	0	0
2	-307500	0	0	0	0	0	0	0
3	-308000	0	0	0	0	0	0	0
4	-308500	0	0	0	0	0	0	0
5	-309000	0	0	0	0	0	0	0
6	-309500	0	0	0	0	0	0	0
7	-310000	0	0	0	0	0	0	0
TOTALS		0	0	0	0	0	0	0

CTS POSITION INFORMATION

CURRENT CTS POSITION INDEX: 0
SAVED CTS POSITION INDEX: 0
NUMBER OF RECAL THROUGH 0: 0

LAST 10 PICK RETRIES (MOST TO LEAST RECENT): 0 0 0 0 0 0 0 0 0 0

Event History

This page displays the most recent CHS events. For more information, see Section 6.5.

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INDEX	HISTORY INFORMATION	TIMESTAMP
-19	UNIT ATTENTION SET: ASC=29 ASCQ=00 ID=00	04-03-90 23:10:15
-18	UNIT ATTENTION SET: ASC=29 ASCQ=00 ID=01	04-03-90 23:10:15
-17	UNIT ATTENTION SET: ASC=29 ASCQ=00 ID=02	04-03-90 23:10:15
-16	UNIT ATTENTION SET: ASC=29 ASCQ=00 ID=03	04-03-90 23:10:15
-15	UNIT ATTENTION SET: ASC=29 ASCQ=00 ID=04	04-03-90 23:10:15
-14	UNIT ATTENTION SET: ASC=29 ASCQ=00 ID=05	04-03-90 23:10:15
-13	UNIT ATTENTION SET: ASC=29 ASCQ=00 ID=06	04-03-90 23:10:15
-12	UNIT ATTENTION SET: ASC=29 ASCQ=00 ID=07	04-03-90 23:10:15
-11	HOME ON Z	04-03-90 23:10:15
-10	HOME ON Y	04-03-90 23:10:16
-9	MSG RECEIVED: Msg=C0 Last Phase=SELECTION ID=07	04-03-90 23:11:13
-8	SCSI CMD: 00 00 00 00 00 00 ID=07	04-03-90 23:11:13
-7	SENSE SET: KEY=06 ASC=29 ASCQ=00 ID=07	04-03-90 23:11:13
-6	STATUS SENT: Status=02 ID=07	04-03-90 23:11:13
-5	MSG SENT: Msg=00 Last Phase=STATUS IN ID=07	04-03-90 23:11:13
-4	MSG RECEIVED: Msg=C0 Last Phase=SELECTION ID=07	04-03-90 23:11:18
-3	SCSI CMD: 00 00 00 00 00 00 ID=07	04-03-90 23:11:18
-2	SENSE SET: KEY=00 ASC=00 ASCQ=00 ID=07	04-03-90 23:11:18
-1	STATUS SENT: Status=00 ID=07	04-03-90 23:11:18
0	MSG SENT: Msg=00 Last Phase=STATUS IN ID=07	04-03-90 23:11:18

Notes:

Glossary

address See *SCSI ID*.

byte Eight bits, or one character.

calibration block A plastic part that fits into the grab base and is used during cartridge sensor calibration. Also referred to as a *calibration tool*.

cartridge holder In the CHS, the black plastic frame that can store up to ten 8mm data cartridges. The CHS is shipped with one cartridge holder; additional cartridge holders can be ordered from EXABYTE.

cartridge sensor The sensor that detects if there is a cartridge in the gripper. This sensor is located on the VY card.

CHM Cartridge handling mechanism. The robotic assembly in the CHS that moves vertically and horizontally to automatically load and unload cartridges. The CHM contains the grab base, the horizontal and vertical lead screws, the VY card, the horizontal and vertical motors, and the vertical motor cables.

CHS Cartridge Handling Subsystem, such as EXABYTE's EXB-10 or EXB-10i.

CHS Terminal VT-100 terminal emulation software that can be used with the Diagnostics firmware.

count A unit of measurement used in the Diagnostics firmware to indicate the grab base's current coordinates.

CSA Canadian Standards Association.

CTS Cartridge Tape Subsystem, such as EXABYTE's EXB-8200 or EXB-8500 8mm Cartridge Tape Subsystem.

Diagnostics CHS firmware that can be used to determine possible problems in CHS operation and to gather system statistics on CHS operation. This firmware is contained on the flash EPROM. To run Diagnostics, you must connect a VT-100 compatible terminal or a PC to the maintenance port on the back of the CHS.

EPROM Erasable programmable read-only memory. In CHS functions, a PROM that resides on the VMC card and contains the CHS and Diagnostics firmware.

encoder A unit attached to the back of the CHM motors that counts the rotations of the motor.

EXB-8200 The EXB-8200 8mm Cartridge Tape Subsystem. The EXB-8200 can store up to 2.5 gigabytes of data on a single 8mm data cartridge.

EXB-8200SX The EXB-8200SX 8mm Cartridge Tape Subsystem. The EXB-8200SX is very similar to the EXB-8200 but offers a high-speed search capability.

EXB-8500 The EXB-8500 8mm Cartridge Tape Subsystem. The EXB-8500 can store up to 5.0 gigabytes of data on a single 8mm data cartridge.

EXB-8500c The EXB-8500c 8mm Cartridge Tape Subsystem. The EXB-8500c is very similar to the EXB-8500 but offers data compression as an option. The EXB-8500c and can store up to 10.0 gigabytes of data (assuming a 2:1 data compression ratio).

FCC Federal Communications Commission.

FRU Field replaceable unit. A part on the CHS that can be ordered from EXABYTE and replaced by a self-maintenance contract customer.

GByte Gigabyte; 1,024 MBytes.

grab base The mechanical “hand” on the CHM that grips cartridges and moves horizontally to pick and place cartridges.

h Hexadecimal (base 16) numbering system.

home flag A plastic rectangle that detects the grab base’s home position. There are two home flags on the grab base: one for the horizontal home position (the outermost position) and one for the vertical home position (the topmost position).

horizontal lead screw The metal screw that serves as a horizontal axis for the grab base.

KBytes Kilobytes; 1,024 bytes.

LEDs Light emitting diodes. The ten indicators on the CHS's front panel.

MByte Megabyte; 1,024 KBytes.

mounting plate A plate located on the CHS's chassis wall that holds the cartridge holder.

nonvolatile RAM A form of random access memory that continues to retain data when the power is turned off.

park The position of the CHS's cartridge handling mechanism while it is waiting for the CTS door to open. When the CHM is in the park position, it is at the bottom of the CHS.

pick The action of the CHS's cartridge handling mechanism when it removes a data cartridge from the CTS or data cartridge holder.

place The action of the CHS's cartridge handling mechanism when it inserts a data cartridge in the CTS or data cartridge holder. Placing a cartridge in the CTS also includes pushing the door of the CTS shut.

plunger spring A spring wrapped around on the horizontal lead screw that pushes the cartridge into the CTS or into the cartridge holder.

power cycle The process of turning the CHS off and then on again.

reset The process of simultaneously pressing the INCR and SEL buttons on the CHS's front panel for a minimum of two seconds.

SCSI Small Computer System Interface.

SCSI ID The octal representation of the unique address (0 to 7). Also referred to as the *address*.

servo A controller mechanism actuated by a low energy signal.

TUV Technischer Uberwachungs-Verein.

UL Underwriters Laboratories.

VDE German Association of Electrotechnical Engineers (Verband Deutscher Elektrotechniker).

vertical lead screw The metal screw that serves as a vertical axis for the grab base.

Y axis Vertical axis.

Y-home	Vertical home. The topmost position the grab base can reach.
Z axis	Horizontal axis.
Z-home	Horizontal home. The outermost position the grab base can reach.
zero position	A predetermined position below the home sensor, which is the uppermost position of the vertical lead screw.
ZIF connector	A connector that is designed for zero insertion force (ZIF).

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