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QUALSTAR®

XLS Series of Tape Libraries

Technical Service Manual

Trademark Notices

Qualstar and the Qualstar logo are registered trademarks and X-Link is a trademark of Qualstar Corporation. Other trademarks are the property of their respective owners.

Revision History

Revision	Release Date	Description
A	17-Apr-2007	Initial release
07-01-19	01-Jul-2019	Address updated

Notices

Qualstar products are covered by one or more of the following patents: 6,271,982; 6,560,061; and 7,181,313. Other patents pending.

Qualstar equipment is manufactured from new parts, or new and used parts. In some cases, Qualstar equipment may not be new and may have been previously installed. Regardless, Qualstar's warranty terms apply unless the equipment is specifically identified by Qualstar as "used" or "refurbished."

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 Rules. Use shielded cables when connecting this device to others.

European Union Directive 89/336/EEC and Standard EN55022 (Electromagnetic Compatibility)

This product has been tested and is certified to be compliant with the Class A provisions of the U.S., Canadian, and European standards for electromagnetic compatibility (EMC).

European Directive on Waste Electrical and Electronic Equipment (WEEE)

Qualstar encourages its customers to use current recycling practices in order to reduce the burden that waste electronic products place on the environment.

If you are retiring a fully functional tape library, you are encouraged to transfer the functional unit to a new user, thereby extending the useful life of the tape library. The manufacture of all products requires the consumption of energy. By extending the life of the tape library, energy is conserved.

In accordance with environmental directives that are being implemented in many countries (refer to the European Directive on Waste Electrical and Electronic Equipment - WEEE), Qualstar provides customers with **"End of Life Instructions"** that identify the process for recycling the materials and components that make up a Qualstar tape library.

End of Life Instructions

Tools required
- #1 and #2 Phillips screwdrivers
- T20 Torx head screwdriver
- Hex head (Allen) wrench/driver set
- 1/4-inch hex nut driver

Disassembly procedure
1. Remove the door(s).
2. Remove the front panel.
3. Remove the external side panels.
4. Remove the internal subassemblies.

Items recyclable using conventional methods
- **Aluminum:** Front panel, exterior side and rear panels, robotics, cartridge and drive bays, carousel and shroud panels
- **Stainless steel:** Robot guides
- **Steel:** Frames, fasteners
- **Plastic:** Windows, cartridge magazines, tape cassettes
- **Copper:** Internal wiring, motors, SCSI cables
- **Paper:** Manuals

Items requiring special disposal due to lead-based solder
- **Printed circuit boards:** Controller card, miscellaneous small printed circuit boards

Items that may have salvage or resale value
- Tape drives
- EMI line power filter

Reduction of Hazardous Substances (RoHS)

Qualstar is committed to the implementation of RoHS (Restriction of the use of certain hazardous substances in electrical and electronic equipment) in accordance with the European Directive. The compliance date is July 1, 2006, at which time Qualstar will certify that its tape library products are compliant with the RoHS standard.

Qualstar tape libraries are classified as "Information Technology Storage Array Systems" for which the RoHS Directive provides an exemption for lead solder until the year 2010. Until Qualstar replaces lead-based solder with lead-free solder, affected subassemblies must be disposed of appropriately.

Technical Support

The best source for service-related information is your system reseller. Alternately, you can reach the Qualstar Technical Support Department at:

Qualstar Corporation
1267 Flynn Road
Camarillo, CA 93012

Monday - Friday 7:00 A.M. to 4:00 P.M. PST
Phone: (805) 416-7055
Toll Free: (877) 886-2758

E-mail: support@qualstar.com
E-mail: sales@qualstar.com

www.qualstar.com

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          501610 Rev. 07-01-19

Part I: Before You Begin

Notes:

1   Getting Started

This manual is intended for trained service professionals who are performing service on the Qualstar® XLS Library. It provides information and instructions for troubleshooting problems, performing diagnostics from X-Link, and replacing library components. This manual assumes that the library has previously been installed and configured and that you are familiar with how to use the library and X-Link. For instructions, refer to the *XLS Library Installation Manual* and the *XLS Library User's Guide*.

> **Important:**   Although Qualstar has made every effort to ensure the accuracy of the information contained in this manual, no guarantee is expressed or implied that the manual is error free. Qualstar reserves the right to make changes at any time without prior notification.

1.1   How This Manual Is Organized

Table 1-1 is a quick reference for locating the information in this manual.

Part	Refer to...	For...
Part I: "Before You Begin"	Chapter 1, "Getting Started"	Information about using this book
	Chapter 2, "About the XLS"	An overview of the XLS
	Chapter 3, "XLS Diagrams"	Detailed diagrams of major XLS components and subsystem
	Chapter 4, "Preventive Maintenance"	Instructions for performing preventive maintenance on the XLS
Part II: "Using X-Link"	Chapter 5, "Using X-Link Service Options"	Instructions for logging into the XLS and accessing and using the options on the Service portlet
	Chapter 6, "Shutting Down the XLS"	Instructions for shutting down the XLS

Table 1-1   Information included in *XLS Service Manual*

Part	Refer to...	For...
Part III: **"Replacing FRUs"**	**Chapter 7, "Replacing Power/PC Bay Components"**	Instructions for replacing power/PC bay components, including the power supplies, battery module, PCI cards, fans, the hard drive, slide rails, and the entire power/PC bay assembly
	Chapter 8, "Replacing Tape Drives"	Instructions for replacing tape drives
	Chapter 9, "Installing or Replacing Cartridge Slots and Drive Bays"	Instructions for the following: • Replacing cartridge magazines • Installing cartridge slots on the door(s) • Replacing a cartridge bay with a drive bay • Replacing a drive bay with a cartridge bay
	Chapter 10, "Replacing Frame Components"	Instructions for removing and replacing the front panel and the side panels
	Chapter 11, "Replacing I/O Ports and Fixed Port Assemblies"	Instructions for replacing I/O ports, fixed port assemblies, and the cartridge magazines in the fixed port assemblies
	Chapter 12, "Replacing Handler Components"	Instructions for replacing the gripper assembly and X- and Y-axis components
	Chapter 13, "Replacing the Touch Screen and User Interface Assemblies"	Instructions for replacing the touch screen and user interface assemblies
	Chapter 14, "Replacing Library Sensors and Solenoids"	Instructions for replacing a door interlock sensor, door-lock solenoid, I/O port open sensor, I/O port solenoid, and light curtain sensors
	Chapter 15, "Replacing MEM Components"	Instructions for installing a MEM and replacing MEM components
	Chapter 16, "Installing an Expansion Pod"	Instructions for installing an expansion pod on the XLS-812300
	Chapter 17, "Restarting the XLS"	Instructions for restarting the XLS after performing a service operation

Table 1-1 Information included in *XLS Service Manual* *(continued)*

Part	Refer to...	For...
Part IV: "Reference"	**Appendix A, "Library Addresses"**	Graphics showing the physical addresses for all cartridge slot and tape drive locations
	Appendix B, "Packing the XLS"	Instructions for packing the XLS in preparation for shipping it to a different location
	Appendix C, "Torque Values"	Recommended torque values for the screw sizes used in the XLS
	"Glossary"	Definitions of the specialized terminology used in this manual
	"Index"	Alphabetized quick reference for specific topics and terms

Table 1-1 Information included in *XLS Service Manual (continued)*

1.2 Safety Notices

> **CAUTION**
>
> The Qualstar XLS Library is a sophisticated, state-of-the art computer peripheral. It must be serviced by authorized service technicians who are experienced with the operation and maintenance of tape libraries and who have read and understood this manual.

> # WARNING!
>
> The tape drives, power supplies, and system controller fans are designed to be replaced while the XLS remains powered on.
>
> To avoid the risk of personal injury, turn off all power to the library before attempting to replace any other XLS components.

ESD Precaution

> **CAUTION**
>
> Before replacing any of the printed circuit board assemblies (PCBAs) in the XLS Library, ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use a grounded static protection wristband. If a wristband is not available, touch a known grounded surface.

1.3   Tools Check List

Table 1-2 is a check list of the tools required to remove and install XLS components.

	Tool
	3/4-inch open-end wrench
	3/8-inch Allen wrench
	5/16-inch Allen wrench (right angled if possible)
	1/4-inch Allen wrench
	3/16-inch Allen wrench
	5/32-inch Allen wrench
	7/64-inch Allen wrench (regular or T-handle)
	5/64-inch Allen wrench
	#1 Phillips screwdriver
	#2 Phillips screwdriver
	Long flat-bladed screwdriver (magnetized if possible)
	7/16-inch nut driver and ratchet
	1/4-inch nut driver
	Standard pliers
	Needle-nosed pliers
	Needle-nosed pliers with smooth blades
	Precision level
	Small metric ruler or calipers
	Cable tie cutters
	Cotton swabs
	Isopropyl alcohol

Table 1-2   Tool check list

Tool
Soft cloth or other padding to protect the touch screen
Lint-free cloth or Kimwipes®
Spring attachment tool (optional)
Small mirror (optional)
Flashlight (optional)

Table 1-2   Tool check list (*continued*)

1.4   Materials Check List

Table 1-3 lists the materials required to replace XLS FRUs.

	Qualstar P/N	Manufacturer P/N	Description
	669-1001-9	Tyton T18R0 Dennison 08-433 Dennison 08-404 Panduit PLT1M-M30	3-inch cable tie
	730-0017-6	Loctite 242 Threadlocker 24077	Thread-locking adhesive

Table 1-3   Materials check list

1.5   Conventions Used in This Manual

This section lists the terminology, typographic, and organizational conventions used in this manual.

1.5.1   Terminology

For clarity and compliance with the SCSI standard, the library control interface of the XLS is referred to as the *medium changer*. Note that the medium changer is different than the *handler*, which is simply the robotic mechanism within the XLS that picks and places the cartridges.

Refer to the **"Glossary"** for the definitions of other specialized terminology.

1.5.2   Typographic Conventions

This manual uses the following typographic conventions:

- For X-Link, options that can be selected are shown in **bold face**. For example:

  – Select **Online Logical Library**

- For X-Link, names of buttons that can be pressed are shown in **bold face**. For example:

  – Press **Done**
  – Press **Unlock Door**

- For X-Link, names of fields or drop-down lists are shown in **bold face**. For example:

  – **Column** and **Row** drop-down lists

- Specialized terminology is introduced in *italic face*. For example:

  – Each physical library can be partitioned into one or more *logical libraries*.

1.5.3   Safety Notices

This manual may include four types of notices.

Warnings and Caution Notices

To avoid personal injury, damage to the equipment, or loss of data, closely follow the operating instructions and maintenance procedures described in this manual. Pay special attention to the information in Warning and Caution notices, as described below:

> # WARNING!
>
> Personal injury may result if you do not fully comply with the handling, operating, or service instructions found in a Warning notice.

> ### CAUTION
>
> Equipment damage or loss of data may result if you do not fully comply with the handling, operating, or service instructions found in a Caution notice.

Important Notices and Notes

Important notices and notes provide additional information and tips, as described below:

> **Important:** Important notices provide tips for completing a procedure or information that is essential to the understanding of a topic.

Note: Notes provide additional information related to the topic being discussed.

1.6 For More Information

This section provides information about related manuals and how to contact Qualstar.

1.6.1 Related Manuals

For more information about the XLS library, refer to the manuals in **Table 1-4**, which are available in Adobe Acrobat PDF format from X-Link.

Refer to...	Part number	For...
XLS-832700 and XLS-820500 Libraries Product Specification	501600	Detailed specifications for the XLS-832700 and XLS-820500
XLS-812300 Tape Library Product Specification	501370	Detailed specifications for the XLS-812300
XLS Library Site Planning Guide	501604	Information for preparing a site for XLS installation
XLS Library Installation Manual	501601	Information and detailed instructions for installing the library
XLS Library User's Guide	501603	Instructions for operating the XLS
XLS Library Interface Manual	501611	Information for creating device drivers or for modifying software applications to control the library

Table 1-4 Related manuals

Accessing the Online Manuals

> **Important:** You cannot access the online manuals from the touch screen. To access the PDF files for the manuals, you must connect the XLS to a standalone or networked computer that has Adobe Acrobat or Adobe Reader installed.

To access and download the manuals, follow these steps:

1. Follow the instructions in **Section 5.1 on page 5-1** to connect the library to a standalone computer or Ethernet network.

2. Open any of the supported Internet browsers on an attached computer.

3. In the address field for the browser, type **http://qualstarxls/manuals/index.html**, where *qualstarxls* is the default name for the physical library. See **Figure 1-1**.

Figure 1-1 Accessing the online manuals (Internet Explorer shown)

> **Important:** If you have changed the name for the physical library, be sure to use the new name instead of *qualstarxls*.

4. Press **Enter**. The Download Manuals page opens, as shown in **Figure 1-2**.

Figure 1-2 Download Manuals page

5.   Select the manual you are interested in. Assuming that Adobe Acrobat or Acrobat Reader is installed on your system, the PDF file opens. See **Figure 1-3**.

Figure 1-3   PDF file of example manual opened in browser window

1.6.2　Contacting Qualstar

If you have questions about the XLS library, contact an authorized reseller or Qualstar Technical Support.

Qualstar Corporation
1267 Flynn Road
Camarillo, CA 93012

Monday - Friday 7:00 AM to 4:00 PM PST
Phone: (805) 416-7055
Toll Free: (877) 886-2758

After hours
Phone: (805) 583-7744
option 4

E-mail: support@qualstar.com
E-mail: sales@qualstar.com
www.qualstar.com

2   About the XLS

This chapter provides an introduction to the Qualstar XLS Library.

2.1   Product Overview

The Qualstar XLS Library is an enterprise-class computer peripheral containing large-capacity tape drives, a variable number of cartridge storage slots, a high-speed robotic mechanism for moving cartridges between the tape drives and the storage slots, and I/O ports for importing and exporting cartridges from the library. Three XLS models are currently available—the XLS-832700, the XLS-820500, and the XLS-812300.

Shown in **Figure 2-1**, the library uses two building blocks:

- The *Library Resource Module (LRM)*, described in **Section 2.2 on page 2-5**, is the fully featured base cabinet containing the power system; the robotic handler; the control electronics; and the tape drives, I/O ports, and cartridge slots.

- The optional Media Expansion Module (MEM), described in **Section 2.3 on page 2-22**, is a rotary tape carousel that attaches to either side of an XLS-832700 or XLS-820500.

Figure 2-1   LRM with two MEMs (XLS-832700 shown)

2.1.1   XLS-832700

Shown in **Figure 2-2**, the XLS-832700 accommodates up to 32 tape drives, up to 655 cartridges, and up to four, 10-slot I/O ports. As an option, it can be attached to one or two MEMs.

Doors (2)

Cartridge slots

I/O ports
(up to 4)

Tape drives

Service port
(Ethernet)

Leveling feet (4)

Touch screen

Status LEDs

Handler &
barcode reader

Air filters
(behind cover)

Wheels (4)

Figure 2-2   Front view of the XLS-832700

2.1.2 XLS-820500

Shown in **Figure 2-3**, the XLS-820500 accommodates up to 20 tape drives, up to 465 cartridges, and up to four, 10-slot I/O ports. As an option, it can be attached to one or two MEMs.

Figure 2-3 Front view of the XLS-820500

2.1.3 XLS-812300

Shown in **Figure 2-4**, the XLS-812300 accommodates up to 12 tape drives, up to 295 cartridges, and up to two, 10-slot I/O ports. As an option, expansion pods can be installed on either side of the library, with each expansion pod adding 120 cartridge slots.

Touch screen

Status LEDs

I/O ports
(1 or 2)

Leveling
feet (4)

Cartridge slots

Door (1)

Optional expansion pod
(1 or 2)

Tape drives

Air filters
(behind cover)

Wheels (4)

Figure 2-4   Front view of the XLS-812300 with two optional expansion pods

2.2 Library Resource Module (LRM)

Figure 2-5 shows the inside of the LRM, while Figure 2-6 on page 2-6 shows the back of the LRM. The LRM contains the following components and features:

- Power/PC bay, which includes the power system and the system controller (see Section 2.2.1 on page 2-6)
- Touch screen and LEDs (see Section 2.2.2 on page 2-10)
- Robotic handler and barcode reader (see Section 2.2.3 on page 2-11)
- Tape drives (see Section 2.2.4 on page 2-14)
- I/O ports (see Section 2.2.5 on page 2-17)
- Cartridge slots (see Section 2.2.6 on page 2-18)
- Doors and light curtain sensors (see Section 2.2.7 on page 2-19)
- Optional equipment rack (see Section 2.2.8 on page 2-21)

Door slots
(110 slots/door)

Cartridge bays
(30 slots/bay)

Rear wall slots

Drive bay
(4 drives/bay)

I/O port
(10 slots/port)

Handler

Figure 2-5 Inside view of the LRM (XLS-832700 shown)

Figure 2-6 Rear view of the LRM (XLS-832700 shown)

2.2.1 Power/PC Bay

[Figure 2-6 on page 2-6](#) shows the location of the power/PC bay at the rear of the LRM. The power/PC bay houses the power components and the system controller. The entire bay slides in and out of the LRM for servicing.

Power System

Figure 2-7 shows the power components accessible from the rear of the LRM.

Cosmetic cover
removed

Power switch/
breaker

Power
connector

Power supplies
(up to 7)

Battery module

Figure 2-7   Power bay components

XLS power components include the following:

- **Main power disconnect switch.** The single disconnect switch for the library is a 20-amp circuit breaker.

- **AC power connector.** The power connector is a single-phase, 100 to 240 volt service connection.

- **Power supplies.** Two to seven AC-to-24VDC power supply modules provide power to the components within the LRM, the tape drives, and any attached MEMs. The power supplies are configured in an N+1 arrangement, meaning that if one fails, the others will handle the load until the failed supply is replaced. The power supplies can be replaced while the library remains powered on. Note that the two leftmost slots must be occupied first.

- **Battery module.** The battery module provides emergency power to safely shut down the XLS if the AC power fails. It is not an uninterruptible power supply. If AC power fails, the library immediately shuts off power to the tape drives, parks the handler at the bottom of the cabinet, and commences an orderly shut down of the remaining systems. The library is non-functional from the moment the AC fails. If power returns before the shutdown is complete, the library completes the shutdown, then restarts. The battery module can be replaced while the library remains powered on.

> **Note:** The battery module does not provide adequate power to protect the tape drives. For this reason, Qualstar recommends connecting the XLS to an external UPS.

- The **power supply controller DCB** (not shown) is mounted on the power distribution board at the back of the power/PC bay. It manages the power supplies as well as the distribution of power to the various subsystems.

For a detailed diagram showing how power is distributed throughout the XLS, refer to .

System Controller

Shown in , the system controller occupies the right side of the power/PC bay and consists of a Linux-based computer that controls the library. The system controller:

- Controls the operation of the distributed control boards (DCBs)
- Manages all communications between the XLS and the host applications
- Maintains an up-to-date cartridge inventory
- Hosts the X-Link management interface
- Provides a control interface to the tape drives for configuration and servicing

Figure 2-8 System controller components in the power/PC bay

System controller components include the following:

- **CAN bus controller card**. A two-channel control area network (CAN) adapter card is plugged into the motherboard to allow the system controller to communicate with the distributed control boards (DCBs) in the library. For a detailed diagram showing how CAN bus communication is routed throughout the XLS, refer to **Section 3.2 on page 3-4**.

- **Host bus adapter cards.** The system controller includes expansion slots for up to four host bus adapter cards (HBAs). Each HBA has two ports, allowing the medium changer interface in the XLS to be concurrently connected to up to eight independent host computers. The XLS supports SCSI and Fibre Channel HBAs.

> **Important:** The HBAs in the system controller manage the XLS's medium changer interface only; they do not control or communicate with the tape drives or move data.

- **Ethernet connectors.** The system controller includes two Ethernet connectors for communication across 10/100 Base-T Ethernet networks. One of the Ethernet connectors allows the XLS to be connected to a customer network for remote managing and monitoring of XLS functions; the other Ethernet connector (service port) allows the XLS to be connected directly to a laptop or other standalone computer for local configuration and service operations.

- **Hard drive.**

- **24VDC PC power supply.** The PC power supply provides power to the system controller, the touch screen LCD display on the front of the library, and the power supply controller.

- **Cooling fans.** Two cooling fans at the back of the system controller draw air in through the air filter cover and air filters on the front of the LRM and ventilate it out through the back. (Individual fans are also included in each tape drive assembly and power supply module.) The cooling fans and air filters are easily changed without interrupting XLS operations.

2.2.2 Touch Screen and LEDs

Shown in **Figure 2-16**, each LRM includes a touch screen, used to display the X-Link Management Interface, and five LEDs.

Figure 2-9 Touch screen and status LEDs (X-Link log-in screen displayed)

Touch Screen

The 15-inch LCD touch screen on the front of the LRM allows for local control and monitoring of library operations. The touch screen receives power from the PC power supply in the system controller and communicates with the system controller using a USB interface. The driver circuitry for the touch screen resides on the user interface controller behind the front panel. The digital signal processors on the user interface controller are not connected to the touch screen circuitry.

X-Link Management Interface

The X-Link management interface can be accessed locally from the touch screen or remotely over Ethernet using a standard Internet browser. The interface and available functions are the same regardless of how they are accessed. The X-Link Home page, shown in **Figure 2-10**, provides information about library status and provides an access point to library management tasks.

Figure 2-10   X-link Home page (Logical Libraries View selected)

LEDs

The LEDs on the front panel indicate the library's operational status at a glance. Status LEDs are also included on the back of each tape drive assembly and each power supply.

2.2.3   Robotic Handler and Barcode Reader

Shown in **Figure 2-11**, the robotic tape handler within each LRM can access cartridges anywhere on the front wall or the back wall. It can also access slots on the rotating

carousel of an attached MEM. The handler is controlled by the medium changer interface and shared by all host software applications on a first-come, first-served basis.

Figure 2-11   Robotic handler (shown reaching into an attached MEM)

Gripper Assembly

The gripper assembly is the part of the handler that actually picks and places the cartridges in the storage slots and tape drives. The gripper moves along four axes, as follows:

- The *X-axis* is the horizontal axis. The gripper assembly is moved along the X-beam by a toothed belt, which is driven by the X-axis motor. The X-motor is controlled by the X-Y controller DCB.

- The *Y-axis* is the vertical axis. The X-beam rides up and down the Y-axis on a round guide shaft. It is moved by a toothed belt, which is driven by the Y-axis motor. The Y-motor is also controlled by the X-Y controller DCB.

- The *Theta-axis* is the rotating axis that allows the gripper assembly to reach cartridge slots on the front, back, and sides of the cabinet. It is controlled using a belt and pulleys by the Theta-axis motor. The Theta-motor is controlled by the Theta-Z controller DCB.

- The *Z-axis* is the in-and-out axis. The fingers on the gripper assembly are opened and closed using a solenoid and moved in and out by the Z-axis motor. The solenoid and Z-motor are controlled by the Theta-Z controller DCB. The gripper assembly uses a Hall effect sensor to determine if the fingers are open or closed, and it has two pairs of optical emitters and receivers where it grips the cartridge. These sensors are managed by a digital signal processor on the Theta-Z controller card.

Motors

The X-, Y-, Theta-, and Z-axis motors are brushless DC motors, equipped with optical incremental encoders. The motors are commutated using position information from the encoders. A power-up process establishes the alignment between the motor and the encoder. During this process (which normally occurs only when the library is powering up), the motors are driven through a series of stepping motions.

Controllers

Two distributed control boards (DCB) control the movements of the handler, as follows:

- **X-Y controller.** Located at the bottom of the cabinet, the X-Y controller DCB includes the drivers for the X- and Y-axes of the handler. Power to this card can be independently turned off and on by the power supply controller. The X-Y controller also includes the capacitor-based energy storage system, which allows the robot to be safely parked at the bottom of the cabinet in case of an AC power failure. See **Section 12.2, "Replacing the X-Y Controller Card," on page 12-15** for more information.

- **Theta-Z controller.** Located on the gripper assembly, the Theta-Z controller DCB includes the drivers for the Theta- and Z-axes of the handler. Power to this card is shared with the user interface DCB and can be turned on and off by the power supply controller DCB. The Theta axis motor drives the gripper assembly with a belt and pulleys.

Barcode Reader

Located on the gripper assembly, the barcode reader performs two types of scans:

- **Fiducial scan.** *Fiducials* are the black and white triangles mounted on either side of every cartridge magazine (see **Figure 2-12**). There is also a fiducial

located on the tape drive calibration cartridge, which is stored in one of the five reserved slots.

Figure 2-12   Cartridge magazine with two fiducials

During a *fiducial scan*, the handler moves up and down and across the cartridge slots and I/O ports until the barcode reader detects the fiducials. It also inserts the calibration cartridge into each tape drive. Once all the fiducials have been detected, the library can calculate the exact position of every storage slot and tape drive in a process known as *calibration*. Fidicual scans and calibration are required only when the library is installed or when certain service procedures are performed.

- **Inventory scan.** During an *inventory scan*, the barcode reader scans each slot to determine which ones contain cartridges. It also scans the barcode labels on the cartridges to establish and maintain its cartridge inventory. The system controller stores the cartridge inventory in a database and makes it available to the host applications.

  Barcode labels must conform to the ANSI/AIM BCI-1995, Uniform Symbol Specification (USS-39). Detailed specifications for XLS barcodes and labels can be found in Qualstar Product Information Note 040, "XLS, RLS, and TLS Barcode Labels." To obtain this document, go to **www.qualstar.com** and click on the Support tab. Pre-printed barcode labels, which are both human- and machine-readable, are available from a number of sources.

2.2.4   Tape Drives

The XLS-832700 can accommodate up to 32 tape drive assemblies in one to eight drive bays, the XLS-820500 can accommodate up to 20 tape drive assemblies in one to five drive bays, and the XLS-812300 can accommodate up to 12 tape drive assemblies in one to three drive bays.

Tape Drive Assemblies

Shown in **Figure 2-13**, an XLS tape drive assembly consists of an LTO tape drive enclosed in a drive carrier.

Figure 2-13 Fibre Channel tape drive assembly (rear view)

Two models of tape drives are available: SCSI tape drive assemblies include dual SCSI HD68 connectors and a single status LED, while Fibre Channel tape drive assemblies include a duplex LC multi-mode Fibre Channel receptacle and three LEDs.

In addition to the connectors, each drive carrier includes a cooling fan, the drive carrier DCB, and a DC-to-DC power supply. A digital signal processor provides communication between the library and the tape drive's serial port for configuring the drive and obtaining status. The serial port is not used to read or write data to the tape. The drive carrier DCB communicates with the system controller using the CAN1 bus. The DC power supply is controlled by the drive bay processor.

Depending on the capabilities of the application software being used, the Fibre Channel tape drive assemblies can be removed and replaced without powering down the library. The library automatically detects the presence of a new tape drive.

Drive Bays

[Figure 2-14](#) shows the front view of two drive bays. Each drive bay can hold up to four tape drive assemblies, which are installed from the rear of the LRM.

Figure 2-14   Front view of two drive bays (front panel removed)

Depending on the XLS model, the library can be equipped with up to eight drive bays. A drive bay, which holds four tape drives, can be exchanged with a cartridge bay, which holds 30 cartridges, and vice versa.

For safety reasons, four tape drive or drive filler assemblies (see [Figure 2-15](#)) must be installed in each drive bay in order for the library to operate. Magnets on each tape drive or drive filler assembly activate a Hall effect sensor at each bay position. If the library detects that one of the positions is empty, it disables the handler until another tape drive or drive filler assembly is installed.

Figure 2-15   Drive filler assembly

2.2.5   I/O Ports

As shown in **Figure 2-16**, I/O ports on the front of the LRM allow cartridges to be imported or exported without opening the door(s) and interrupting XLS operations. Each I/O port holds 10 cartridges in a removable magazine. Depending on the model, the XLS can include one, two, or four I/O ports. For each I/O port that is not installed, the library includes 10 additional cartridge storage slots, called *fixed port assemblies*.

Each I/O port includes an *I/O port solenoid*, which allows the I/O port to be opened electrically from X-Link, and an *I/O port open sensor*, which detects if the I/O port is open. The I/O port sensors are controlled by the user interface controller DCB on the back of the front panel.

Figure 2-16   I/O port (XLS-832700 shown)

Each I/O port uses a removable magazine suitable for long-term storage. See
Figure 2-17.

Figure 2-17 I/O port magazine

2.2.6 Cartridge Slots

Table 2-1 lists the cartridge capacities of each XLS model. **Figure 2-18 on page 2-19**
shows the cartridge slot locations for the XLS-832700.

Location	Number of Cartridge Slots		
	XLS-832700	**XLS-820500**	**XLS-812300**
Cartridge bays	up to 210 (7 bays)	up to 120 (4 bays)	up to60 (2 bays)
Rear wall slots[1]	265	205	205
Door slots	0, 110, or 220	0 or 110	*not available*
Fixed port slots	0 (assumes all four I/O ports are installed)	up to 30 (assumes only one I/O port is installed)	up to 30 (assumes only one I/O port is installed)
Total slots	up to 665	up to 465	up to 295
Each MEM adds[1]	1,075	1,075	*not available*
Each expansion pod adds	*not available*	*not available*	120

1. Numbers do not include the 5 reserved slots.

Table 2-1 Available cartridge slots

Figure 2-18 Cartridge slots in the XLS-832700 (fixed port slots not shown)

2.2.7   Doors and Light Curtain Sensors

Doors

The XLS-832700 has two doors, while the XLS-820500 and XLS-812300 have one door. Each MEM has two doors. All doors have windows for viewing robot operations; the front windows in the LRM are blocked if the optional door slots are installed. There are also smaller viewing windows on the side panels.

- **Door-lock solenoids.** Each door includes a door-lock solenoid that allows the door to be locked and unlocked electrically from X-Link. A user name and password are required to unlock the electronic locks. Before the doors are unlocked, pending operations are completed and the handler is parked in a safe location. The handler will not move when the doors are unlocked.

- **Door interlock sensors.** Each door includes a door interlock sensor to detect if the door is opened while the library power is off. When the power is reapplied, the XLS checks the state of the door interlock sensors and performs one of the following actions:

  – If a sensor indicates that a door was opened while the power was off, the XLS scans all cartridge locations before becoming ready.

  – If the sensors indicate that the doors were not opened while the power was off, the XLS bypasses the inventory scan, thus minimizing the time to become ready.

  The sensors are controlled by the user interface controller DCB on the back of the front panel.

Light Curtain Assembly

The *light curtain*, also known as the "Inventor Sentry," consists of a series of infrared emitters and detectors arrayed throughout the XLS. In the LRM, the emitters are located on the floor of the cabinet, while the detectors are located on the ceiling. In the MEM and the expansion pods, the detectors are located on the floor of the cabinet, while the emitters are located on the ceiling. In all cases, the emitters project small beams of infrared light toward corresponding detectors.

The curtain of light formed by the emitters and detectors allows the XLS to precisely monitor all areas within the LRM and MEM cabinets, as follows:

- The beams of light at the rear of the cabinet can detect whether a cartridge is protruding from a slot. If the door(s) are closed and one of these beams of light is broken, the XLS prevents the handler from moving to avoid hitting a protruding cartridge.

- The beams of light curtain at the front of the cabinet can detect when someone reaches into the cabinet. If a door is open and one of these beams of light is broken, the XLS detects and logs a potential inventory violation and automatically scans the cartridges and drives in the affected area as soon as all doors are closed.

The sensors are managed by the user interface controller DCB. The emitters are operated one at a time, while the corresponding detectors are read by the digital signal processor on the user interface controller. The infrared light is not visible with the naked eye; however, it can be detected by a digital camera, infrared scope, night-vision scope, or an infrared-detector card.

The light curtain assembly consists of a series of printed circuit board assemblies (PCBAs) and cables. The PCBAs are attached to the cabinet with sheet-metal brackets.

2.2.8   Equipment Rack

Shown in **Figure 2-19 on page 2-21**, the LRM includes space in the back for an optional EIA 19-inch equipment rack installed in a vertical orientation (equipment installed on its side). The rack can accommodate equipment up to 26 inches deep (66 cm). Installed equipment could include a Fibre Channel switch or other ancillary equipment.

Two versions of the rack option are available. The 6U rack (10.5-inches) resides entirely within the LRM cabinet. The 8U (14-inches) rack protrudes 3.5 inches beyond the rear of the LRM cabinet. A 15-amp power strip with six grounded outlets and circuit breaker is supplied with either equipment rack. This power strip must be connected to an external power source.

Figure 2-19   Equipment rack option (6U rack shown in XLS-832700)

2.3   Media Expansion Module (MEM)

Both the XLS-832700 and the XLS-820500 can be expanded by adding one or two MEMs. Shown in **Figure 2-20**, each MEM contains 1,080 cartridges slots, five of which are reserved.

Doors (2)

Carousel

Air filter
(behind cover)

Carousel supports (2)

Leveling feet (4)

Wheels (4)

Figure 2-20   Front view of the Media Expansion Module (MEM)

The MEM derives its power and control from an attached LRM. The carousel can rotate in either direction and is driven by a brushless DC motor with optical encoder. The handler from an attached LRM can reach into the MEM to pick, place, and scan the barcode of any cartridge.

The MEM also includes the following features:

- Air filters behind the air filter cover

- Two doors with viewing windows, key locks, door-lock solenoids, and door interlock sensors

- Light curtain sensors, managed by the carousel controller DCB (note the emitters are at the top and the detectors are at the bottom)

3   XLS Diagrams

This chapter provides diagrams of major XLS components and subsystems. You may find it helpful to refer to these diagrams as you perform service operations on the XLS.

3.1   Power Distribution

shows how power is distributed throughout the XLS.

Power for the library is provided by a single 120V line cord. The AC power is distributed by a power backplane to modular AC-to-24VDC power supplies. The chassis containing the power backplane, the power supplies, and the PC chassis is referred to as the *power/PC bay* (see).

Slots in the backplane can accommodate up to seven 24V supplies plus the battery module. The 24VDC is routed to the subsystems through switches on the power backplane. These switches are controlled by the power supply controller DCB, which is mounted on the power backplane. The system controller is powered from the 24VDC backplane by a separate DC-to-DC converter (the PC power supply) that also provides the motherboard and the touch screen with the appropriate voltages.

The AC-to-24VDC power supplies in the power/PC bay can be turned on and off by the power supply controller, except for the first slots (the two on the left when facing the back of the cabinet), which are always on.

There are up to eight drive bays, each of which can host four tape drives. The power to each of the drive bays can be independently turned on and off by the power supply controller. The tape drives are permanently mounted in removable tape drive assemblies. The tape drive assemblies contain the drive carrier DCB and have DC-to-DC power supplies to provide power for the drives. A digital signal processor in the tape drive assemblies provides a communication path to the drive for configuring the drive and to obtain drive status information. The power supplies that power the drives are in the tape drive assemblies, but are controlled by the drive bay processor.

The touch screen on the front of the library is powered by the PC power supply.

The X-Y controller DCB has the drivers for the X- and Y-axes of the handler. Power to this card can be independently turned on and off by the power supply controller.

The Theta-Z controller DCB and the user interface controller DCB share a power source that can be turned on and off by the power supply controller DCB.

The X-Y controller DCB has the emergency capacitor-based energy storage system that holds enough energy to park the robot at the bottom if other sources of power fail. The energy storage system is charged from the Theta-Z power path when the library is powering up. If energy is needed, the power from the capacitors is fed into both the Theta-Z power path and the X-Y power path. Two LEDs are located on the cover of the X-Y controller card. One indicates that the capacitors are fully charged; the other that they are fully discharged. When servicing the X-Y controller card, shut off the power to both the X-Y controller card and the Theta-Z controller card, then wait for both LEDs to go off.

Figure 3-1 XLS power distribution

3.2   CAN Bus Communications

Figure 3-2 shows how CAN bus communications are routed throughout the library.

A two-channel control area network (CAN) adapter card is plugged into the motherboard to allow the system controller to communicate with the distributed control boards (DCBs) in the library. The library uses two CAN busses: the CAN1 ("can one") bus connects the system controller to each of the drive bays, while the CAN0 ("can zero") bus connects the system controller to the battery module, the robotics, the power supply controller, the user interface, and to any attached MEMs.

Each CAN bus consists of two wires that connect the system controller and the DCBs. The signaling is differential. Most communication is between the system controller and the DCBs, but there is a small amount of communication directly between DCBs. The digital signal processors on the DCBs have a built-in CAN bus interface that connects to a CAN bus transceiver device on the board.

Figure 3-2 CAN bus communications

3.3 X-Y Controller DCB

Figure 3-3 shows the connections of the X-Y controller card.

Figure 3-3 Connections on the X-Y controller card

3.4 Connections to the User Interface Controller DCB

Figure 3-4 shows the connections on the user interface controller for the XLS-832700.

Figure 3-4 User interface connections for the XLS-832700

shows the connections on the user interface controller for the XLS-820500 and the XLS-812300.

Figure 3-5   User interface connections for the XLS-820500 and XLS-812300

3.5 Components on the Gripper Assembly

Figure 3-6 shows the components on the gripper assembly.

Figure 3-6 Diagram of the gripper assembly

3.6   Cabling for the Drive Bay Assemblies

Figure 3-7 shows the cabling for the drive bay assemblies in the three XLS models.

Figure 3-7   Cabling for the drive bay assemblies

3.7   Cabling for the Carousel Controller

Figure 3-8 shows the cabling for the carousel controller.

Figure 3-8   Cabling for the carousel controller

Notes:

4   Preventive Maintenance

This chapter provides instructions for performing preventive maintenance on the XLS. Preventive maintenance tasks include the following:

- Checking the air filters (see **Section 4.1**)
- Replacing an air filter (see **Section 4.2 on page 4-3**)
- Inspecting the cartridge slots and fiducials (see **Section 4.3 on page 4-5**)
- Inspecting the fans (see **Section 4.4 on page 4-7**)
- Inspecting and cleaning the gripper pads and sensors and the mirror on the barcode reader (see **Section 4.5 on page 4-7**)

4.1   Checking the Air Filters

Fans in the system controller, each power supply, and each drive carrier draw outside air through filters located behind the air filter covers on the LRM and MEM. The filters help keep dust and dirt from entering the library and degrading the performance of the tape drives and media. To ensure the best reliability, periodically check and replace the air filters.

To order replacement filters, see **Section 1.6.2 on page 1-10**.

Important:	The air filters help protect the library from large contaminants but are not intended to keep the tape drives clean. For best performance, clean the tape drives according to the manufacturer's recommendations.

X-Link automatically alerts users to check the air filters after the amount of time specified by the Days until Air Filter Check library policy. Because filters should be replaced more frequently in dusty environments, the recommended time between air filter changes varies with the installation environment. When the XLS is first installed, inspect the filters frequently. Then, as required, adjust the time specified for the Days until Air Filter Check policy.

When you receive a check air filter alert, follow these steps:

1. Locate the air filters behind the air filter cover, as shown in **Figure 4-1**. The XLS-832700 has three filters, the XLS-820500 and XLS-812300 have two filters, and the MEM has two filters.

Air filters (3)

Figure 4-1   Location of the air filters (XLS-832700 shown)

2. Inspect the air filters. If dirt is clinging to the gray filter, you should replace it.

3. As required, adjust the **Days until Air Filter Check** library policy:

   a. If necessary, press the **Home** button in the upper right corner of any page to return to the Home page.

   b. Select **Administrator View** or **Show All** to display the Settings & Policies portlet, shown in **Figure 4-2**.

Figure 4-2   Settings & Policies portlet

c.   From the Settings & Policies portlet, select **View/Edit Policies**. The View/Edit Policies page opens, as shown in **Figure 4-3**.

Figure 4-3   View/Edit Policies page

d.   In the **Days until Air Filter Check** field, specify how long you want to wait before receiving another alert to check the air filters.

- If you did not need to change the filters, enter the number of days until you want to receive a second reminder.

- If the filters are especially dirty, specify a shorter time for the policy.

4.2   Replacing the Air Filters

As shown in **Figure 4-1**, the air filters are located behind the air filter covers on the LRM and the MEM. You can replace the air filters while the library is powered on and in logical mode.

4.2.1   Removing the Air Filters

To remove the air filters, follow these steps:

1. Locate the captive screws at the top of the air filter cover, as shown in **Figure 4-4**. The XLS-832700 has three screws, the XLS-820500 and XLS-812300 have two screws, and the MEM has two screws.

Captive screws (3)

Figure 4-4   Location of the captive screws on the air filter cover (XLS-832700 shown)

2. Using a #2 Phillips screwdriver, loosen the screws.

3. Release the top edge of the air filter cover from the frame. See **Figure 4-5**.

Figure 4-5   Releasing the top edge of the air filter cover (XLS-832700 shown)

4. Remove the bottom edge of the air filter cover by lifting the tabs out of the slots.

5. Remove the old air filters from the back of the air filter cover. See **Figure 4-6**.

Figure 4-6 Removing the air filter

4.2.2 Installing the Air Filters

To install the air filters, follow these steps:

1. Orient the notched edges of the new filters toward the top of the air filter cover.

2. Insert the new filters, making sure that all edges are held securely under the metal flanges.

3. Insert the air filter cover's tabs into the slots on the frame.

4. Raise the top of the air filter cover into position.

5. Using the Phillips screwdriver, tighten the captive screws.

4.3 Inspecting the Cartridge Slots and Fiducials

As part of the XLS's preventive maintenance, you should check the condition of the cartridge slots and fiducials on a regular basis. In addition, if you are operating the library in an especially dusty environment, you may need to dust the library's interior.

Important:	You must shut down and power off the library before checking the cartridge slots and fiducials. To avoid a lengthy out-of-service period, be sure to schedule library inspection and cleaning to coincide with other service procedures.

To inspect or clean the library's interior, follow these steps:

1. Shut down the library (see **Section 6.2 on page 6-1**).

2. Open the door(s).

3. As needed, use a vacuum cleaner or slightly damp cloth to dust the inside of the cabinet.

4. Inspect each cartridge magazine and the fiducial targets on each side of the magazine. If you notice broken or worn parts, replace the magazine. See **Section 9.2 on page 9-2**.

5. Replace any cleaning cartridges in the system-reserved slots (G46 to G49). See **Figure 4-7**.

> **Important:** Be sure that the system-reserved slots contain cleaning cartridges only. Never install data cartridges in these slots.

Figure 4-7 Location of the calibration and reserved cleaning cartridges

6. Inspect the calibration cartridge in the system-reserved slot (G50) and replace it if it is worn or damaged. See **Figure 4-7**.

7. Close the door(s) and restart the library.

4.4 Inspecting the Fans

To inspect the fans in the system controller, follow these steps:

1. Remove the four screws (two on either side) that secure the power/PC bay to the library's frame. See **Figure 4-8**.

Figure 4-8 Removing the screws on the left side of power/PC bay

2. Holding the power/PC bay by a power supply handle or by the flanges on either side of the bay, slide the bay out.

3. Check to make sure that both fans are turning and not making excessive noise. If there seems to be a problem, replace the fan as described in **Section 7.4 on page 7-12**.

4. Slide the power/PC bay back into the library's frame.

5. Replace the four screws.

4.5 Inspecting and Cleaning the Gripper and Barcode Reader

Three or four times a year, check the pads and sensors on the gripper assembly. Also, look at the mirror on the barcode reader. You should also check these parts if the library experiences errors related to picking and placing cartridges or scanning barcode labels.

> **Important:** The library can remain powered on when you perform this procedure, although you will need to power down the gripper.

Required tools and equipment: Make sure you have the following:

- Cotton swabs
- Isopropyl alcohol
- Kimwipes® or lint-free cloth for cleaning lenses

Procedure overview: **Table 4-1** provides an overview of inspecting and cleaning the gripper pads and sensors and the mirror on the barcode reader.

Step	Task	Refer to...
1	Power off the gripper	**Section 4.5.1**
2	Inspect and clean the parts if necessary	**Section 4.5.2 on page 4-9**
3	Power on the gripper and resume operation	**Section 4.5.3 on page 4-11**

Table 4-1   Overview of inspecting and cleaning gripper components

4.5.1   Powering Off the Gripper

Before inspecting or cleaning gripper components, you must power off the gripper. Follow these steps:

1. If necessary, press the **Home** button in the upper right corner of any page to return to the Home page.

2. Select **Service View** or **Show All** to display the Service portlet, shown in **Figure 4-9**.

Figure 4-9   Service portlet

3. From the Change Mode section, select **Physical Mode** to put the XLS in physical mode. See **Section 5.4 on page 5-8**.

4.   From the Run Diagnostics section, select **Service Utilities**. The Service Utilities page opens, as shown in **Figure 4-10**.

Figure 4-10   Service Utilities page

5.   From the Robot section, select **Power Off Gripper** to power off the gripper.

4.5.2   Inspecting and Cleaning the Gripper

To inspect and clean the gripper, follow these steps:

1.   From the General section of the Service Utilities page, select **Unlock Doors**.

2.   Open the door closest to the gripper assembly.

3. Locate the left and right pads on the gripper. See **Figure 4-11**.

Gripper pads

Figure 4-11 Location of the gripper pads

4. Carefully inspect each pad.

5. If you see debris accumulating, use a cotton swab moistened with isopropyl alcohol to gently swab the pads and the recessed area around the sensors until they are clean. See **Figure 4-12**.

Figure 4-12 Swabbing the gripper pads and sensors

6. Locate the mirror on the barcode reader.

7. If you see debris accumulating, use a lint-free cloth to very gently wipe the debris off of the mirror.

CAUTION

The mirror can be scratched easily. Be sure to use very gentle wiping motions and avoid leaving any streaks on the glass.

---

8. Make certain that the pads and sensors are completely clean and dry and that there are no streaks on the mirror.

9. Close any open doors.

4.5.3   Powering On the Gripper and Resuming Operation

To power on the gripper and resume operation, follow these steps:

1. From the Robot section of the Service Utilities page, select **Power On Gripper**.

2. From the General section of the Service Utilities page, select **Lock Doors**.

3. Wait while the XLS automatically rescans the cartridge inventory in any areas marked as violated by the light curtain sensors.

4. When the inventory scan is complete, press **Done** to return to the Service portlet.

5. From the Change Mode section, select **Logical Mode** to put the XLS in logical mode. See **Section 5.4 on page 5-8**.

Notes:

Part II: Using X-Link

Notes:

5   Using X-Link Service Options

This chapter describes how to access and use the service and diagnostic options available in X-Link. It includes instructions for the following tasks:

- Connecting the XLS to a computer (see **Section 5.1**)
- Logging into X-Link (see **Section 5.2 on page 5-5**)
- Accessing the Service portlet (see **Section 5.3 on page 5-7**)
- Changing the operating mode (see **Section 5.4 on page 5-8**)
- Performing library diagnostics (see **Section 5.5 on page 5-12**)
- Changing the library's configuration (see **Section 5.6 on page 5-17**)

5.1   Connecting the XLS to a Computer

This section describes how to connect the XLS to a standalone or networked computer. You can skip these instructions if the XLS has already been connected and configured to communicate across your network.

Note: Although you can use the touch screen to perform service and diagnostic procedures, it is typically much faster using a standard computer keyboard.

When connecting the XLS to a network, you can use either of the Ethernet ports, as follows:

- The primary Ethernet connector (ENET 0), located on the back of the power/PC bay, is intended for remote operations across a 10/100 BaseT Ethernet network. See **Figure 5-1**.

Figure 5-1   Location of the primary Ethernet connector

- The secondary Ethernet connector (the "service port") is intended for local service operations with a laptop or other standalone computer. The service port for the XLS-832700 (see **Figure 5-2**) is located behind the air filter cover. The service port for the XLS-820500 and XLS-812300 is located on the power/PC bay, as shown in **Figure 5-1 on page 5-1**.

Figure 5-2   Location of the service port on the XLS-832700

Required tools and equipment: Make sure you have the following:

- A standalone or networked computer running one of the following Internet browsers:

  – Microsoft Internet Explorer 6 (and higher)
  – Netscape 7.2 (and higher)
  – Firefox 1.5 (and higher)
  – Mozilla 1.7.12 (and higher)

  Note: While other browsers can be used, Qualstar cannot confirm that the page display and operation will be correct.

- Java Script enabled for the browser.

- Cookies enabled for the browser.

> **Important:** The XLS uses cookies to verify proper login and to "remember" any custom view settings that you select for the browser. At a minimum, you must allow session cookies to prevent X-Link from blocking access to commands. However, if you allow cookies for the session only, any changes you make to the Home page layout will be lost as soon as you log out.

- A CAT5e or better straight-through Ethernet cable

5.1.1 Connecting to a Networked Computer

> **Important:** If your network includes an automatic Dynamic Host Configuration Protocol (DHCP) server and dynamic domain name system (DNS), you can use the primary Ethernet connector (ENET0) for the initial configuration. The library hostname, **qualstarxls**, will be automatically available to the network.

To connect the XLS to a computer on a 10/100 BaseT Ethernet network with a DNS server, follow these steps:

1. Enter the library's hostname, **qualstarxls**, into the DNS server for the network.

2. Insert one end of the Ethernet cable into the ENET0 port on the back of the library (see **Figure 5-1 on page 5-1**).

3. Connect the other end of the cable to the Ethernet switch for the network.

4. Start an Internet browser on a computer on the network.

5. Type the library's hostname, **http://qualstarxls**, in the address line for the browser. See **Figure 5-3**.

Figure 5-3 Entering the hostname (Internet Explorer shown)

6. Press **Enter**. The X-Link log-in page is displayed as shown in **Figure 5-6 on page 5-6**.

5.1.2   Connecting to a Standalone Computer

To connect the XLS to a standalone computer, follow these steps:

1. Set the computer's IP address to the following settings:

    –   **IP address:**   192.168.0.245
    –   **Subnet mask:**   255.255.255.0

2. Insert one end of the Ethernet cable into the service port (ENET 1).

    Note: The service port for the XLS-832700 is located behind the air filter cover on the front of the library (see **Figure 5-2 on page 5-2**). The service port for the XLS-820500 and XLS-812300 is located on back of the power/PC bay (see **Figure 5-1 on page 5-1**).

3. Connect the other end of the cable to the computer's Ethernet port.

4. Start the Internet browser.

5. In the address line for the browser, type the default IP address for the service port, **http://192.168.0.1**. See **Figure 5-4**.

Figure 5-4   Entering the service port IP address (Internet Explorer shown)

6. Press **Enter**. The X-Link log-in page opens, as shown in **Figure 5-5**.

Figure 5-5 Log-in page

5.2 Logging Into X-Link

To log into X-Link, follow these steps:

1. Contact the XLS administrator to obtain a user ID and password. Make sure that the user ID has been assigned to a user group (such as SuperUser or Physical Library Administrator) that has permission to execute service commands.

2. On the X-Link log-in page, type the user ID in the **User ID** field.

3. Type the password in the **Password** field.

4.   Press **Log In.** The X-Link Home page opens, as shown in **Figure 5-6**.

Figure 5-6   X-Link Home page (Logical Library View shown)

5.3 Accessing the Service Portlet

To access the Service portlet, follow these steps:

1. If necessary, press the **Home** button in the upper right corner of any page to return to the Home page, shown in **Figure 5-6 on page 5-6**.

2. Select **Service View** or **Show All** to display the Service portlet, shown in **Figure 5-7**.

Figure 5-7 Service portlet

Table 5-1 on page 5-8 describes the options that can be selected from the Service portlet.

> **Important:** The options you can select depend on which user group the user belongs to. If the user group has permission to perform all service tasks, all options are selectable. If the user group has permission to perform a subset of tasks, some of the options may not be selectable (grayed out).

Section	Option	Refer to...
Change Mode	Physical Mode	**Section 5.4.3 on page 5-10**
	Logical Mode	**Section 5.4.4 on page 5-11**
Run Diagnostics	Execute Command	**Section 5.5.1 on page 5-12**
	Audit Library	**Section 5.5.2 on page 5-13**
	Shutdown Library	**Section 6.2 on page 6-1**
	View SCSI Log	**Section 5.5.3 on page 5-14**
	Service Utilities	**Section 5.5.4 on page 5-15**
Change Configuration	View/Edit Hardware Configuration	**Chapter 17, "Restarting the XLS"**
	Upload File	**Section 5.6.1 on page 5-18**
	Install File	**Section 5.6.2 on page 5-19**
	View/Edit SCSI Log Settings	**Section 5.6.3 on page 5-20**

Table 5-1 Options on the Service portlet

5.4   Changing the Operating Mode

This section provides background information about logical and physical modes and instructions for the following:

- Putting the XLS in physical mode (see **Section 5.4.3 on page 5-10**)
- Putting the XLS in logical mode (see **Section 5.4.4 on page 5-11**)

5.4.1   About Logical and Physical Libraries

Before changing the library's operating mode, make sure you understand the distinction between the physical library and logical libraries, as follows:

- The *physical library* consists of the entire XLS system, including the Library Resource Module (LRM), any attached Media Expansion Modules (MEMs), all tape drives, all cartridges slots, all I/O ports, the medium changer interface, the robotics, and all HBAs in the system controller's expansion slots.

- A *logical library* is one of up to eight partitions of XLS physical resources. Logical libraries are defined to ensure that different software applications have restricted and dedicated access to specific tape drives, cartridge slots, and I/O ports. All logical libraries share access to the XLS's medium changer interface on a first-come, first-served basis.

5.4.2   About Logical and Physical Modes

You can operate the XLS in logical mode or in physical mode. The current operating mode is shown at the top of every page. See **Figure 5-8**.

Figure 5-8   Physical and logical mode indicators (included on each page)

Logical Mode

During typical day-to-day library operation, the XLS is in *logical mode*. In logical mode, one or more software applications control the library and you interact with X-Link from a logical library perspective. When you interact with the XLS in logical mode:

- You can view and control only those resources (cartridge slots, tape drives, and I/O ports) that have been assigned to a particular logical library.

- You cannot view or control resources assigned to any other logical library.

- You specify SCSI element addresses for cartridge slots, I/O port slots, and tape drives.

- The logical libraries may be online or offline.

Physical Mode

If you are an XLS administrator, you may occasionally need to operate the XLS in *physical mode*. In physical mode, you interact with X-Link from a physical library perspective. When you interact with the XLS in physical mode:

- You can view and control all resources in the library, whether or not they have been assigned to a logical library.

- You specify physical addresses for each cartridge slot, I/O port slot, or tape drive.

- All logical libraries must be offline.

5.4.3   Putting the XLS in Physical Mode

If you need to perform a task that could change the internal state of the physical library, you must put the XLS in physical mode. When you put the XLS in physical mode, the following occurs:

- The XLS completes any current or pending operations for the software applications, then it takes all defined logical libraries offline.

- The XLS returns Check Condition status to any new requests by the software applications, indicating that it is not ready.

- An event is logged in the event log and a message is sent to designated users.

- The tape drives remain accessible to the software applications and can continue reading and writing data.

To put the XLS in physical mode, follow these steps:

1. If necessary, press the **Home** button in the upper right corner of any page to return to the Home page.

2. Access the Service portlet (see **Section 5.3 on page 5-7**).

3. From the Change Mode section, select **Physical Mode**. The Put Into Physical Mode confirmation page opens, as shown in **Figure 5-9**.

Figure 5-9   Put Into Physical Mode confirmation page

4. Press **Yes** to confirm that you want to put the XLS in physical mode.

5.4.4   Putting the XLS in Logical Mode

This section provides instructions for putting the XLS in logical mode. When you put the XLS in logical mode, the following occurs:

- The XLS restores the logical libraries to their previous states.

Important:	• If a logical library was online when you put the XLS in physical mode, it will go back online when you put the XLS in logical mode.
	• If a logical library was offline when you put the XLS in physical mode, it will remain offline when you put the XLS in logical mode.

- As it brings any logical libraries online, the XLS returns Check Condition status to any new requests by the software applications, indicating that the cartridge inventory may have changed.

- An event is logged in the event log and a message is sent to designated users.

To put the XLS in logical mode, follow these steps:

1. Make sure that all library doors are closed and locked.

2. If necessary, press the **Home** button in the upper right corner of any page to return to the Home page.

3. Access the Service portlet (see **Section 5.3 on page 5-7**).

4. From the Change Mode section, select **Logical Mode.**

The Put into Logical Mode confirmation page opens, as shown in **Figure 5-10**.

Figure 5-10   Put into Logical Mode confirmation page

5. Press **Yes** to confirm that you want to put the XLS in logical mode.

5.5   Performing Diagnostics

This section describes how to perform the following Run Diagnostic procedures from the Service portlet:

- Execute Command (see **Section 5.5.1**)
- Audit Library (see **Section 5.5.2 on page 5-13**)
- View SCSI Log (see **Section 5.5.3 on page 5-14**)
- Service Utilities (see **Section 5.5.4 on page 5-15**

Note: For instructions for shutting down the library, see **Section 6.2 on page 6-1**.

5.5.1   Executing a Command

> **CAUTION**
>
> The Execute Command option was designed for Qualstar Technical Support and Engineering use. To prevent operational problems with the library, be sure to contact Qualstar Technical Support *before* attempting to execute any diagnostic commands on the XLS.

To execute a command, follow these steps:

1. Access the Service portlet. See **Section 5.3 on page 5-7**.

2. From the Run Diagnostics section of the Service portlet, select **Execute Command**. The Execute Command page opens. This page includes a number of diagnostic and service commands.

3. Before attempting to execute any of these commands, contact Qualstar Technical Support. Technical Support can help you determine which command to execute, what parameters to use, and how to interpret any results.

5.5.2 Auditing the Library

The XLS maintains a comprehensive inventory of all tape drives, cartridges, cartridge slots, and I/O ports in the physical library and in each logical library. During XLS installation, you use X-Link to establish the library's inventory. During its initial inventory scan, the handler scans each cartridge slot and reads each barcode label. The resulting inventory includes the following information:

- The empty or full status of every cartridge slot
- The human-readable text from the barcode labels
- The media type, if it is included on the barcode label

Accessing the Inventory

As described in the *XLS Library User's Guide*, you can access the results of the inventory scan in the following ways:

- For the physical library, select **View Hardware Details** from the Physical Library portlet, then drill down to the cartridges slots and tape drives

- For a logical library, select **View Inventory** from the Logical Libraries portlet

The inventory is also used by the software applications and may be viewed from the application. See the software documentation for instructions.

Inventory Updates

The XLS updates its inventory as follows:

- **After every cartridge move.** The XLS records the new location of the cartridge and changes the full or empty status of the source and destination slots.

- **When an I/O port is closed.** The XLS automatically scans the I/O port slots and reads the barcode labels on any cartridges.

- **When a door is locked from X-Link.** The XLS automatically scans any door slots and all areas flagged by the light curtain sensors. For example, if the light curtain sensors on the left side of the LRM are violated while the doors are open, the XLS automatically scans the cartridges on the left side of the cabinet when the doors are locked.

- **When you force an audit**. You can force an audit by selecting **Audit Library** from the Service portlet. See **Section 17.3.2 on page 17-6**.

5.5.3 Viewing the SCSI Log

The SCSI log contains a history of the SCSI commands and messages sent and received by the library. Qualstar Technical Support may request that you send them a copy of this log to help debug certain problems. Refer to **Section 5.6.3 on page 5-20** for information about changing the settings for the SCSI log.

You can view the last 1,000 entries in the log or download the entire log.

> **Important:** For help interpreting the SCSI log, contact Qualstar Technical Support.

To view or download the SCSI log, follow these steps:

1. Access the Service portlet. See **Section 5.3 on page 5-7**.

2. From the Run Diagnostics section, select **View SCSI Log.** The View SCSI Log page opens, as shown in **Figure 5-11**.

Figure 5-11 View SCSI Log page

3. To view the last 1,000 entries in the log, scroll through the log using the scroll bar on your browser.

4. To download the entire SCSI log:

   a. In the sentence above the table, right click on the word **here**.

   b. From the pop-up window, select **Save Target As**.

   c. Specify a destination directory for the log file.

   d. Press **Save** to download and save the file.

5. Press **Done** to exit the page.

5.5.4 Using the Service Utilities

To access the service utilities, follow these steps:

1. Access the Service portlet. See **Section 5.3 on page 5-7**.

2. From the Run Diagnostics section of the Service portlet, select **Service Utilities**. The Service Utilities page opens, as shown in **Figure 5-12**. This page includes a number of options that may be required as you perform service on the XLS.

Figure 5-12 Service Utilities page

Options on the Service Utilities Page

Table 5-2 lists the options that you can select from the Service Utilities page.

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CAUTION

To prevent operational problems with the library, follow the instructions in this manual very carefully before using the options on the Service Utilities page. If you have questions about the use of these options, contact Qualstar Technical Support.

</div>

Section	Option	Use option to...
General	Lock Doors	Lock the door(s)
	Unlock Doors	Unlock the door(s)
	Get Cabinet Status	Display the physical status of the light curtains, the I/O ports, and the door
Robot	Power Off Gripper	Power off the gripper so that it can be serviced. See **Section 12.1 on page 12-2**.
	Power On Gripper	Power the gripper back on. See **Section 12.1 on page 12-2**.
	Home Robot	Realign the motor magnetics and reestablish the hard stop and index positions for all robots. At the end of the home operation, the gripper is moved to the park position near the bottom right corner of the base cabinet.
	Position Robot	Move the gripper to the appropriate position for using the gripper alignment cartridge
	Park Robot	Move the gripper to a safe position near the bottom right corner of the base cabinet
	Get Robot Status	Record the gripper's X and Theta positions when using the gripper alignment cartridge
Inventory	Scan Inventory	Scan the barcode labels on all cartridges in the library
	Sync Inventory	Synchronize the results of the Scan Inventory operation with the logical inventory

Table 5-2 Options on the Service Utilities page

Section	Option	Use option to...
Fiducials	Scan Magazine Fiducials	Scan the fiducials on all storage magazines
	Scan I/O Port Fiducials	Scan the fiducials on the I/O port magazines and scan the inventory of each port
	Scan/Calibrate Tape Drives	Scan and calibrate the tape drive locations
	Scan Unscanned Fiducials	Based on the results of Dump Fiducial Database (see below), scan any fiducials that were missed during the magazine, I/O port, and tape drive scans
	Calibrate Fiducials	Based on the results of the fiducial scan operations, calculate the positions of the fiducials for the cartridge magazines and I/O ports
	Dump Fiducial Database	Display the database of fiducial information to establish whether any fiducials were missed during the fiducial scans
Carousels	Power Off Carousel Left	Power off the left or right carousel controller before replacing the carousel motor. See **Section 15.3.1 on page 15-23**.
	Power Off Carousel Right	
	Power On Carousel Left	Power on the left or right carousel controller after replacing the carousel motor. See **Section 15.3.4 on page 15-30**.
	Power On Carousel Right	

Table 5-2 Options on the Service Utilities page (*continued*)

5.6 Changing the Configuration

This section describes how to perform the following Change Configuration procedures from the Service portlet:

- Upload File (see **Section 5.6.1**)
- Install File (see **Section 5.6.2 on page 5-19**)
- View SCSI Log Setting (see **Section 5.6.3 on page 5-20**)

> **Important:** The **View/Edit Hardware Configuration** selection is used only after a hardware part is installed or replaced. For instructions on using this option, refer to the appropriate FRU replacement procedure.

5.6.1 Uploading a File

The Update File option allows you to copy a file to the XLS from a networked computer. For example, you would upload a file if you wanted to update the library's firmware. To upload a file, follow these steps:

1. Contact Qualstar Technical Support.

   > **Important:** Do not update the library's firmware until you after you have consulted Qualstar Technical Support.

2. After talking to Technical Support, connect to Qualstar's FTP site and transfer the appropriate file to your network.

3. Log in to X-Link, using a computer that can access the downloaded file. See **Section 5.2 on page 5-5**.

4. From the Home page, access the Service portlet. See **Section 5.3 on page 5-7**.

5. From the Change Mode section, select **Physical Mode** to put the library in physical mode. See **Section 5.4.3 on page 5-10**.

6. From the Change Configuration section of the Service portlet, select **Upload File**. The Upload File page opens, as shown in **Figure 5-13**.

Figure 5-13 Upload File page

7. Select **Browse**, then locate the file you copied from Qualstar's FTP site.

8. Press **Upload File** to upload the file to the XLS.

9. When finished, press **Done** to return to the Home page.

5.6.2   Installing a File

When you install a file, you distribute the uploaded information (for example, library firmware) to the appropriate places within the XLS.

To install a file, follow these steps:

1.   Contact Qualstar Technical Support.

   > **Important:**   Do not install a file until you after you have consulted Qualstar Technical Support.

2.   Follow the instructions in **Section 5.6.1 on page 5-18** to upload the file.

3.   From the Home page, access the Service portlet. See **Section 5.3 on page 5-7**.

4.   From the Change Mode section, select **Physical Mode** to put the library in physical mode. See **Section 5.4.3 on page 5-10**.

5.   From the Change Configuration section of the Service portlet, select **Install File**. The Install File page opens, as shown in **Figure 5-14**.

Figure 5-14   Install File page

6.   Select the file you want to install.

7.   Review the file information displayed in the File description window.

8.   Select **Install File**. X-Link installs the file and indicates that it is restarting.

5.6.3 Viewing or Editing SCSI Log Settings

The SCSI log contains a history of the SCSI commands and messages sent and received by the XLS. Qualstar Technical Support may request that you send them a copy of this log to help debug certain problems.

After talking to Technical Support, use the View/Edit SCSI Log Settings page (described in this section) to specify what information to record in the log. Then, use the View SCSI Log page (described in **Section 5.5.3 on page 5-14**) to download the actual log.

To view or edit the SCSI log settings, follow these steps:

1. From the Home page, access the Service portlet. See **Section 5.3 on page 5-7**.

2. From the Change Configuration section, select **View/Edit SCSI Log Settings**. The View/Edit SCSI Log Setting page opens, as shown in **Figure 5-15**.

Figure 5-15 View/Edit SCSI Log Settings page

3. Change the log settings as instructed by Qualstar Technical Support.

> **Important:**   Selecting **SCSI Major Events** causes all SCSI commands sent to the XLS to be logged. The results of the other log settings are intended for use by Qualstar Technical Support and are beyond the scope of this manual.

4. When you are finished, press **Yes** to exit the page.

5. As required, refer to **Section 5.5.3 on page 5-14** to download the log itself.

6   Shutting Down the XLS

This chapter provides instructions for shutting down the XLS to perform a service operation.

6.1   What Happens When the XLS is Shut Down

When the XLS is shut down, it performs the following actions:

- It completes all current and pending moves.
- It moves the handler and carousel to their home positions.
- It logs an event in the event log and sends a message to designated users.
- It goes into physical mode.
- It closes X-Link and displays a system-halted message on the touch screen.

When the shut-down process is complete, the Fault LED (red) flashes, indicating that it is safe to move the power switch to the off position.

6.2   Shutting Down the XLS

To shut down the XLS, follow these steps:

1. Make sure that no backup operations are in process, then shut down the applications. Refer to the documentation for the software applications.

2. From X-Link, press the **Home** button in the upper right corner of any page to return to the Home page.

3. Access the Physical Library portlet or the Service portlet (see **Section 5.3 on page 5-7**).

4. Select **Physical Mode** to put the XLS in physical mode. See **Section 5.4.3 on page 5-10**.

5. Select **Shutdown Library**. The Shutdown Library confirmation page opens, as shown in **Figure 6-1 on page 6-2**.

Figure 6-1   Shutdown Library confirmation page

6. Press **Yes** to confirm that you want to shut down the physical library.

7. Wait while the XLS shuts down. The amount of time required depends on what activities were occurring when you began the shut-down process.

8. When the Fault (red) LED begins flashing, finish shutting down the XLS by moving the power switch on the back of the library to the off position, as shown in **Figure 6-2**.

Figure 6-2   Power switch in off position

6.3   Restarting the XLS

The procedure for restarting the XLS depends on what activities occurred while the XLS was shut down. For detailed information and instructions, refer to **Chapter 17, "Restarting the XLS."**

Part III: Replacing FRUs

Notes:

7 Replacing Power/PC Bay Components

This chapter provides instructions for replacing the following components in the power/PC bay:

- Power supplies (see **Section 7.1**)

- Battery module (see **Section 7.2 on page 7-7**)

- Cooling fans (see **Section 7.4 on page 7-12**)

- Components within the system controller, including the PCI cards and the hard drive (see **Section 7.5 on page 7-14**)

- Entire power/PC bay assembly, including the power controller PCBA, the power switch/breaker, and the power connector (see **Section 7.6 on page 7-21**)

- Slide rails for the power/PC bay (see **Section 7.7 on page 7-25**)

Figure 7-1 shows the components in the power/PC bay, which is accessible from the rear of the LRM. **Figure 3-1 on page 3-3** is a diagram that illustrates how power is distributed throughout the library.

Figure 7-1 Power/PC bay components

7.1 Installing or Replacing a Power Supply

This section provides instructions for replacing a power supply.

> **Important:** When installing or replacing a power supply, be aware that the two leftmost slots are always "on" (receiving power from the power backplane). For this reason, be sure both of these slots are occupied before installing additional power supplies.

> **Important:** If a redundant power supply is installed, the power supplies are hot swappable and can be replaced while the logical libraries are online and the XLS is powered on.

Required tools and equipment: Make sure you have the following:

- Flat-blade screwdriver
- #2 Phillips screwdriver
- Replacement power supply

Figure 7-2 Power supply

7.1.1   Removing a Power Supply

To remove a power supply, follow these steps:

1.   Identify which power supply needs to be replaced by looking at the power supply LEDs, shown in **Figure 7-3**, and comparing them to the LED states described in **Table 7-1**.

LEDs

Figure 7-3   Power supply LEDs

LED		Meaning
PWR Good	**Fault**	
On (green)	Off	The power supply is operating correctly
On (green)	On (yellow)	The power supply is not operating correctly and needs to be replaced
Off	Off	The power supply has failed and needs to be replaced

Table 7-1   Meaning of the power supply LEDs

2. Using a flat-blade screwdriver, loosen the upper and lower lock screws on the failed or failing power supply by turning them counterclockwise. See **Figure 7-4**.

Figure 7-4   Loosening the power supply lock screws

3. Using one hand to grasp the handle and the other to support the power supply's weight, carefully slide the supply out of the power/PC bay. See **Figure 7-5**.

Important:	The power supply should slide out easily. If there is any resistance, adjust the position of the power supply and try again.

Figure 7-5   Removing a power supply from the power/PC bay

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WARNING!

To avoid damaging the library and to avoid electrical shock, never insert anything into an open power supply slot.

</div>

4. Install a new power supply in the empty slot, as described in the next section.

7.1.2   Installing a Power Supply

To install a power supply, follow these steps:

1. As required, use a Phillips screwdriver to remove the two 8-32 × 3/8 Phillips screws that secure the cosmetic cover to an unused power supply slot. See **Figure 7-6**.

Cosmetic cover removed

Power switch/breaker

Power connector

Power supplies (up to 7)

Battery module

Figure 7-6   Cosmetic cover removed

2. Orient the new power supply so that the label "SYSTEM PWR" is to the top and the handle is to the right.

3. Carefully slide the supply into the power/PC bay. See **Figure 7-7**.

> **Important:** The power supply should slide in easily. If there is any resistance, adjust the position of the power supply and try again. Do not force it into position.

Figure 7-7 Inserting a power supply into the power/PC bay

4. Push on the power supply to ensure that the connectors are fully seated against the power/PC bay.

    Assuming that the library's power is on, both LEDs will light briefly when you install the new power supply. If the supply is operating correctly, the Fault LED (yellow) will go off, and the PWR Good LED (green) will remain lit.

5.   Using a flat-blade screwdriver, turn the upper and lower lock screws clockwise until hand tight. See **Figure 7-8**.

Figure 7-8   Tightening the power supply lock screws

CAUTION

Do not tighten the lock screws unless the power supply is fully seated. Do not overtighten the screws.

7.2   Replacing the Battery Module

This section provides instructions for replacing the battery module. If the Fault LED is on the battery module needs to be replaced. You can replace the battery module while the XLS remains powered on.

CAUTION

The battery module in the power/PC bay provides enough backup power to safely shut down the XLS if an unexpected power failure occurs. However, the battery module does not provide enough power to protect the tape drives. For this reason, Qualstar recommends that you connect the XLS to an external UPS.

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver
- Replacement battery module

7.2.1 Removing the Battery Module

To remove the battery module, follow these steps:

1. Locate the two screws that attach the battery module to the power/PC bay. See **Figure 7-9**.

Figure 7-9 Location of the battery module screws

2. Using a Phillips screwdriver, remove the two screws and set them aside. You will reuse these screws to install the replacement module.

3. Using one hand to grasp the handle and the other to support the battery module's weight, carefully slide the module out of the power/PC bay. See .

Important:	The battery module should slide out easily. If there is any resistance, adjust the position of the battery module and try again.

Figure 7-10 Removing the battery module from the power/PC bay

---

WARNING!

To avoid damaging the library and to avoid electrical shock, never insert anything into the open battery module slot.

7.2.2 Installing the Battery Module

To install the battery module, follow these steps:

1. Orient the new module so that the label is to the top and the handle is to the right.

2. Carefully slide the module into the power/PC bay. See **Figure 7-10**.

> **Important:** The battery module should slide in easily. If there is any resistance, adjust the position of the module and try again. Do not force it into position.

3. Push on the battery module to ensure that the connectors are fully seated against the power/PC bay.

> **Important:** If the Charge LED on the battery module illuminates, the battery module may not be charged. It can take up to 10 minutes for the battery in the replacement module to fully charge.

4. Using a Phillips screwdriver, replace the two screws and turn them clockwise until hand tight. See **Figure 7-11**.

Figure 7-11 Location of screws for the battery module

> **CAUTION**
>
> Do not tighten the screws unless the battery module is fully seated. Do not overtighten the screws.

7.3 Sliding the Power/PC Bay In and Out

This section describes how to slide the power/PC bay out of the library in preparation for replacing a cooling fan, the hard drive or a PCI card, or the entire power/PC bay assembly.

CAUTION

The fans are hot-swappable, which means that you can safely slide the power/PC bay in and out while the library remains powered on. However, you must power down the library before replacing any system controller components – including the PCI cards and the hard drive – or the power/PC bay itself.

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver

7.3.1 Sliding the Power/PC Bay Out

To slide the power/PC bay out, follow these steps:

1. Remove the four screws (two on either side) that secure the power/PC bay to the library's frame. See **Figure 7-12**.

Figure 7-12 Removing the screws on the left side of power/PC bay

2. Holding the power/PC bay by a power supply handle or by the flanges on either side of the bay, slide the bay out.

3. Refer to the following sections as required:

   – To replace a fan, see **Section 7.4**
   – To replace a PCI card or hard drive, see **Section 7.5 on page 7-14**
   – To replace the entire power/PC bay assembly, see **Section 7.6 on page 7-21**

7.3.2 Sliding the Power/PC Bay In

To slide the power/PC bay back into place, follow these steps:

1. Holding the power/PC bay by a power supply handle or by the flanges on either side, slide the bay into the library's frame.

2. Replace the four screws (two on either side). See **Figure 7-13**.

Insert screws

Figure 7-13   Replacing the screws on the left side of power/PC bay

7.4 Replacing a Fan

This section provides instructions for replacing either of the two cooling fans in the power/PC bay.

> **Important:**   The fans are hot swappable. You can replace a fan while the library is powered on.

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver
- Replacement fan

7.4.1   Removing a Fan

To remove a fan, follow these steps:

1. Follow the instructions in **Section 7.3.1 on page 7-11** to slide the power/PC bay out.

2. Using your fingers or a Phillips screwdriver, turn the thumb screw counterclockwise to loosen the fan.

3. Holding the fan by the thumb screw, lift the fan out of the power/PC bay. See **Figure 7-14**.

Thumb screw

Figure 7-14   Removing a fan

7.4.2   Installing a Fan

To install a fan, follow these steps:

1. Holding the fan by the thumb screw, lower the fan into the power/PC bay. See **Figure 7-15**.

Thumb screw

Figure 7-15   Replacing a fan

2. Turn the thumb screw clockwise until hand tight.

3. Follow the instructions in **Section 7.3.2 on page 7-12** to slide the power/PC bay back into the library's frame.

7.5   Replacing System Controller Components

This section provides instructions for accessing and replacing the following components in the system controller:

• Any of the PCI cards, including the Fibre Channel and SCSI host bus adapter (HBA) cards and the CAN bus controller card.

• Hard drive

Precautions:

<div style="border: 2px solid blue;">

CAUTION

To avoid damaging the system controller, you must shut down the library before removing or installing cards or other components.

</div>

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CAUTION

Ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use a grounded static protection wristband. If a wristband is not available, touch a known grounded surface.

</div>

Required tools and equipment: Make sure you have the following:

- Replacement card or hard drive
- Phillips screwdriver

7.5.1 Accessing System Controller Components

To access the components within the system controller, follow these steps:

1. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2. Slide the power/PC bay out. See **Section 7.3.1 on page 7-11**.

3. Using a Phillips screwdriver, remove the 10 screws that attach the system controller cover to the power/PC bay. See **Figure 7-16**.

Figure 7-16 Removing the system controller cover

4. Lift the cover off of the system controller.

7.5.2 Replacing PCI Cards

This section provides instructions for removing any of the following PCI cards:

- CAN bus controller card
- Fibre Channel HBA
- SCSI HBA

Removing PCI Cards

To remove a PCI card, follow these steps:

1. Remove the top cover of the system controller, as described in **Section 7.5.1 on page 7-15**.

2. Using a Phillips screwdriver, loosen the three captive screws that attach the EMI shield to the back of the system controller. See **Figure 7-17**.

Figure 7-17 Location of the screws on the EMI shield

3. Remove the shield.

4. Disconnect any cables connected to the card you want to remove.

5. Remove the screw securing the card to the frame. See **Figure 7-18**.

Figure 7-18 Removing the card-retention plate

6. Holding the card by its edges, pull up on the card to disconnect the connector from the slot on the motherboard.

Installing a PCI Card

> **CAUTION**
>
> If you are replacing a Fibre Channel or SCSI HBA, install the replacement card before reapplying power to the library. Otherwise, the XLS may assign new port IDs to any remaining HBA ports, which could corrupt any existing nexus settings to the logical libraries.
>
> For example, if you remove HBA B and then apply power to the library, port IDs 3 and 4 will be assigned to HBA C and port IDs 5 and 6 will be assigned to HBA D. As a result, any logical libraries connected to these ports will have invalid nexus settings.
>
> | 1 | 3 | 5 | 7 | | 1 | | 3 | 5 |
> | 2 | 4 | 6 | 8 | | 2 | | 4 | 6 |
> | HBA A | HBA B | HBA C | HBA D | | HBA A | HBA B | HBA C | HBA D |
>
> Original port IDs   Port IDs after removing HBA B

To install a PCI card, follow these steps

1. If you are replacing an HBA, use the slot you removed the card from.

    or

    If you are installing a new HBA:

    a. Locate the empty expansion slot that is closest to the power supplies.

    b. Remove the slot cover from the slot.

2. Holding the card by its edges, insert the card into the slot. Push down on the edge of the card to seat the connector.

3. Replace the screw securing the card to the frame. See **Figure 7-18 on page 7-17**.

4.   Reconnect any cables to the card.

> **Important:**   If you are replacing the CAN adapter card, connect the CAN 0 cable to the bottom port and the CAN 1 cable to the upper port.

5.   Replace the EMI shield. See **Figure 7-17 on page 7-17**.

6.   Reinstall the system controller cover, as described in **Section 7.5.4 on page 7-20**.

7.5.3   Replacing the Hard Drive

This section provides instructions for replacing the hard drive.

> **Important:**   Before replacing the hard drive, contact Qualstar Technical Support.

Removing the Hard Drive

To remove the hard drive, follow these steps:

1.   Remove the top cover of the system controller, as described in **Section 7.5.1 on page 7-15**.

2.   Locate the hard drive on the right side of the system controller. See **Figure 7-19**.

Figure 7-19   Location of the hard drive

3.   Disconnect the following cables from the hard drive:

   –   IDE ribbon cable to the motherboard
   –   4-pin power cable to the power back plane

4. Using a Phillips screwdriver, remove the four screws that secure the hard drive to the frame.

Installing the Hard Drive

To install the hard drive, follow these steps

1. Hold the hard drive in position and replace the four screws that secure the hard drive to the frame.

2. Reconnect the following cables:

   – 4-pin cable to the power back plane
   – IDE ribbon cable to the motherboard

3. Reinstall the system controller cover, as described in **Section 7.5.4**.

7.5.4   Replacing the System Controller Cover

To replace the system controller cover, follow these steps:

1. Using a Phillips screwdriver, replace the 10 screws that secure the system controller cover to the power/PC bay. See **Figure 7-20**.

Figure 7-20   Replacing the system controller cover

2. Slide the power/PC bay back into the frame. See **Section 7.3.2 on page 7-12**.

7.6   Replacing the Power/PC Bay Assembly

This section describes how to remove and replace the power/PC bay assembly, which includes the following:

- Power supply for the computer
- Power supply controller PCBA
- Motherboard and cables
- Main power disconnect switch
- AC power connector

Precautions:

> **CAUTION**
>
> To avoid damaging the XLS, you must shut down the library before removing or installing power/PC bay assembly.

> **CAUTION**
>
> Ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use a grounded static protection wristband. If a wristband is not available, touch a known grounded surface.

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver

7.6.1   Removing the Power/PC Bay Assembly

To remove the power/PC bay assembly, follow these steps:

1.   Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2.   Unplug the power cord. Use your thumb to release the latch. See **Figure 7-21**.

Push on latch
to remove
connector

Figure 7-21   Attaching the power cord

3.   Remove the power supplies (see **Section 7.1.1 on page 7-3**) and battery module (see **Section 7.2.1 on page 7-8**); you will install them in the replacement power/PC bay.

4.   Follow the instructions in **Section 7.3.1 on page 7-11** to slide the power/PC bay out of the library's frame.

5.   Using a Phillips screwdriver, loosen the three capture screws that attach the EMI shield and remove the shield. See **Figure 7-22**.

Figure 7-22   Location of the screws for the EMI shield

6.   Remove the strain relief plate, and disconnect any cables to the HBAs.

7. Disconnect any cables connected to the system controller, including the:

    – Ethernet cable from ENET0
    – USB cable
    – VGA cable
    – CAN bus cables

8. Cut the cable ties.

9. Remove the screws and plates attaching the USB and VGA cables to the EMI shield. See **Figure 7-23**.

Figure 7-23   Location of the screws for VGA and USB cables

10. Slide the USB and VGA cables out through the bay.

11. Remove the following components; you will install them in the new power/PC bay.

    – Hard drive (see **"Removing the Hard Drive" on page 7-19**)

    – PCI cards, including the CAN bus controller and the HBAs (see **"Removing PCI Cards" on page 7-16**)

    > **Important:**   Be sure to keep track of which HBA is installed in which slot; you will need to replace them in the same order.

12. Disconnect the following cables from the back of the power/PC bay. See **Figure 7-24 on page 7-24**.

    – Drive bay cables
    – Carousel cables
    – X-Y/user interface cables

Drive bays 1&2

Drive bays 3&4

Drive bays 5&6

Drive bays 7&8

Carousels

XY and UI PCBs

Figure 7-24 Location of the cables attached to the power/PC bay (XLS-32700 shown)

13. Using wire cutters, snip the two cable ties that attach the CAN bus cable to the frame.

14. Disconnect the CAN bus cable.

15. Using a Phillips screwdriver, unscrew the ground strap.

16. Push on the slide-rail release levers and slide the bay out.

7.6.2   Installing the Power/PC Bay Assembly

To replace the power/PC bay assembly, follow these steps:

1. Insert the new bay into position. Make sure that the slide rails are correctly inserted into the tracks and that the bay slides in and out easily.

2. Using a Phillips screwdriver, reconnect the ground strap.

3. Reconnect the CAN bus cable and replace the cable ties.

4. Reconnect the following cables to the back of the power/PC bay. See **Figure 7-24**:

   – Drive bay cables
   – Carousel cables
   – X-Y/user interface cables

5. Install the following components in the replacement bay:

   – Hard drive (see **"Installing the Hard Drive" on page 7-20**
   – PCI cards (see **"Installing a PCI Card" on page 7-18**)

   > **Important:** Be sure to replace the HBAs in the same order as they were previously installed.

6. Slide the power/PC bay into the frame (see **Section 7.3.2 on page 7-12**).

7. Reattach the USB and VGA cables and plates. See **Figure 7-23 on page 7-23**.

8. Reconnect the cables and replace the EMI shield.

9. Reconnect the Ethernet cable.

10. Replace the:

    – Power supplies (see **Section 7.1.2 on page 7-5**)
    – Battery module (see **Section 7.2.2 on page 7-9**)

11. Reconnect the power cord. Make sure the latch clicks and locks the cord in place.

12. Apply power to the library. See **Section 17.2 on page 17-3**.

7.7 Replacing the Power/PC Bay Slide Rails

This section describes how to remove and replace the slide rails that support the power/PC bay.

7.7.1 Removing the Slide Rails

To remove the slide rails, follow these steps:

1. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2. Unplug the power cord. Use your thumb to release the latch.

3. Remove the power/PC bay as described in **Section 7.6.1 on page 7-21**.

4. Using a Phillips screwdriver, remove the three screws attaching the slide rail to the side of the power/PC bay. See **Figure 7-25**.

Figure 7-25 Location of the screws attaching slide rail to power/PC bay

7.7.2 Installing the Slide Rails

To replace the slide rails, follow these steps:

1. Using a Phillips screwdriver, replace the three screws attaching the slide rail to the side of the power/PC bay. See **Figure 7-25**.

2. Replace the power/PC bay, as described in **Section 7.6.2 on page 7-24**.

3. Reconnect the power cord. Make sure the latch clicks and locks the cord in place.

4. Apply power to the library. See **Section 17.2 on page 17-3**.

8   Replacing Tape Drives

This chapter provides information about replacing a tape drive assembly.

The XLS-832700 can accommodate 4 to 32 tape drives; the XLS-820500 can accommodate 4 to 20 tape drives; and the XLS-812300 can accommodate 4 to 12 tape drives. Tape drives are available in Ultra 160 SCSI and 4 Gb Fibre Channel configurations and are cabled and controlled independently of the XLS's medium changer interface.

The tape drives are designed to be hot-swappable. That is, depending on the capabilities of your software, you can remove and replace a tape drive while the XLS is powered on and the logical libraries are online.

> **Important:**   For safety and UL compliance, the XLS handler will not move if a tape drive assembly or a drive filler assembly is removed. Although it is not required, you may want to put the XLS in physical mode to prevent the software applications from timing out when a tape drive is removed.

Procedure overview: [Table 8-1](#) provides an overview of replacing a tape drive.

Step	Description	Refer to...
1	Access the View/Manage Tape Drives page	**Section 8.1**
2	Take the tape drive offline	**Section 8.2 on page 8-3**
3	Power off the tape drive	**Section 8.3 on page 8-5**
4	Remove the tape drive from the drive bay	**Section 8.4 on page 8-6**
5	Install the tape drive in the drive bay	**Section 8.5 on page 8-8**
6	Power on the tape drive	**Section 8.6 on page 8-10**
7	Calibrate the tape drive (optional)	**Section 8.7 on page 8-11**
8	Bring the tape drive online	**Section 8.8 on page 8-12**

Table 8-1   Overview of replacing a tape drive

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver

- Replacement tape drive assembly, including any cables or terminators, or a drive filler assembly

8.1 Accessing the View/Manage Tape Drives Page

> **Important:** The instructions in this chapter describe how to replace a tape drive using options available from the Physical Library portlet.
>
> You can also replace a tape drive using options available from the Logical Libraries portlet. However, if you use the options available from the Logical Libraries portlet, you must specify a SCSI element address for the tape drive instead of a physical address.

To access the View/Manage Tape Drives page, follow these steps:

1. If necessary, press the **Home** button in the upper right corner of any page to return to the Home page.

2. Select **Service View** or **Show All** to display the Physical Library portlet, as shown in **Figure 8-1**

Figure 8-1 Physical Library portlet

3.   From the Media and Tape Drives section of the Physical Library portlet, select **Tape Drives**. The View/Manage Tape Drive page opens, as shown in .

Figure 8-2   View/Manage Tape Drives page

8.2   Taking a Tape Drive Offline

When you take a tape drive *offline*, the physical location becomes inaccessible to the logical library. For this reason:

- Cartridges cannot be moved to an offlined tape drive by the software application that controls the logical library.

- Cartridges cannot be moved to an offlined tape drive by logical library commands that have the tape drive as their destination.

Important:	Taking a tape drive offline prevents the logical library from moving cartridges to the tape drive. This action does not affect the tape drive's ability to communicate with the software application or to read and write data.

To take a tape drive offline, follow these steps:

1. Access the View/Manage Tape Drives page, as described in **Section 8.1 on page 8-2**.

2. In the Status–Offline column of the tape drives table, select **Online.**

Important:	As an alternative, you can select **Offline Tape Drive** from the list of options below the table. However, if you select **Offline Tape Drive**, you must enter the address of the tape drive.

The Take Tape Drive Offline page opens, as shown in **Figure 8-3**.

Figure 8-3   Take Tape Drive Offline page (physical library version shown)

3. Press **Yes** to take the tape drive offline.

4. Confirm that **Offline** is now reported in the Status–Offline column of the tape drives table.

Important:	You may need to press **Refresh** to update the contents of the table.

8.3   Powering Off a Tape Drive

Before removing a tape drive assembly, you must power off the tape drive.

CAUTION

To avoid damaging the electronics within the tape drive, power off the tape drive from X-Link before attempting to remove the tape drive assembly from the back of the library. Do not remove the tape drive if the Drive Status LED is green.

To power off a tape drive, follow these steps:

1.   Access the View/Manage Tape Drives page, as described in **Section 8.1 on page 8-2**.

2.   If the tape drive contains a cartridge and you want to remove it before powering off the drive, eject and unload the cartridge from the tape drive.

   Note: It is not an error to remove a tape drive that contains a cartridge.

3.   In the Status–Power column of the tape drives table, select **On.**

Important: As an alternative, you can select **Power Off Tape Drive** from the list of options below the table. However, if you select **Power Off Tape Drive**, you must enter the address of the tape drive.

The Power Off Tape Drive page opens, as shown in **Figure 8-4**.

Figure 8-4   Power Off Tape Drive page (physical library version shown)

4.   Press **Yes** to power off the tape drive.

5. Confirm that **Off** is now reported in the Status–Power column of the tape drives table.

Important:	You may need to press **Refresh** to update the contents of the table.

6. Check the Drive Status LED on the back of the tape drive assembly. If the LED is amber or off, it is safe to remove the tape drive. See **Figure 8-5**.

Figure 8-5 Status LEDs on Fibre Channel drive carrier

8.4   Removing a Tape Drive

To remove a tape drive, follow these steps:

1. Check to ensure that the Drive Status LED is amber or off.

2. Disconnect any cables and terminators from the tape drives.

3. Using a Phillips screwdriver, turn the two captive screws counterclockwise until loose. See **Figure 8-6**.

Figure 8-6 Loosening the tape drive assembly screws

4. Using one hand to support the tape drive's weight at the front of the carrier, carefully slide the drive carrier out of the drive bay, as shown in **Figure 8-7**.

Figure 8-7 Removing a drive carrier from a drive bay

5. As soon as possible, install a replacement tape drive or a drive filler assembly in the empty slot, as described in **Section 8.5**.

CAUTION

For safety and UL compliance, the XLS handler is prevented from moving if any tape drive slots are empty.

CAUTION

To avoid damaging the equipment and voiding your warranty, do not attempt to remove a tape drive from a drive carrier. The tape drives used in the XLS must be installed into drive carriers at the factory.

8.5 Installing a Tape Drive

To install a tape drive assembly in the library, follow these steps:

1. Using one hand to support the tape drive's weight at the front of the carrier, carefully slide the tape drive assembly into the drive bay, as shown in **Figure 8-8**.

Figure 8-8 Inserting a tape drive assembly into a drive bay

2. Push on the back of the tape drive to ensure that the connectors are fully seated and that the carrier's gasket has made a good seal against the drive bay. If the tape drive is installed correctly, the Drive Status LED will turn amber.

3.   Using a Phillips screwdriver, turn the two captive screws clockwise until tight. See **Figure 8-9**.

Figure 8-9   Tightening the tape drive assembly screws

4.   As required, repeat steps 1–3 to install a drive filler assembly (shown in **Figure 8-10**) in any unused tape drive slot.

Figure 8-10   Drive filler assembly

5.   Reconnect the cables and terminators.

8.6 Applying Power to a Tape Drive

To power on a tape drive, follow these steps:

1. Access the View/Manage Tape Drives page, as described in **Section 8.1 on page 8-2**.

2. In the Status–Power column of the tape drives table, select **Off.**

Important: As an alternative, you can select **Power On Tape Drive** from the list of options below the table. However, if you select **Power On Tape Drive**, you must enter the address of the tape drive.

The Power On Tape Drive page opens, as shown in **Figure 8-11**.

Figure 8-11 Power On Tape Drive page (physical library version shown)

3. Press **Yes** to power on the tape drive.

4. Confirm that **On** is now reported in the Status–Power column of the tape drives table.

Important: You may need to press **Refresh** to update the contents of the table.

---

5. Check the status LEDs on the back of the tape drive assembly. If the Drive Status LED is green (may take up to 45 seconds), the tape drive has been successfully powered on.

8.7   Calibrating a Tape Drive (optional)

Whenever a tape drive is installed in the XLS, its position needs to be exactly calibrated to ensure accurate pick and place operations. During *calibration*, the handler moves the calibration cartridge to the tape drive and scans the triangular target on the cartridge. It then returns the calibration cartridge to its reserved slot.

The XLS can detect when a tape drive is installed or replaced and automatically performs calibration when that tape drive is brought online.

> **Important:**   The XLS does not always calibrate a tape drive's position when the tape drive is brought online. For example, it does not recalibrate the position before onlining the tape drive:
> - If the tape drive was taken offline but not physically replaced
> - If the position was already calibrated manually

As described in this section, there are a few occasions when you may want to calibrate a tape drive manually. For example, if you intend to move cartridges to and from the tape drive *before* bringing it online to the logical library, you need to calibrate it manually. Or, you may want to force the XLS to recalibrate the location of an existing drive even if it was not replaced.

To calibrate a tape drive manually, follow these steps:

1.   Confirm that a calibration cartridge is installed in slot G50. See **Figure 8-12**.

Calibration cartridge slot (G50)

Cleaning cartridge slots (G46-G49)

Figure 8-12   Location of the reserved slot for the calibration cartridge

2. Access the View/Manage Tape Drives page, as described in **Section 8.1 on page 8-2**.

3. In the Status–Calibrate column of the tape drives table, select **Uncalibrated**.

Important: As an alternative, you can select **Calibrate Tape Drive** from the list of options below the table. However, if you select **Calibrate Tape Drive**, you must enter the address of the tape drive.

The Calibrate Tape Drive page opens, as shown in **Figure 8-13**.

Figure 8-13 Calibrate Tape Drive page (physical library version shown)

4. Press **Yes** to calibrate the tape drive.

5. Confirm that **Calibrated** is now reported in the Status–Calibrated column of the tape drives table.

Important: You may need to press **Refresh** to update the contents of the table.

8.8 Bringing a Tape Drive Online

When you bring a tape drive *online*, the physical location becomes accessible to the logical library. A tape drive must be online before you can use the software application or logical library commands to move cartridges to it. Bringing a tape drive online does not affect the

tape drive's ability to communicate with the software application or to read and write data.

> **Important:**   When you bring a new or replaced tape drive online, the XLS automatically calibrates its position unless you have already performed a manual calibration. See **Section 8.7 on page 8-11**.

To bring a tape drive online, follow these steps:

1. Access the View/Manage Tape Drives page, as described in **Section 8.1 on page 8-2**.

2. In the Status–Offline column of the tape drives table, select **Offline.**

> **Important:**   As an alternative, you can select **Online Tape Drive** from the list of options below the table. However, if you select **Online Tape Drive**, you must enter the address of the tape drive.

The Bring Tape Drive Online page opens, as shown in **Figure 8-14**.

Figure 8-14   Bring Tape Drive Online page (physical library version shown)

3. Press **Yes** to bring the tape drive online.

4. Confirm that **Online** is now reported in the Status–Offline column of the tape drives table.

> **Important:**   You may need to press **Refresh** to update the contents of the table.

Notes:

9 Installing or Replacing Cartridge Slots and Drive Bays

This chapter provides instructions for installing or replacing cartridge slots and drive bays, including background information about fiducials and procedures for the following tasks:

- Replacing a cartridge magazine (see **Section 9.2 on page 9-2**)
- Installing and removing door slots (see **Section 9.3 on page 9-4**)
- Replacing a cartridge bay with a drive bay (see **Section 9.4 on page 9-10**)
- Replacing a drive bay with a cartridge bay (see **Section 9.5 on page 9-16**)

9.1 XLS Fiducials

Figure 9-1 shows an XLS cartridge magazine with storage slots for five cartridges and two fiducials. *Fiducials* are the black and white triangles that are mounted on either side of every cartridge magazine. There is also a fiducial on the calibration cartridge, which is inserted in each tape drive to precisely locate the tape drive position.

Figure 9-1   Cartridge magazine with two fiducials

During a *fiducial scan*, the barcode reader on the handler tries to locate and scan every fiducial installed in the library. For example, the handler moves up and down and across the cartridge slots on the back wall until it detects all fiducials. Once it determines the location of each fiducial, the XLS can calculate the exact position of every storage slot in the XLS in a process known as *calibration*.

9.2 Replacing a Cartridge Magazine

To ensure accurate pick and place operations, you may need to replace a magazine if a slot is worn or if a fiducial is damaged or missing.

Procedure overview: **Table 9-1** provides an overview of replacing a cartridge magazine.

Step	Task	Refer to...
1	Shut down the library and power it off	**Section 6.2 on page 6-1**
2	Remove the cartridge magazine	**Section 9.2.1**
3	Install the cartridge magazine	**Section 9.2.2 on page 9-3**
4	Power on the library and scan the fiducials and inventory	**Section 17.4 on page 17-8**

Table 9-1 Overview of replacing a cartridge magazine

Required tools and equipment: Make sure you have the following:

- Replacement cartridge magazine
- Two 6-32 × 3/8 Phillips screws
- #2 Phillips screwdriver, magnetized if possible

9.2.1 Removing a Cartridge Magazine

To remove a cartridge magazine, follow these steps:

1. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2. Open the door closest to the magazine you want to remove.

    – If the cartridge magazine is located on a fixed port assembly, remove the front panel. See **Section 10.1 on page 10-1**.

    – If the cartridge magazine is located in an XLS-812300 expansion pod, remove the three socket-head cap screws from the front of the pod, then swing the pod open.

    – If the cartridge magazine is located in a MEM, rotate the carousel by hand to access the magazine.

3. Remove any cartridges stored in the magazine.

4. Using a magnetized #2 Phillips screwdriver, loosen and remove the two screws that hold the cartridge magazine in place. See **Figure 9-2**.

Figure 9-2   Location of screws for cartridge magazine

Important:	Be sure to replace the magazine before powering the library back on. If the library detects that a magazine is missing during the fiducial scan, the operation will fail.

9.2.2   Installing a Cartridge Magazine

To install a cartridge magazine, follow these steps:

1. Locate the cartridge magazine mounting holes on the frame.

2. Insert two 6-32 × 3/8 Phillips screws through the two holes in the cartridge magazine and into the frame. See **Figure 9-2**.

3. Using a Phillips screwdriver, tighten the screws.

4. Replace any cartridges you removed.

5. If the cartridge magazine is located on a fixed port assembly, replace the front panel. See **Section 10.2 on page 10-7**. If the cartridge magazine is located in an XLS-812300 expansion pod, swing the pod closed, then replace the three socket-head cap screws.

6. Refer to **Section 17.4 on page 17-8** to power on the library and scan the fiducials and inventory.

9.3 Installing and Removing Door Slots

This section provides instructions for installing and removing the door pack 110-tape kit. With the kit installed, a door can hold an additional 110 cartridge slots.

9.3.1 Installing Door Slots

Important:	If you decide to install the door pack 110-tape kit, be sure to install all 22 cartridge magazines. Otherwise, the library will not operate correctly.

Procedure overview: **Table 9-2** provides an overview of installing door slots.

Step	Task	Refer to...
1	Shut down the library and power it off	**Section 6.2 on page 6-1**
2	Install the magazine faceplates	**"Installing the Magazine Faceplates" on page 9-4**
3	Install the cartridge magazines	**"Installing the Cartridge Magazines" on page 9-6**
4	Power on the library, update the hardware configuration, and scan the fiducials and inventory	**Section 17.5 on page 17-12**

Table 9-2   Overview of installing door slots

Required tools and equipment: Make sure you have the following:

- Door pack 110-tape kit, including:
    - 11 magazine faceplates
    - 22 cartridge magazines
    - 6-32 x 5/16 flat-head screws (33)
    - 6-32 x 3/8 pan-head screws (44)

- #2 Phillips screwdriver

Installing the Magazine Faceplates

To install the magazine faceplates, follow these steps:

1. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2.   Open the door upon which you want to install door slots.

3.   On the back of the door, locate the bracket with the DOR barcode label.

4.   Using a Phillips screwdriver, remove the two screws attaching the bracket to the door and remove the bracket. See **Figure 9-3**.

Figure 9-3   DOR barcode label and bracket (back of door shown)

5.   On the back of the door, locate the holes for the 11 magazine faceplates.

6.   Insert three 6-32 x 5/16 flat-head screws through the outermost holes on a magazine faceplate to attach the faceplate to the door. There are two holes on the inside edge of the bracket, but you only need to use the lower hole. See **Figure 9-4**.

Figure 9-4   Attaching the magazine faceplate to the door

7.   Using a Phillips screwdriver, tighten the screws.

8.   Repeat steps 6 and 7 for the remaining magazine faceplates.

Installing the Cartridge Magazines

To install the cartridge magazines on the door, follow these steps:

1. Locate the four threaded mounting holes on the uppermost magazine faceplate. The faceplate can hold two magazines, so it includes two upper and two lower mounting holes. See **Figure 9-5**.

Magazine mounting holes (use top threaded hole)

Figure 9-5   Location of mounting holes for cartridge magazines on magazine faceplate

2. Use two 6-32 x 3/8 pan-head screws to attach a cartridge magazine to one side of the magazine faceplate. Be sure to use the holes shown in **Figure 9-5**.

3. Attach the remaining 21 cartridge magazines.

> **Important:**   Be sure to install all 22 cartridge magazines. The XLS will not operate correctly if any of the door slots are missing.

4. As required, insert cartridges into each slot.

5. Refer to **Section 17.5 on page 17-12** to power on the library, update the hardware configuration, and scan the fiducials and inventory.

9.3.2 Removing Door Slots

> **Important:** If you decide to remove door pack 110-tape kit, be sure to remove all 22 cartridge magazines. Otherwise, the library will not operate correctly.

Procedure overview: **Table 9-3** provides an overview of removing door slots.

Step	Task	Refer to...
1	Shut down the library and power it off	**Section 6.2 on page 6-1**
2	Remove the cartridge magazines	**"Removing the Cartridge Magazines" on page 9-7**
3	Remove the magazine faceplates	**"Removing the Magazine Faceplates" on page 9-8**
4	Power on the library, update the hardware configuration, and scan the fiducials and inventory	**Section 17.5 on page 17-12**

Table 9-3 Overview of removing door slots

CAUTION

Before removing door slots, consider that all logical libraries will be deleted as soon as you edit the hardware configuration from X-Link.

In addition, you will need to allow time for the library to re-scan all fiducials and barcodes.

Required tools and equipment: Make sure you have the following:

- DOR barcode label bracket (see **Figure 9-8 on page 9-9**)
- Two 6-32 × 3/8 Phillips screws
- #2 Phillips screwdriver

Removing the Cartridge Magazines

To remove the cartridge magazines on the door, follow these steps:

1. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2. Open the door from which you want to remove door slots.

3. Remove any cartridges from the door slots.

4. Locate the two magazines on the uppermost magazine faceplate.

5. Using a Phillips screwdriver, remove the screws from the upper and lower holes on each of the upper magazines. See **Figure 9-6**.

Figure 9-6 Removing a cartridge magazine

6. Remove the remaining cartridge magazines.

Removing the Magazine Faceplates

To remove the magazine faceplates, follow these steps:

1. On the back of the doors, locate the 11 magazine faceplates.

2.   Using a Phillips screwdriver, remove the three screws that attach a faceplate to the door. See **Figure 9-7**.

Figure 9-7   Removing the magazine faceplate from the door

3.   Remove the remaining magazine faceplates.

4.   On the back of the door, locate the two holes for the DOR barcode label bracket.

5.   Using a Phillips screwdriver, insert two screws through the bracket and into the door. See **Figure 9-8**.

Figure 9-8   DOR barcode label bracket (back of door shown)

> **Important:**   To ensure correct library operation, you must install a DOR barcode label bracket after removing door slots.

6.   Refer to **Section 17.5 on page 17-12** to power on the library, update the hardware configuration, and scan the fiducials and inventory.

9.4 Replacing a Cartridge Bay with a Drive Bay

This section provides instructions for replacing a cartridge bay with a drive bay. Shown in **Figure 9-9**, a drive bay can accommodate up to four tape drive assemblies.

Figure 9-9 Two drive bays (viewed from the front with the front panel removed)

> **Important:** If you simply need to replace one cartridge bay with another, refer to **Section 9.4.1 on page 9-11** to remove the cartridge bay and **Section 9.5.2 on page 9-20** to install the replacement.

Procedure overview: **Table 9-4** provides an overview of replacing a cartridge bay with a drive bay.

Step	Task	Refer to...
1	Shut down the library and power it off	**Section 6.2 on page 6-1**
2	Remove the cartridge bay	**Section 9.4.1 on page 9-11**
3	Install the drive bay	**Section 9.4.2 on page 9-13**
4	Install the tape drives	**Section 8.5 on page 8-8**
5	Power on the library, update the hardware configuration, and scan the fiducials and inventory	**Section 17.5 on page 17-12**

Table 9-4 Overview of replacing a cartridge bay with a drive bay

---

> **CAUTION**
>
> Before replacing a cartridge bay with a drive bay, consider that all logical libraries will be deleted as soon as you edit the hardware configuration from X-Link.
>
> In addition, you will need to allow time for the library to re-scan all fiducials and barcodes.

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver
- Empty drive bay
- Four 6-32 × 3/8 Phillips screws
- Four tape drive assemblies or drive filler assemblies

9.4.1 Removing a Cartridge Bay

To remove a cartridge bay, follow these steps:

1. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2. Open the doors.

3. Remove any cartridges from the cartridge bay you plan to remove.

> **CAUTION**
>
> To avoid dropping cartridges or damaging the cartridge bay, do not attempt to remove a cartridge bay unless the cartridges have been removed.

4. From the back of the library, use a Phillips screwdriver to remove the four screws (two on the left and two on the right) that hold the cartridge bay in place. See

[Figure 9-10](#). Save these screws; you will use them to secure the replacement bay.

Remove screws   Remove screws

Figure 9-10   Removing the drive bay screws

5.   From the back of the library, carefully slide the cartridge bay out of the frame.

6.   If you are installing a drive bay, go to the next section. Otherwise, refer to **Section 9.5.2, "Installing a Cartridge Bay," on page 9-20**.

┌───┐
│   │
│   **WARNING!**   │
│   │
│   To avoid the risk of injury, do not apply power to the library if a │
│   cartridge or drive bay is missing. The library cannot detect that a bay │
│   has been removed and will not prevent the handler from moving to the │
│   empty bay position.   │
│   │
└───┘

9.4.2   Installing a Drive Bay

To install a drive bay, follow these steps:

1. Use a Phillips screwdriver to remove the two screws holding the drive bay plate to the front of the bay. See **Figure 9-11**.

Remove screws

Figure 9-11   Removing the drive bay plate

2. Remove the plate and screws and set them aside.

3. Orient the empty drive bay so that the flanged edges are to the top. See **Figure 9-12**.

Flange

Figure 9-12   Drive bay orientation (back of drive bay shown)

4. From the back of the library, lift the drive bay into an empty bay position.

5. Slide the bay forward

CAUTION

If the bay does not slide easily, reposition it slightly and try again. Do not force it into position.

---

6. Secure the bay with four 6-32 × 3/8 Phillips screws (two on the left and two on the right). See **Figure 9-13**.

Insert screws   Insert screws

Figure 9-13   Installing the drive bay screws (view from the back)

7. Open the right door.

8. From the front of the library, connect the drive bay cable to its connector. See **Figure 9-14**.

Figure 9-14   Connecting the drive bay cable (view from the front)

9.   Replace the drive bay plate and screws. See **Figure 9-15**.

Replace screws

Figure 9-15   Replacing the drive bay plate (view from the front)

10.   Install a tape drive assembly or drive filler assembly into each of the four slots. See **Section 8.5 on page 8-8**.

CAUTION

For safety and UL compliance, a tape drive assembly or drive filler assembly must be installed in all tape drive slots. If there are empty tape drive slots, the XLS handler will not move.

---

11.   Refer to **Section 17.5 on page 17-12** to power on the library, update the hardware configuration, and scan the fiducials and inventory.

Important: If you replaced a drive bay with another drive bay, refer to **Section 17.4 on page 17-8** to scan the fiducials and inventory.

9.5 Replacing a Drive Bay with a Cartridge Bay

This section provides instructions for replacing a drive bay with a cartridge bay. Shown in **Figure 9-16**, a cartridge bay can accommodate up to 30 cartridges.

Cartridge slots

Flange

Figure 9-16 Cartridge bay

> **Important:** If you simply need to replace one drive bay with another, refer to **Section 9.5.1 on page 9-17** to remove the drive bay and **Section 9.4.2 on page 9-13** to install the replacement.

Procedure overview: **Table 9-5** provides an overview of replacing a drive bay with a cartridge bay.

Step	Task	Refer to...
1	Shut down the library and power it off	**Section 6.2 on page 6-1**
2	Remove the drive bay	**Section 9.5.1 on page 9-17**
3	Insert the cartridge bay	**Section 9.5.2 on page 9-20**
4	Power on the library, update the hardware configuration, and scan the fiducials and inventory	**Section 17.5 on page 17-12**

Table 9-5 Overview of replacing a drive bay with a cartridge bay

<div style="border: 2px solid blue;">

CAUTION

Before replacing a drive bay with a cartridge bay, consider that all logical libraries will be deleted as soon as you edit the hardware configuration from X-Link.

In addition, you will need to allow time for the library to re-scan all fiducials and barcodes.

</div>

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver
- Empty cartridge bay
- Four 6-32 × 3/8 Phillips screws
- Up to 30 cartridges

9.5.1   Removing a Drive Bay

To remove a drive bay, follow these steps:

1. Put the library in physical mode, which takes all logical libraries offline. See **Section 5.4.3 on page 5-10**.

2. Unlock and open the doors.

3. Push the eject buttons on the tape drives in the drive bay to ensure that they do not contain any cartridges.

4. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

5. Remove all tape drive assemblies and drive filler assemblies from the drive bay. See **Section 8.4 on page 8-6**.

<div style="border: 2px solid blue;">

CAUTION

To avoid damaging the drive bay, do not attempt to remove a drive bay unless the tape drive assemblies have been removed.

</div>

6. From the back of the library, use a Phillips screwdriver to remove the four screws (two on the left and two on the right) that hold the drive bay in place. See

Figure 9-17. Save these screws; you will use them to secure the replacement bay.

Remove screws   Remove screws

Figure 9-17   Removing the drive bay screws

7.   From the front of the library, open the right door.

8.   Use a Phillips screwdriver to remove the two screws that hold the drive bay plate in place. See **Figure 9-18**.

Remove screws

Figure 9-18   Removing the drive bay plate

9.   Remove the plate and screws and set them aside.

10. Carefully push the drive bay back until you can access the drive bay cable and connector on the right. See **Figure 9-19**.

Figure 9-19 Drive bay cable and connector

11. Disconnect the drive bay cable from its connector.

12. From the back of the library, slide the tape drive assembly completely out of the frame.

13. If you are installing a cartridge bay, go to the next section. Otherwise, refer to **Section 9.4.2, "Installing a Drive Bay," on page 9-13**.

> # WARNING!
>
> To avoid the risk of injury, do not apply power to the library if a cartridge or drive bay is missing. The library cannot detect that a bay has been removed and will not prevent the handler from moving to the empty bay position.

9.5.2 Installing a Cartridge Bay

To install a cartridge bay, follow these steps:

1. Orient the empty cartridge bay so that the cartridge slots are to the front and the flanged edges are on top. See **Figure 9-20**.

Cartridge slots

Flange

Figure 9-20 Cartridge bay orientation

2. From the back of the library, lift the empty cartridge bay into an empty bay position.

3. Slide the bay forward.

CAUTION

If the bay does not slide easily, reposition it slightly and try again. Do not force it into position.

---

4. Secure the bay with four 6-32 × 3/8 Phillips screws (two on the left and two on the right). See **Figure 9-21**.

Insert screws   Insert screws

Figure 9-21   Installing the cartridge bay screws (view from the back)

5. As required, insert cartridges into each slot.

6. Refer to **Section 17.5 on page 17-12** to power on the library, update the hardware configuration, and scan the fiducials and inventory.

> **Important:**   If you replaced a cartridge bay with another cartridge bay, refer to **Section 17.4 on page 17-8** to scan the fiducials and inventory.

Notes:

10   Replacing Frame Components

This chapter provides instructions for the following tasks:

- Removing the front panel (see **Section 10.1**)
- Replacing the front panel (see **Section 10.2 on page 10-7**)
- Removing and replacing the side panels (see **Section 10.3 on page 10-11**)

10.1   Removing the Front Panel

Procedure overview: **Table 10-1** provides an overview of removing the front panel.

Step	Description	Refer to...
1	Shut down the library and power it off	**Section 6.2 on page 6-1**
2	Remove front panel cartridges	**Section 10.1.1**
3	Remove the air filter cover	**Section 10.1.2 on page 10-3**
4	Detach the cables	**Section 10.1.3 on page 10-4**
5	Remove the front panel from the frame	**Section 10.1.4 on page 10-5**

Table 10-1   Overview of removing the front panel

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver
- Cable tie cutters

10.1.1   Removing Front Panel Cartridges

To remove the front panel cartridges, follow these steps:

1. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2. Open the door(s).

3. Reach behind the front panel and remove all cartridges from the fixed port assemblies.

4. For each I/O port, locate the I/O port solenoid behind the front panel, as shown in **Figure 10-1**.

I/O port
solenoid

Figure 10-1   I/O port solenoid

5. Press the solenoid release button to open the I/O port. See **Figure 10-2**.

Figure 10-2   Pressing the I/O port solenoid release

6. Remove the I/O port magazine from each I/O port.

7. Push each I/O port closed.

10.1.2   Removing the Air Filter Cover

To remove the air filter cover, follow these steps:

1.   Locate the three captive screws at the top of the air filter cover, as shown in **Figure 10-3**. The XLS-832700 has three screws, and the XLS-820500 and XLS-812300 have two screws.

Captive screws (3)

Figure 10-3   Location of the captive screws on the air filter cover (XLS-832700 shown)

2.   Using a #2 Phillips screwdriver, loosen the screws.

3.   Lower the top edge of the air filter cover away from the frame. See **Figure 10-4**.

Figure 10-4   Releasing the top edge of the air filter cover

4.   Remove the bottom edge of the air filter cover by lifting the tabs out of the slots.

10.1.3 Detaching the Cables

To detach the cables, follow these steps:

1. Locate the cable coupling block at the base of the frame. See **Figure 10-5**.

Light curtain lower emitters

User Interface PCBA

Touch screen video

LCD power

Touch screen USB interface

Figure 10-5 Cable coupling block

2. Disconnect all five cables from the coupling block:

   – Touch screen video
   – LCD power
   – Touch screen USB interface
   – User interface PCBA
   – Light curtain lower emitters

3. Locate the left and right door interlock sensors. See **Figure 10-6**.

Door interlock sensor cable

Figure 10-6 Cable for door interlock sensor (left side of XLS-832700 shown)

4.   For each door interlock sensor, cut the two cable ties that secure the cable to the frame. See **Figure 10-7**.

Cable ties

Figure 10-7   Cable ties for door interlock sensor

5.   Disconnect the cable from each door interlock sensor.

6.   On the ceiling of the frame, locate the cable that connects the right front light curtain to the front panel. See **Figure 10-8**.

Light curtain cable
to front panel

Figure 10-8   Light curtain cable connector

7.   Disconnect the cable at the connector.

10.1.4   Removing the Front Panel from the Frame

> **CAUTION**
>
> The front panel weighs close to 75 pounds (34 kg). Do not attempt this procedure by yourself unless you are comfortable lifting and moving this amount of weight.

To remove the front panel from the frame, follow these steps:

1. Locate the five Phillips screws attaching the front panel to the frame. See **Figure 10-9**.

Figure 10-9 Location of front panel screws

2. Using a Phillips screwdriver, remove the three bottom screws.

3. Using one hand to support the top of the front panel, remove the two top screws.

4. Slowly release the top of the panel away from the frame. See **Figure 10-10**.

Figure 10-10   Removing the front panel

5. Lift the panel up and out of the frame and carefully lean it against a wall.

CAUTION

The touch screen is easily scratched. Be sure to protect the screen with a soft cloth or other padding before leaning the front panel against any surface.

10.2   Installing the Front Panel

Procedure overview: **Table 10-2** provides an overview of installing the front panel.

Step	Description	Refer to...
1	Insert the front panel into the frame	**Section 10.2.1**
2	Reattach the cables	**Section 10.2.2 on page 10-9**
3	Replace the air filter cover	**Section 10.2.3 on page 10-10**
4	Replace the cartridges	**Section 10.2.4 on page 10-11**
5	Power on the library and scan the fiducials and inventory	**Section 17.4 on page 17-8**

Table 10-2   Overview of installing the front panel

10.2.1 Inserting the Front Panel in the Frame

┌───┐
│   │
│   **WARNING!**   │
│   │
│ The front panel weighs close to 75 pounds (34 kg). Do not attempt this │
│ procedure by yourself unless you are comfortable lifting and moving │
│ this amount of weight.   │
│   │
└───┘

To insert the front panel in the frame, follow these steps:

1. Lift the front panel into position so that the base of the panel rests on the frame and the flange fits behind the frame. See **Figure 10-11**.

Figure 10-11   Replacing the front panel

┌───┐
│   │
│   **CAUTION**   │
│   │
│ Be careful not to pinch any of the cables between the frame and the │
│ center panel.   │
│   │
└───┘

2. Using one hand to hold the top of the front panel in place, replace the two Phillips screws at the top.

3. Replace the three Phillips screws at the bottom.

10.2.2   Attaching the Cables

To attach the cables, follow these steps:

1.   Connect the light curtain cable to its connector on the ceiling of the frame. See **Figure 10-12**.

Light curtain cable
to front panel

Figure 10-12   Light curtain cable connector

2.   Connect the cables to both the left and right door interlock sensors. See **Figure 10-13**.

Door interlock
sensor cable

Figure 10-13   Door interlock sensor (left side of XLS-832700 shown)

3. Replace the cable ties (two on each side) securing the door-interlock sensor cables to the frame. See **Figure 10-14**

Cable ties

Figure 10-14   Cable ties for door interlock sensor cable

4. Locate the bundle of cables attached to the lower left side of the front panel.

5. Using **Figure 10-15** as a guide, reattach the five cables to the coupling block. The connectors are keyed and can be inserted in only one direction.

Light curtain lower emitters

User Interface PCBA

Touch screen video

LCD power

Touch screen USB interface

Figure 10-15   Cable coupling block

6. Ensure that the bundle of cables attached to the coupling back is safely out of the way of the Y-axis belt.

CAUTION

To avoid damaging the cables, do not apply power to the library until these cables are safely out of the way of the Y-axis belt.

10.2.3   Replacing the Air Filter Cover

To replace the air filter cover, follow these steps:

1. Insert the air filter cover's three tabs into the slots on the frame.

2.   Raise the top of the air filter cover into position.

3.   Tighten the captive screws.

10.2.4   Replacing the Cartridges

To replace the cartridges, follow these steps:

1.   Reach in from the front of the library and replace any cartridges that were located in the fixed slots behind the front panel.

2.   Press the I/O port solenoids to open the I/O ports.

3.   Replace the I/O port magazines.

4.   Refer to **Section 17.4 on page 17-8** to power on the library and scan the fiducials and inventory.

CAUTION

If you replaced a fixed port assembly with an I/O port, follow the instructions in **Section 17.5 on page 17-12** to restart the library. Do not close the doors until you have updated the hardware configuration in X-Link. Otherwise, hardware damage may occur when the I/O ports are automatically scanned.

10.3   Replacing a Side Panel

This section provides instructions for removing the left or right side panel from the LRM or MEM.

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver

10.3.1   Removing a Side Panel

To remove a side panel, follow these steps:

1.   Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2.   Locate the two Phillips screws at the base of the side panel.

3. Using a #2 Phillips screwdriver, remove the two screws. See **Figure 10-16**.

Figure 10-16 Removing the screws from the side panel

4. Carefully slide the panel up until you can lift the hooks out of the corresponding slots on the frame. See **Figure 10-17**.

Figure 10-17 Removing a side panel

10.3.2 Installing a Side Panel

To install a side panel, follow these steps:

1. Holding the side panel with both hands, carefully lower it into place. Make sure that the hooks on the panel engage with the corresponding slots on the frame.

2.   Replace the two screws in the holes at the bottom of the panel. See **Figure 10-18**.

Figure 10-18   Installing the side panel

3.   Refer to **Section 17.3 on page 17-4** to power on the library.

Notes:

11   Replacing I/O Ports and Fixed Port Assemblies

This chapter provides instructions for the following tasks:

- Replacing an I/O port (see **Section 11.1**)
- Replacing a fixed port assembly (see **Section 11.2 on page 11-7**)
- Upgrading a fixed port assembly to an I/O port (see **Section 11.3 on page 11-9**)

11.1   Replacing an I/O Port

This section describes how to remove an I/O port and replace it with another I/O port.

Procedure overview: **Table 11-1** provides an overview of replacing an I/O port.

Step	Task	Refer to...
1	Shut down the library and power it off	**Section 6.2 on page 6-1**
2	Remove the front panel	**Section 10.1 on page 10-1**
3	Remove the I/O port	**Section 11.1.1**
4	Install the I/O port	**Section 11.1.2 on page 11-5**
5	Replace the front panel	**Section 10.2 on page 10-7**
6	Power on the library and scan the fiducials and inventory	**Section 17.4 on page 17-8**

Table 11-1   Overview of replacing an I/O port

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver with a 5-inch or longer blade, magnetized if possible
- Needle-nosed pliers or spring attachment tool

11.1.1   Removing an I/O Port

To remove an I/O port, follow these steps:

1. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2. Remove the front panel, as described in **Section 10.1 on page 10-1**, and carefully lean it against a wall. Make sure you can easily access the I/O ports from the back and allow enough room in front for the I/O ports to open freely.

> **CAUTION**
>
> The touch screen is easily scratched. Protect the screen with a soft cloth or other padding before leaning the front panel against any surface.

3. Locate the I/O port solenoid on the back of the front panel, as shown in **Figure 11-1**.

I/O port solenoid

Figure 11-1 I/O port solenoid

4. Press the solenoid release button to open the I/O port. See **Figure 11-2**.

Figure 11-2 Pressing the I/O port solenoid release

5. Using a long-bladed Phillips screwdriver, remove the two flat-head screws and two pre-assembled screws securing the black cosmetic cover to the front of the I/O port. See **Figure 11-3**.

Screw hidden by sheet metal

Figure 11-3   Location of screws for the I/O port cosmetic cover

6. Locate the I/O port damper, as shown in **Figure 11-4**.

I/O port damper

Figure 11-4   I/O port damper

7. Using a Phillips screwdriver, remove the two screws holding the damper to the frame and set it aside.

8. Push on the I/O port to fully open it. (This releases the tension on the spring so it can be removed more easily.)

9. Using a spring-removal tool, needle-nosed pliers, or the end of a screwdriver, release the I/O port spring from either its upper or lower attachment point. See **Figure 11-5**.

Upper attachment

Lower attachment

Figure 11-5 I/O port spring

10. Locate the four screws at the base of the I/O port assembly, as shown in **Figure 11-6**.

Screws

Screws

IOP

Figure 11-6 I/O port screws

11. Using a long-bladed, magnetized Phillips screwdriver, remove the four screws and set them aside.

12.   Remove the I/O port from the back of the front panel.

CAUTION

 Do not power on the library with the front panel removed or with an I/O
port missing.

11.1.2   Installing an I/O Port

To install an I/O port, follow these steps:

1.   Make sure you have the correct assembly for the opening. There are left and right
     I/O port assemblies. The racheting mechanism should face the outer edge of the
     frame.

2.   From the back of the front panel, insert the I/O port assembly into the front
     panel.

3.   Lay the front panel and I/O port face down on the floor or a workbench, being
     careful not to scratch or damage the touch screen.

CAUTION

The touch screen is easily scratched. Protect the screen with a soft cloth
or other padding before leaning the front panel against any surface.

---

4.   Using a long-bladed, magnetized Phillips screwdriver, replace the four I/O port
     screws. See **Figure 11-7**.

Figure 11-7   I/O port screws

> **Important:** If you do not have a magnetized screwdriver available, simply slide one hand under the tray at the base of the I/O port. Use this hand to hold the screws in place and use the other hand to turn the screwdriver.

5. Lean the front panel against a wall.

6. Using your finger, depress the solenoid release button to open the I/O port. See **Figure 11-1 on page 11-2**.

7. Using needle-nosed pliers or spring attachment tool, reattach the spring. See **Figure 11-5 on page 11-4**.

8. Reattach the I/O port damper with the two screws. See **Figure 11-4 on page 11-3**.

9. Replace the cosmetic cover using the two flat-head screws and two pre-assembled screws. See **Figure 11-8**.

Screw hidden
by sheet metal

Figure 11-8   Location of screws for the I/O port cosmetic cover

10. Replace the front panel. See **Section 10.2 on page 10-7**.

11. Refer to **Section 17.4 on page 17-8** to power on the library and scan the fiducials and inventory.

11.2   Replacing a Fixed Port Assembly

This section describes how to remove and replace a fixed port assembly. Fixed port assemblies can be installed on the back of the front panel instead of I/O ports. Each fixed port includes 10 cartridge slots in two magazines.

Procedure overview: **Table 11-1** provides an overview of replacing a fixed port assembly.

Step	Task	Refer to...
1	Shut down the library and power it off	**Section 6.2 on page 6-1**
2	Remove the fixed port	**Section 11.2.1**
3	Install the fixed port	**Section 11.2.2 on page 11-8**
4	Power on the library and scan the fiducials and inventory	**Section 17.4 on page 17-8**

Table 11-2   Overview of replacing a fixed port assembly

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver

11.2.1   Removing a Fixed Port Assembly

To remove a fixed port assembly, follow these steps:

1. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2. Open the doors.

3. Reach in and remove any cartridges located in the fixed slots you plan to remove.

4. If desired, remove the front panel. See **Section 10.1 on page 10-1**.

> **Important:**   You can replace a fixed port assembly while the library's front panel remains in place; however, you may find it easier to access the fixed port if you remove the front panel.

5. On the back of the front panel, locate the three screws that attach the fixed port assembly to the frame. See **Figure 11-9**.

Figure 11-9   Location of screws for the fixed port assembly

6. Using a Phillips screwdriver, remove the three screws and set them aside.

7. Remove the fixed port assembly.

<div style="border:2px solid blue; padding:10px;">

CAUTION

Do not turn on the library before reinstalling the fixed port assembly or an I/O port.

</div>

11.2.2   Installing a Fixed Port Assembly

To install a fixed port assembly, follow these steps:

1. From the front of the front panel, slide the fixed port assembly into place.

2. Replace the three screws attaching the assembly to the frame. The two larger screws go on the bottom; the single smaller screw goes on top. See **Figure 11-9**.

3. If you chose to remove the front panel to access the fixed port assembly, refer to **Section 10.2 on page 10-7** for instructions for replacing the front panel.

4. If necessary, replace the cartridges you removed from the fixed slots.

5. Refer to **Section 17.4 on page 17-8** to power on the library and scan the fiducials and inventory.

11.3 Upgrading a Fixed Port Assembly to an I/O Port

This section provides instructions for replacing a fixed port assembly with an I/O port. Shown in **Figure 11-10**, two or four I/O ports can be installed on the front of the LRM. Each I/O port holds 10 cartridges in a removable magazine.

Figure 11-10 I/O port

Procedure overview: **Table 11-3** provides an overview of replacing a fixed port assembly with an I/O port.

Step	Task	Refer to...
1	Shut down the library and power it off	**Section 6.2 on page 6-1**
2	Remove the front panel	**Section 10.1 on page 10-1**
3	Remove the fixed port assembly	**Section 11.3.1 on page 11-10**
4	Install the I/O port	**Section 11.3.2 on page 11-11**

Table 11-3 Overview of replacing a fixed port assembly with an I/O port

Step	Task	Refer to...
5	Replace the front panel	**Section 10.2 on page 10-7**
6	Power on the library, update the hardware configuration, and scan the fiducials and inventory	**Section 17.5 on page 17-12**

Table 11-3   Overview of replacing a fixed port assembly with an I/O port (*continued*)

CAUTION

Before replacing a fixed port assembly with an I/O port, consider that all logical libraries will be deleted as soon as you edit the hardware configuration from X-Link.

In addition, you will need to allow time for the library to re-scan all fiducials and barcodes.

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver with a 5-inch or longer blade, magnetized if possible
- Needle-nosed pliers or spring attachment tool
- Replacement I/O port assembly
- 6-32 × 3/8 Phillips screws (4)
- I/O port magazine

11.3.1   Removing a Fixed Port Assembly

To remove a fixed port assembly, follow these steps:

1. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2. Remove the front panel as described in **Section 10.1 on page 10-1** and lean it against a wall.

CAUTION

The touch screen is easily scratched. Protect the screen with a soft cloth or other padding before leaning the front panel against any surface.

---

3. Locate the three screws that attach the fixed port assembly to the frame. See **Figure 11-11**.

Figure 11-11 Location of screws for the fixed port assembly

4. Using a #2 Phillips screwdriver, remove the three screws and set them aside.

5. Remove the fixed port assembly.

CAUTION

Do not turn on the library before reinstalling the fixed port assembly or an I/O port.

11.3.2 Installing an I/O Port

To install an I/O port, follow these steps:

1. Make sure you have the correct assembly for the opening. There are left and right I/O port assemblies. The racheting mechanism should face the outer edge of the frame.

2. From the back of the front panel, insert the I/O port assembly into the front panel.

3. Lay the front panel and I/O port face down on the floor or a workbench, being careful not to scratch or damage the touch screen.

CAUTION

The touch screen is easily scratched. Protect the screen with a soft cloth or other padding before leaning the front panel against any surface.

---

4. Using a long-bladed, magnetized Phillips screwdriver, replace the four I/O port screws. See **Figure 11-12**.

Figure 11-12   I/O port screws

Important: If you do not have a magnetized screwdriver, simply slide one hand under the tray at the base of the I/O port. Use this hand to hold the screws in place and use the other hand to turn the screwdriver.

---

5. Lean the front panel against a wall.

6. Using your finger, depress the solenoid release button to open the I/O port. See **Figure 11-1 on page 11-2**.

7. Using needle-nosed pliers or spring attachment tool, attach the spring. See **Figure 11-5 on page 11-4**.

8. Attach the I/O port damper with the two screws. See **Figure 11-4 on page 11-3**.

9.   Install the cosmetic cover using the two flat-head screws and two pre-assembled screws. See **Figure 11-13**.

Screw hidden
by sheet metal

Figure 11-13   Location of screws for the I/O port cosmetic cover

10.   Replace the front panel as described in **Section 10.2 on page 10-7**.

11.   Refer to **Section 17.5 on page 17-12** to power on the library, update the hardware configuration, and scan the fiducials and inventory.

Notes:

12   Replacing Handler Components

This chapter provides instructions for the following procedures:

- Removing and replacing the gripper assembly, including the barcode reader (see **Section 12.1**)

- Removing and replacing the X-Y controller card (see **Section 12.2 on page 12-15**)

- Removing and replacing the X-axis cable and cat track (see **Section 12.3 on page 12-19**)

- Removing and replacing the X-motor assembly (see **Section 12.4 on page 12-22**)

- Removing and replacing the Y-axis cable and cat track (see **Section 12.5 on page 12-30**)

- Removing and replacing the Y-motor assembly (see **Section 12.6 on page 12-34**)

12.1 Replacing the Gripper Assembly

This section provides instructions for replacing the gripper assembly, shown in **Figure 12-1**.

Barcode reader   Gripper mechanism

Figure 12-1 Gripper assembly

Procedure overview: **Table 12-1** provides an overview of replacing the gripper assembly.

Step	Task	Refer to...
1	Power off the gripper	**Section 12.1.1**
2	Remove the gripper	**Section 12.1.2 on page 12-5**
3	Replace the gripper	**Section 12.1.3 on page 12-7**
4	Align the gripper assembly with the left back wall	**Section 12.1.4 on page 12-9**
5	Align the gripper assembly with the right back wall	**Section 12.1.5 on page 12-10**
6	Align the gripper assembly with any MEMs	**Section 12.1.6 on page 12-11**
7	Update the database	**Section 12.1.7 on page 12-12**
8	Scan the fiducials and calibrate the library	**Section 12.1.8 on page 12-13**

Table 12-1 Overview of replacing the gripper assembly

Required tools and equipment: Make sure you have the following:

- 7/16-inch socket wrench or nut driver
- Small flat-bladed screwdriver
- Needle-nosed pliers with smooth blades, or tweezers
- Gripper alignment cartridge (Qualstar part number: 620059). See **Figure 12-2**.

Figure 12-2   Gripper alignment cartridge

12.1.1 Powering Off the Gripper

To power off the gripper assembly, follow these steps:

1. Make sure that no backup operations are in process, then shut down the applications. Refer to the documentation for the software applications.

2. From the Home page in X-Link, select **Service View** to display the Service portlet, shown in **Figure 12-3 on page 12-4**.

Figure 12-3 Service portlet

3.   From the Change Configuration section of the Service portlet, select **View/Edit Hardware Configuration**. The View/Edit Hardware Configuration page opens as shown in **Figure 12-4**.

Figure 12-4 View/Edit Hardware Configuration page

4.   From the Misc section, select **Go to Physical Mode**, which puts the library in physical mode. See **Section 5.4.3 on page 5-10** for more information.

5.   From the Misc section, select **Unlock Doors** to unlock the door(s).

6.   From the Robot section, select **Power Off Gripper** to power off the gripper.

Important:	The XLS itself can remain powered on when you replace the gripper assembly.

12.1.2   Removing the Gripper Assembly

To remove the gripper assembly, follow these steps:

1.   Open the door on the side closest to the gripper assembly.

2.   Locate the end of the flex cable that connects the gripper assembly to the flex adapter card. See **Figure 12-5**.

Important:	You may need to rotate the gripper from side to side or slide it along the track to access the connection.

Gripper assembly

Flex cable

Figure 12-5   Gripper assembly and flex cable

3. Using a small flat-bladed screwdriver, very carefully push on each side of the locking mechanism to release the flex cable. See **Figure 12-6**.

Push on both sides of the
locking mechanism to release
the cable from the connector

Figure 12-6   Releasing the gripper flex cable from the connector

4. Using tweezers or needle-nosed pliers with smooth blades, very carefully pull the flex cable away from the connector.

5. Locate the hex nut directly in the center of the gripper assembly. This nut attaches the gripper assembly to the X-beam mount. See **Figure 12-7**.

Hex nut

Figure 12-7   Location of hex nut for gripper assembly

6. Using a 7/16-inch socket wrench or nut driver, loosen and remove the hex nut.

7. Using both hands, carefully lift the gripper assembly off of the X-beam mount.

12.1.3   Installing the Gripper Assembly

To install the gripper assembly, follow these steps:

1. Orient the gripper assembly so that flex cable is facing the flex adapter card. See **Figure 12-5 on page 12-5**.

2. Place the gripper assembly on top of the X-beam mount. See **Figure 12-8**.

Figure 12-8   Location of X-beam mount

3. Align the gripper assembly so that the ribs on the bottom of the gripper align with the notches on the X-beam mount. See **Figure 12-9 on page 12-8**.

> ### CAUTION
>
> Make sure that the gripper is securely installed and correctly aligned.

Figure 12-9 Correct alignment of the gripper assembly

4. Using a 7/16-inch socket wrench or nut driver, replace the hex nut. See **Figure 12-7 on page 12-6**.

5. Using tweezers or needle-nosed pliers with smooth blades, reattach the flex cable to the flex cable adapter card. Push the locking mechanisms in to lock the cable in place. See **Figure 12-10**.

Flex cable connector

Figure 12-10 Cable connector on the flex cable adapter card

6. Close any open doors.

7. From the Robot section of the View/Edit Hardware Configuration page, select **Position Robot**, which powers on the robots, homes all axes (including any carousels), and positions the gripper to an easily accessible location.

8. Align the gripper with the left back wall (see **Section 12.1.4 on page 12-9**), the right back wall (see **Section 12.1.5 on page 12-10**), and any installed MEMs (see **Section 12.1.6 on page 12-11**).

12.1.4 Aligning the Gripper Assembly with the Left Back Wall

To align the gripper assembly with the left back wall, follow these steps:

1. Open the door(s).

2. Insert the gripper alignment cartridge into the left column on the back wall, as follows:

   – **XLS-832700:** Insert the cartridge into slot **A36**
   – **XLS-820500:** Insert the cartridge in slot **B36**
   – **XLS-812300:** Insert the cartridge into slot **B36**

> **Important:** Make sure the alignment cartridge indicates "This side up for Theta Alignment."

Figure 12-11 Inserting the gripper alignment cartridge into the left back wall

3. Move the X-beam by hand until the gripper assembly is just under the gripper alignment cartridge.

> **Important:**   Make sure the alignment cartridge aligns with the gripper assembly guide rod. The alignment cartridge should be flush with the gripper assembly and the cartridge slot.

4. Select **Get Robot Status**. X-Link displays information about the robot's position.

5. Write down the values for Left Theta Position ("TPOS") and X Position ("XPOS").

6. Move the X-beam down by hand so that it is not blocking the gripper alignment cartridge.

7. Remove the gripper alignment cartridge.

8. Align the gripper assembly with the right back wall as described in **Section 12.1.5**.

12.1.5 Aligning the Gripper Assembly with the Right Back Wall

To align the gripper assembly with the right back wall, follow these steps:

1. Insert the gripper alignment cartridge into the right column of the back wall as follows:

    –   **XLS-832700:** Insert the cartridge into slot **H36**
    –   **XLS-820500:** Insert the cartridge in the slot **G36**
    –   **XLS-812300:** Insert the cartridge into slot **G36**

    > **Important:**   Make sure the alignment cartridge indicates "This side up for Theta Alignment."

2. Move the X-beam by hand until the gripper assembly is just under the gripper alignment cartridge.

    > **Important:**   Make sure the alignment cartridge aligns with the gripper assembly guide rod. The alignment cartridge should be flush with the gripper assembly and the cartridge slot.

3. Select **Get Robot Status**. X-Link displays information about the robot's position.

4. Write down the values for Right Theta Position ("TPOS") and X Position ("XPOS").

5.   Move the X-beam down by hand so that it is not blocking the gripper alignment cartridge.

6.   Remove the gripper alignment cartridge.

7.   If one or more MEMs are attached, align the gripper to the carousel slots. See **Section 12.1.6**.

12.1.6   Aligning the Gripper with Any MEMs

To align the gripper to any installed MEMs, follow these steps:

1.   Insert the gripper alignment cartridge into slot 36 of the carousel (use whichever column of slots is facing forward). See **Figure 12-12**.

> **Important:**   Make sure the alignment tool indicates "This side up for Carousel Alignment."

Figure 12-12   Inserting the gripper alignment cartridge into the carousel

2.   Move the X-beam by hand until the gripper assembly is just under the gripper alignment cartridge.

> **Important:**   Make sure the alignment cartridge aligns with the gripper assembly guide rod and that it is flush with the gripper and the cartridge slot.

3. Select **Get Robot Status**. X-Link displays information about the robot's position.

4. Write down the values for Theta Position ("TPOS") and X Position ("XPOS").

5. Move the X-beam down by hand so that it is not blocking the gripper alignment cartridge.

6. Remove the gripper alignment cartridge.

12.1.7   Updating the Database

To update the database after obtaining the Theta Position and X Position values, follow these steps:

1. Calculate the values for Theta Back Wall and Theta Front Wall as follows:

    a. Add the value you obtained in **Section 12.1.4 on page 12-9** for Left Theta Position to the value for you obtained in **Section 12.1.5 on page 12-10** for Right Theta Position.

    b. Divide the resulting number by two. This is the Theta Back Wall value.

    c. Add 180 to the Theta Back Wall value to obtain the Theta Front Wall value. Note that:

        •   If the Theta Back Wall value starts with 14, the Theta Front Wall value will start with 32.

        •   If the Theta Back Wall value starts with 15, the Theta Front Wall value will start with 33.

2. In the Robot Configuration section, enter the value you calculated for Theta Back Wall in the **Back Wall Theta** field and the value you calculated for Theta Front Wall in the **Front Wall Theta** field.

3. In the Carousels/Pods section, locate whichever drop-down list is appropriate for the MEM (that is, either **Carousel/Pod installed on left?** or **Carousel/Pod installed on right?**).

4. Select **Carousel18** from the list.

5. Enter the TPOS value for the carousel in the **Theta 1** field.

6. Enter the XPOS value for the carousel in the **X 1** field.

7. Press **Update Alignment**. The XLS updates the robot alignment file.

12.1.8   Scanning the Fiducials

After replacing the gripper assembly and updating the database, follow these steps to scan the fiducials:

1.   Make sure there are no cartridges loaded or present in any of the tape drives.

> **Important:**   If cartridges are present, unload them and place them into empty slots on the back wall.

2.   Make sure that a calibration cartridge is located in the reserved slot (G50).

3.   Close any open doors.

4.   From the Service portlet, select **View/Edit Hardware Configuration**. The View/Edit Hardware Configuration page opens.

5.   Select **I/O Ports** from the Fiducials section of the page, then wait while the XLS scans the fiducials on the I/O ports.

6.   Select **All Slots** from the Fiducials section of the page, then wait while the XLS scans the fiducials on all magazine slots.

> **Important:**   Depending on the number of magazines in your library, scanning all slots can take several hours.

7.   Select **Tape Drives** from the Fiducials section of the page, then wait while the XLS inserts the calibration cartridge into each tape drive to scan and calibrate its position.

> **Important:**   All tape drives will be scanned and calibrated, even if they were not replaced.

8. When the fiducial scan has completed, select **Dump Fiducial Database**. The results of the fiducial scan displays, as shown in **Figure 12-13**. This report indicates whether any of the fiducials in the library are unscanned.

```
Diagnostic Command Results

      running /xls/bin/xlsinit_checkFidbScanned -i -d
Sent MsgId ( LIM_WRITEDB_REQ ):
limMsgWriteDB ----------------------
dest id : 61 XLSBOOT
msgID   : 4006 (LIM_WRITEDB_RSP)
src id  : 4 INV
src base: 0
len     : 130
transC  : 56
transL  : 56
time    : Mon Nov 20 15:07:28 2006

status  : 0
srcbase : 0
seq     : 40285
priority: 0
dbId       : 5
status     : 0
outfilename: /xls/tmp/fidbdump.out

=========================================
Following fiducial entries are unscanned


  Drive : 1011,001B00C01011,0x00000000,30106,1833,0,0,0,14971,0,199,0
  Drive : 1013,001B00C01013,0x00000000,16751,1833,0,0,0,14971,0,200,0
  Drive : 1014,001B00C01014,0x00000000,10084,1833,0,0,0,14971,0,199,0
  Drive : 1022,001B00C01022,0x00000000,23438,7333,0,0,0,14971,0,199,0
  Drive : 1023,001B00C01023,0x00000000,16771,7333,0,0,0,14971,0,199,0
  Drive : 1024,001B00C01024,0x00000000,10098,7333,0,0,0,14971,0,199,0

----- Total unscanned fiducuals = 6
```

Figure 12-13   Excerpt from the fiducial scan, showing unscanned tape drives

9. If any of the fiducials display as unscanned, select the appropriate option from the Fiducial section of the page:

    –   Select **All Slots** to scan the fiducials on the cartridge magazine
    –   Select **I/O Ports** to scan the fiducials on the I/O ports
    –   Select **Tape Drives** to scan and calibrate the tape drives

10. When the fiducial scans are complete, select **Calibrate Fiducials** to calculate the positions of the fiducials.

11. Select **Lock Doors** from the Misc section of the page, then wait for the XLS to automatically rescan and resync the inventory.

12. As required, put the XLS in logical mode and restart the applications. See **Section 5.4.4 on page 5-11**.

12.2   Replacing the X-Y Controller Card

This section provides instructions for replacing the X-Y controller card, shown in **Figure 12-14**.

Located at the bottom of the cabinet, the X-Y controller card includes the drivers for the X- and Y-axes of the handler. The card also includes the capacitor-based energy storage system that allows the robot to be safely parked at the bottom of the cabinet in case of an AC power failure. Refer to **Section 3.1 on page 3-2** for more information.

Refer to **Section 3.3, "X-Y Controller DCB," on page 3-6** for a diagram of the connections on the X-Y controller.

Figure 12-14   X-Y controller card

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver

12.2.1 Removing the X-Y Controller Card

To remove the X-Y controller card, follow these steps:

1. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2. Open the right door.

3. On the floor of the XLS on the right-hand side, locate the two X-Y LEDs. See **Figure 12-15**.

X-Y LEDs

Figure 12-15 LEDs on the X-Y controller card

4. Ensure that both LEDs are off, indicating that the capacitors on the X-Y controller card have fully discharged. It may take as long as 25 minutes after you power off the XLS for the capacitors to fully discharge.

> # WARNING!
>
> **To avoid the risk of dangerous electric shock, do not remove the cover from the X-Y controller if the X-Y LEDs are illuminated!**

5. Once the LEDs are off, disconnect the following cables from the X-Y controller card, as shown in **Figure 12-16 on page 12-17**:

   – Power cable (multi color)
   – Y flex cable (lower right corner)
   – Two X-motor cables (left side of the card)

CAUTION

Be very careful as you disconnect the X-motor cables. The cables are fragile and very easily damaged.

Figure 12-16   Location of the cables and screws on the X-Y controller card

6. Using a Phillips screwdriver, remove the four screw attaching the X-Y controller cover to the frame. See **Figure 12-16**.

7. Remove the X-Y controller cover.

8. Remove the Phillips screws attaching the X-Y controller card to the frame.

9. Lift out the card.

WARNING!

To avoid the risk of electric shock, do not touch the capacitors on the bottom of the X-Y controller card even when they are fully discharged (that is, even when the LEDs are off).

Do not touch the capacitors

12.2.2 Installing the X-Y Controller Card

To replace the X-Y controller card, follow these steps:

1. Reposition the card in the frame.

2. Replace the screws that attach the card to the frame.

3. Replace the X-Y controller card cover.

4. Replace the four screws that attach the cover to the frame. See **Figure 12-16 on page 12-17**.

5. Reattach the four cables. See **Figure 12-16 on page 12-17**.

6. Close any open doors.

7. Apply power to the XLS. See **Section 17.3 on page 17-4**.

8. Check the X-Y controller card to ensure that both LEDs come back on, as follows:

   – The right LED should light up in about 1 minute
   – The left LED should light up in about 6 to 8 minutes.

12.3 Replacing the X-Axis Cable and Cat Track

This section provides instructions for replacing the X-axis cable and cat track, shown in **Figure 12-17**.

Figure 12-17 X-axis cable and cat track

Procedure overview: **Table 12-2** provides an overview of replacing the X-axis cable and cat track.

Step	Task	Refer to...
1	Shut down the XLS and power it off	**Section 6.2 on page 6-1**
2	Remove the gripper	**Section 12.1.2 on page 12-5**
3	Remove the X-axis cable and cat track	**Section 12.3.1 on page 12-20**
4	Install the X-axis and cat track	**Section 12.3.2 on page 12-22**
5	Replace the gripper	**Section 12.1.3 on page 12-7**
6	Power on the library	**Section 17.4.1 on page 17-8**
7	Align the gripper assembly with the left back wall	**Section 12.1.4 on page 12-9**
8	Align the gripper assembly with the right back wall	**Section 12.1.5 on page 12-10**
9	Align the gripper assembly with any MEMs	**Section 12.1.6 on page 12-11**
10	Update the database	**Section 12.1.7 on page 12-12**
11	Scan the fiducials and calibrate the library	**Section 12.1.8 on page 12-13**

Table 12-2 Overview of replacing the X-axis cable and cat track

Precautions:

> **CAUTION**
>
> Before removing the X-axis cable and cat track, shut down the library from X-Link and move the library's power switch to off.

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver

12.3.1   Removing the X-Axis Cable and Cat Track

To remove the X-axis cable and cat track, follow these steps:

1. Open the door closest to the gripper assembly.

2. Remove the gripper assembly, as described in **Section 12.1.2 on page 12-5**.

3. Locate the connection between the cat track flex cable and the flex cable adapter card. See **Figure 12-18**.

Cat track flex cable

Flex cable adapter card

Figure 12-18   Cat track flex cable attached to the flex cable adapter card

4. Using a small, flat-bladed screwdriver, very carefully push on the locking mechanism on each side of the connector to release the flex cable.

5. Remove the two Phillips screws holding the cat track flex cable to the flex adapter mounting plate.

6. Locate the connection between the cat track flex cable and the X-motor adapter. See **Figure 12-19**.

Cat track
flex cable

X-motor
adapter card

Figure 12-19 Cat track flex cable attached to the X-motor adapter card

7. Disconnect the flex cable from the X-motor adapter card by releasing the connector and pulling back on the cable.

8. Remove all of the screws from the X-beam access cover. See **Figure 12-20**.

Figure 12-20 Location of screws on X-beam access cover (left side of XLS-832700 shown)

Note: The X-beam cover for the XLS-832700 has 12 screws (6 large and 6 small); the X-beam covers for the XLS-820500 and XLS-812300 have 10 screws.

9. Lift the X-beam cover up and carefully slide the flex cable out from under the cover.

10. Remove the cable from the cat track.

11. If you are replacing the cat track, remove the two Phillips screws holding the track to the X-beam.

12.3.2 Installing the X-Axis Cable and Cat Track

To install the X-axis cable and cat track, follow these steps:

1. Put the cat track and cable into position.

2. If you are replacing the cat track, attach it to the X-beam using two Phillips screws.

3. Carefully slide the cable through the cat track.

4. Lift up on the X-beam cover and slide the cable under the cover.

5. Attach one end of the flex cable to the X-motor adapter. See **Figure 12-19**.

6. Replace the screws that hold the X-beam cover in place.

    Note: The X-beam cover for the XLS-832700 has 12 screws (6 large and 6 small); the X-beam covers for the XLS-820500 and XLS-812300 have 10 screws.

7. Replace the two screws attaching the cat track flex cable to the mounting bracket for the flex cable adapter.

8. Reattach the flex cable to the adapter card. See **Figure 12-18 on page 12-20**.

9. Replace the gripper assembly. See **Section 12.1.3 on page 12-7**.

10. Reapply power to the library. See **Section 17.4.1 on page 17-8**.

11. Align the gripper with the left back wall (see **Section 12.1.4 on page 12-9**), the right back wall (see **Section 12.1.5 on page 12-10**), and any installed MEMs (see **Section 12.1.6 on page 12-11**).

12.4   Replacing the X-Motor Assembly

This section provides instructions for replacing the X-motor assembly. The X-motor assembly controls the movement of the handler along the X-axis.

> **Important:** For clarity, this procedure has been photographed with the front panel removed. However, you can replace the X-motor while the front panel remains in place.

Procedure overview: Table 12-3 provides an overview of replacing the X-motor assembly.

Step	Task	Refer to...
1	Shut down the library and power it off	**Section 6.2 on page 6-1**
2	Remove the X-motor assembly	**Section 12.4.1**
3	Install the X-motor assembly	**Section 12.4.2 on page 12-26**
4	Power on the library	**Section 17.3 on page 17-4**

Table 12-3   Overview of replacing the X-motor assembly

Required tools and equipment: Make sure you have the following:

- #1 Phillip screwdriver
- #2 Phillips screwdriver
- Cable tie cutters
- 7/64-inch T-handle or standard Allen wrench
- Replacement X-axis motor assembly
- Replacement cable ties

12.4.1   Removing the X-Axis Motor Assembly

To remove the X-axis motor assembly, follow these steps:

1.   Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2.   Open the door(s).

3.   Locate the X-beam access cover. See **Figure 12-21**.

X-beam
access cover

Figure 12-21   X-beam access cover (front panel removed for clarity)

4. Remove all of the screws from the X-beam access cover. See **Figure 12-22**.

Figure 12-22 Location of screws on X-beam access cover (left side shown)

> **Note:** The X-beam cover for the XLS-832700 has 12 screws (6 large and 6 small); the X-beam covers for the XLS-820500 and XLS-812300 have 10 screws.

5. Slide the gripper all the way to the left.

6. Carefully lift the access cover up and remove it from the frame. See **Figure 12-23**.

Figure 12-23 Removing the X-beam access cover (front panel removed for clarity)

7.   Push up on the bottom of X-beam belt in the center and slide the belt off of the center idler pulleys. See **Figure 12-24**.

Push here

Idler pulleys

Figure 12-24   Removing the X-beam belt

8.   Disconnect the X-motor cable from the X-motor adapter card. Cut the cable ties securing the X-motor cable to the X-beam. See **Figure 12-25**.

Cable ties

X-motor
cable
connector

Figure 12-25   Disconnecting the X-motor cable from the X-motor adapter card

9. On the back of the X-beam, locate the four mounting screws that secure the motor to the X-beam. See **Figure 12-26**.

Figure 12-26   Mounting screws for the X-motor (X-beam removed from XLS for clarity)

10. Use a 7/64-inch T-handle or standard Allen wrench to remove the four mounting screws.

> **Important:**   As you remove the fourth screw, support the motor with one hand to prevent it from dropping.

11. Slide the X-motor down and remove it from the X-beam.

12.4.2   Installing the X-Motor Assembly

To install the X-motor assembly, follow these steps:

1. Route the cable through the X-motor mount.

2. Slide the X-motor up from bottom of the X-beam.

3. Holding the X-motor in place, use a 7/64-inch T-handle or standard Allen wrench to replace the four mounting screws. See **Figure 12-27**.

Figure 12-27 Location of mounting screws for the X-motor (X-beam removed for clarity)

4. Connect the X-motor cable to the X-motor adapter card. See **Figure 12-28**.

Cable ties

X-motor cable connector

Figure 12-28 Connecting the X-motor cable to the X-motor adapter card

5. Replace the cable ties securing the X-motor cable assembly to the X-beam.

6.   Carefully slide the X-motor belt over the center idler pulleys and make sure the belt is securely seated around the pulleys. See **Figure 12-29**.

Figure 12-29   X-motor belt and center idler pulleys (X-beam removed for clarity)

7.   To check the tension of the X-motor belt, position your forefinger on the lower belt and your thumb on the upper rail, about 8 inches (20 cm) from the left idler pulley, as shown in **Figure 12-30**. The resistance when you touch the belt teeth together should be about 1-1/4 pounds.

Figure 12-30   Checking the tension on the X-motor belt (X-beam removed for clarity)

8. To loosen or tighten the belt, follow these steps:

    a. Locate the two Allen screws on the left end of the X-beam in the front. The locking screw is the upper screw in the slot; the adjustment screw is the screw to the lower right. See **Figure 12-31**.

Locking screw

Adjustment screw

Figure 12-31   Allen screws for adjusting the tension of the X-belt

    b. Loosen the locking screw by 1/2 of a turn.

    c. To tighten the belt, turn the adjustment screw clockwise.

        or

        To loosen the belt, turn the adjustment screw counterclockwise.

    d. Retighten the locking screw.

9. Slide the X-beam access cover back in place and secure it with the mounting screws.

10. Apply power to the XLS. See **Section 17.3 on page 17-4**.

12.5 Replacing the Y-Axis Cable and Cat Track

This section provides instructions for removing the Y-axis cable and cat track, shown in **Figure 12-32**.

Figure 12-32 Y-axis cable and cat track

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver

12.5.1 Removing the Y-Axis Cable and Cat Track

To remove the Y-axis cable and cat track, follow these steps:

1. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2. Open the right-hand door.

3.   On the floor of the XLS on the right-hand side, locate the two X-Y LEDs. See **Figure 12-15**.

X-Y LEDs

Figure 12-33   LEDs on the X-Y controller card

4.   Ensure that both LEDs are off, indicating that the capacitors on the X-Y controller card have fully discharged. It may take as long as 25 minutes after you power off the XLS for the capacitors to fully discharge.

WARNING!

To avoid the risk of electric shock, do not attempt to remove any of the Y-axis components until the LEDs on the X-Y controller are off, indicating that the capacitors on the card are fully discharged.

---

5. Once the LEDs are off, locate the connection between the Y-axis flex cable and the X-motor adapter card. See **Figure 12-34**.

Y-axis flex cable

X-motor adapter card

Figure 12-34 Y-axis flex cable attached to the X-motor adapter card

6. Disconnect the flex cable from the card by releasing the locking mechanism on the connector and pulling back on the cable.

7. Remove the two Phillips screws from under the cable attaching the Y-axis cat track to the X-beam.

8. Locate the two white plastic clips securing the Y-axis cable to the frame. See **Figure 12-35**.

Figure 12-35 Y-axis flex cable attached to frame

9. Press on the sides of the clips to release the cable.

10.   Disconnect the Y-axis flex cable from the X-Y controller card. See **Figure 12-36**.

Figure 12-36   Y-axis flex cable attached to X-Y controller

11.   Carefully pull the cable through the frame and then through the cat track.

12.   To remove the cat track, follow these steps:

   a.   Remove the two Phillips screws holding the cat track to the frame.

   b.   Remove the cat track.

12.5.2   Installing the Y-Axis Cable and Cat Track

To install the Y-axis cable and cat track, follow these steps:

1.   Put the cat track and cable into position.

2.   If you are replacing the cat track, attach it to the frame using two Phillips screws.

3.   Carefully slide the cable through the cat track and frame.

4.   Attach one end of the flex cable to the X-Y controller. See **Figure 12-36 on page 12-33**.

5.   Replace the two Phillips screws attaching the Y-axis cat track to the X-beam.

6.   Reattach the Y-axis flex cable to the X-motor adapter card. See **Figure 12-34 on page 12-32**.

7.   Close any open doors.

8. Apply power to the XLS. See **Section 17.3 on page 17-4**.

9. Check the X-Y controller card to ensure that both LEDs come back on, as follows:

   – The right LED should light up in about 1 minute
   – The left LED should light up in about 6 to 8 minutes.

12.6 Replacing the Y-Motor Assembly

This section provides instructions for replacing the Y-motor assembly. The Y-motor assembly controls the movement of the handler along the Y-axis.

> **Important:** For clarity, this procedure has been photographed with the front panel removed. However, you can replace the Y-motor while the front panel remains in place.

Procedure overview: **Table 12-4** provides an overview of replacing the Y-motor assembly.

Step	Task	Refer to...
1	Shut down the library and power it off	**Section 6.2 on page 6-1**
2	Remove the Y-motor assembly	**Section 12.6.1**
3	Install the Y-motor assembly	**Section 12.6.2 on page 12-37**
4	Power on the library	**Section 17.2 on page 17-3**

Table 12-4   Overview of replacing the Y-motor assembly

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver
- 5/32-inch T-handle or standard Allen wrench
- Small metric ruler or calibers

12.6.1 Removing the Y-Axis Motor Assembly

To remove the Y-axis motor assembly, follow these steps:

1. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2. Remove the air filter cover from the front of the library. See **Section 10.1.2 on page 10-3**.

3. Use a #2 screwdriver to remove the screws from the grille; then, remove the grille. See **Figure 12-37**.

Figure 12-37 Location of screws for the front access grille

4. Locate the X-Y controller card.

5. Disconnect the Y-motor encoder and Y-motor power cables from the X-Y controller card, as shown in **Figure 12-38**.

Y-motor encoder cable

Y-motor power cable

Figure 12-38 Location of the Y-motor encoder and power cables on the X-Y controller card

6. Using a 5/32-inch T-handle or standard Allen wrench, remove the four Allen screws from the Y-motor mounting bracket, as shown in **Figure 12-39**.

Figure 12-39   Location of screws on Y-motor mounting bracket

7. Carefully lift the Y-motor assembly up and out of the frame.

12.6.2 Installing the Y-Motor Assembly

To install the Y-motor assembly, follow these steps:

1. Carefully place the Y-motor assembly into the frame, making sure that the belt slips around the Y-motor gear pulley.

2. Replace the four Allen screws on the Y-motor assembly mounting bracket. See **Figure 12-39 on page 12-36**.

3. Locate the two belt-tensioning plates just above the Y-motor gear pulley. See **Figure 12-40**.

Figure 12-40 Location of plates for tensioning the Y-motor belt

4. To check the tension of the Y-motor belt, use a small metric ruler or calibers to measure the gap between the two plates. It should be between 3 and 5 mm. See **Figure 12-41 on page 12-38**.

> **Important:** The factory setting for the belt tension is between 4 and 5 pounds.

Figure 12-41 Measuring the gap between the two tension plates

5. To adjust the belt tension, follow these steps:

    a. Loosen—by 1/4 turn only—the four Allen screws that hold the top tension plate in place. See **Figure 12-42**.

Figure 12-42 Allen screws on the top tension plate

b. Locate the Allen screw used to adjust the distance between the two tension plates. See **Figure 12-43**.

Adjustment screw

Figure 12-43   Allen screw for adjusting the tension of the Y-belt

c. To tighten the belt, turn the Allen screw clockwise, which pulls the tension plates closer together.

or

To loosen the belt, turn the adjustment screw counterclockwise, which allows the tension plates to slide farther apart.

d. When the gap between the two tension plates is between 3 and 5 mm, tighten the four Allen screws on the top tension plate.

6. Route the Y-motor encoder and power cables under the light curtain.

7. Reconnect the cables to the X-Y controller card. See **Figure 12-38 on page 12-35**.

8. Replace the grille. See **Figure 12-37 on page 12-35**.

9. Replace the air filter cover. See **Section 10.2.3 on page 10-10**.

10. Apply power to the XLS. See **Section 17.2 on page 17-3**.

Notes:

13 Replacing the Touch Screen and User Interface Assemblies

This chapter provides instructions for replacing the following components:

- Touch screen assembly (see **Section 13.1**)

- User interface assembly, which includes the five status LEDs (see **Section 13.2 on page 13-5**)

13.1 Replacing the Touch Screen Assembly

Shown in **Figure 13-1**, each LRM includes a 15-inch, color touch screen used to monitor and control XLS operations.

Figure 13-1 Touch screen with X-Link log-in screen displayed

Procedure overview: Table 13-1 provides an overview of replacing the touch screen assembly.

Step	Task	Refer to...
1	Shut down the library and power it off	**Section 6.2 on page 6-1**
2	Remove the front panel	**Section 10.1 on page 10-1**
3	Remove the touch screen	**Section 13.1.1**
4	Install the touch screen	**Section 13.1.2 on page 13-4**
5	Replace the front panel, reattach the cables, replace the air filter cover, and replace any cartridges	**Section 10.2.1 on page 10-8** through **Section 10.2.4 on page 10-11**
6	Power on the library	**Section 17.4.1 on page 17-8**
7	Calibrate the touch screen	**Section 13.1.3 on page 13-5**
8	Scan the fiducials and inventory	**Section 17.4.2 on page 17-10**

Table 13-1   Overview of replacing the touch screen assembly

Precautions:

> **CAUTION**
>
> Ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use a grounded static protection wristband. If a wristband is not available, touch a known grounded surface.

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver
- Soft cloth to protect the touch screen
- Laptop or other computer close to the XLS, in case you encounter problems calibrating the replacement touch screen

13.1.1 Removing the Touch Screen Assembly

To remove the touch screen assembly, follow these steps:

1.   Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2. Remove the front panel as described in **Section 10.1 on page 10-1** and lean it against a wall.

CAUTION

The touch screen is easily scratched. Protect the screen with a soft cloth or other padding.

---

3. Disconnect the four touch screen cables from their connectors, as shown in **Figure 13-2**:

   – VGA cable
   – Power cable
   – Touch screen USB cable
   – LCD button cable

VGA cable   Power cable

LCD button cable   Touch-screen cable

Figure 13-2   Location of the cables for the touch screen

4. Using a Phillips screwdriver, remove the five screws at the top and the sides of the touch screen. See **Figure 13-3**.

Remove the 5 screws on the top and sides

Loosen the 3 screws on the bottom

Figure 13-3 Location of screws for the touch screen

5. Loosen the three screws at the bottom of the touch screen.

6. Slide the touch screen up and remove it from the front panel.

13.1.2 Installing the Touch Screen Assembly

To install the touch screen, follow these steps:

1. Lean the front panel against a wall.

2. Slide the touch screen into position, making sure to align the notches on the bottom of the touch screen with the three screws.

3. Replace the five screws on the sides and top of the touch screen.

4. Tighten all eight screws around the edges of the touch screen.

5. Reattach the four cables. See **Figure 13-2 on page 13-3**.

6. Replace the front panel. See **Section 10.2 on page 10-7**.

7. Apply power to the XLS. See **Section 17.4.1 on page 17-8**.

13.1.3   Calibrating the Touch Screen

To calibrate the touch screen, follow these steps:

1.   Contact Qualstar Technical Support for instructions.

2.   When the calibration is complete, scan the fiducials and cartridges. See **Section 17.4.2 on page 17-10**.

13.2   Replacing the User Interface Assembly

As shown in **Figure 13-4**, the user interface assembly is located above the I/O ports on the back of the front panel. The user interface assembly includes the user interface PCBA—which controls many of the library's sensors, including the door, I/O port, and light curtain sensors—and the front panel LED display.

Figure 13-4   User interface assembly on back of front panel

Procedure overview: **Table 13-2** provides an overview of replacing the user interface assembly.

Step	Task	Refer to...
1	Shut down the library and power it off	**Section 6.2 on page 6-1**
2	Remove the front panel	**Section 10.1 on page 10-1**
3	Remove the user interface assembly	**Section 13.2.1 on page 13-6**
4	Install the user interface assembly	**Section 13.2.2 on page 13-8**
5	Replace the front panel	**Section 10.2 on page 10-7**
6	Power on the library and scan the fiducials and inventory	**Section 17.4 on page 17-8**

Table 13-2   Overview of replacing the user interface assembly

Precautions:

> ## CAUTION
>
> Ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use a grounded static protection wristband. If a wristband is not available, touch a known grounded surface.

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver. magnetized if possible
- Soft cloth to protect the touch screen

13.2.1 Removing the User Interface Assembly

To remove the user interface assembly, follow these steps:

1. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2. Remove the front panel as described in **Section 10.1 on page 10-1** and lay it flat on the floor, with the touch screen facing down.

> ## CAUTION
>
> The touch screen is easily scratched. Protect the screen with a soft cloth or other padding before placing the front panel on the floor.

3. Locate the user interface assembly, then disconnect the 14 cables from their connectors (connectors are listed in clockwise order, starting from the upper left corner). See **Figure 13-5 on page 13-7**.

   - LCD button
   - Touch screen
   - USB
   - I/O port 3
   - I/O port 1
   - Left cabinet (LCAB) door
   - Bottom temperature sensor
   - System
   - Light curtain transmit (TX)
   - Light curtain receive (RX)
   - Right cabinet (RCAB) door
   - I/O port 2
   - I/O port 4

– Top temperature sensor

> **Important:**   The Cab Light, Serial, and JTAG connectors are not used.
>
> In addition, since the XLS-820500 and XLS-812300 do not have a left door, there is no LCAB door cable. Instead, a jumper is installed on the LCAB door connector.

Figure 13-5   User interface assembly cables

4.   Using a Phillips screwdriver, remove the six screws holding the user interface assembly cover in place. See **Figure 13-6**.

Figure 13-6   User interface assembly screws

5.   Remove the user interface assembly cover.

6.   Using a Phillips screwdriver, remove the two screws holding the user interface PCBA to the front panel.

7.   Remove the user interface PCBA.

13.2.2   Installing the User Interface Assembly

To install the user interface assembly, follow these steps:

1.   With the front panel on the floor, place the user interface assembly in position on top of the front panel.

2.   Using a magnetized Phillips screwdriver, replace the two screws that secure the PCBA to the front panel.

3.   Place the cover on top of the PCBA.

CAUTION

Be sure not to pinch the cables between the PCBA and the cover.

---

4.   Replace the six screws that secure the cover to the user interface PCBA. See **Figure 13-6 on page 13-7**.

5.   Reattach the 14 cables. See **Figure 13-5 on page 13-7**.

6.   For the XLS-820500 and XLS-812300, install the LCAB jumper cable on the LCAB door connector.

Important: If the LCAB jumper is not installed, the XLS-820500 and XLS-812300 will respond as if a door were open and the handler will be prevented from moving.

---

7.   Replace the front panel. See **Section 10.2 on page 10-7**.

8.   Refer to **Section 17.4 on page 17-8** to power on the library and scan the fiducials and inventory.

14   Replacing Library Sensors and Solenoids

This chapter provides instructions for replacing the following library sensors:

- Door interlock sensors (see **Section 14.1**)
- Door lock solenoids (see **Section 14.2 on page 14-4**)
- I/O port open sensors (see **Section 14.3 on page 14-5**)
- I/O port solenoids (see **Section 14.4 on page 14-8**)
- Light curtain sensors (see **Section 14.5 on page 14-10**)

> **Important:**   For clarity, all of these procedures have been photographed with the front panel removed However, with the exception of replacing the I/O port solenoids, you can perform any of these procedures with the front panel in place.

14.1   Replacing a Door Interlock Sensor

This section provides instructions for replacing a door interlock sensor in the XLS-832700, XLS-820500, XLS-812300, or a MEM. Each door uses a door interlock sensor to detect if a door is opened while the library power is off.

Procedure overview: **Table 14-1** provides an overview of replacing a door interlock sensor.

Step	Task	Refer to...
1	Shut down the library and power it off	**Section 6.2 on page 6-1**
2	Remove the air filter cover	**Section 10.1.2 on page 10-3**
3	Remove the door interlock sensor	**Section 14.1.1 on page 14-2**
4	Install the door interlock sensor	**Section 14.1.2 on page 14-3**
5	Replace the air filter cover	**Section 10.2.3 on page 10-10**
6	Power on the library	**Section 17.3 on page 17-4**

Table 14-1   Overview of replacing a door interlock sensor

Precautions:

> **CAUTION**
>
> Ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use a grounded static protection wristband. If a wristband is not available, touch a known grounded surface.

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver

14.1.1 Removing a Door Interlock Sensor

To remove a door interlock sensor, follow these steps:

1. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2. Remove the air filter cover from the front of the library. See **Section 10.1.2 on page 10-3**.

3. Open the door.

4. Locate the door interlock sensor, mounted at the base of the door frame. See **Figure 14-1**. Each door has its own sensor.

Door interlock sensor cable

Figure 14-1   Door interlock sensor (view from inside the left door of XLS-832700)

5. Disconnect the cable that connects the door interlock sensor to the front panel. See **Figure 14-1**.

6.   From the front of the library, remove the two Phillips screws that attach the sensor to the frame. See **Figure 14-2**.

Figure 14-2   Door interlock sensor screws

7.   Lift the sensor out of the frame.

8.   Remove the two Phillips screws that attach the metal bracket to the sensor—you will reuse this part when you install the replacement part. See **Figure 14-3**.

Figure 14-3   Door interlock sensor bracket

14.1.2   Installing a Door Interlock Sensor

To install a door interlock sensor, follow these steps:

1.   Using the two Phillips screws, attach the metal bracket to the new sensor. See **Figure 14-3**.

2.   Insert the sensor into the frame.

3.   Replace the two Phillips screws to secure the sensor to the frame. See **Figure 14-2**.

4. Reconnect the cable from the front panel to the door interlock sensor. See **Figure 14-1 on page 14-2**.

5. Replace the air filter cover. See **Section 10.2.3 on page 10-10**.

6. Close any open doors.

7. Apply power to the library. See **Section 17.3 on page 17-4**.

14.2 Replacing a Door-Lock Solenoid

This section provides instructions for replacing a door-lock solenoid in the XLS-832700, XLS-820500, XLS-812300, or a MEM. Each door includes a door-lock solenoid that allows the door to be locked and unlocked electrically from X-Link.

Procedure overview: **Table 14-2** provides an overview of replacing a door-lock solenoid.

Step	Task	Refer to...
1	Shut down the library and power it off	**Section 6.2 on page 6-1**
2	Remove the door-lock solenoid	**Section 14.2.1**
3	Install the door-lock solenoid	**Section 14.2.2 on page 14-5**
4	Power on the library	**Section 17.3 on page 17-4**

Table 14-2   Overview of replacing a door-lock solenoid

Precautions:

<div style="border:2px solid blue; padding:10px;">

CAUTION

Ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use a grounded static protection wristband. If a wristband is not available, touch a known grounded surface.

</div>

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver
- Cable tie cutters
- Replacement cable ties

14.2.1 Removing a Door-Lock Solenoid

1. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2.   Open the door.

3.   Locate the door-lock solenoid you want to remove behind the front panel, as shown in **Figure 14-4**.

Figure 14-4   Location of the left and right door solenoids (view from the back of the XLS-832700 front panel)

4.   Cut the cable ties securing the white solenoid cable to the frame.

5.   Disconnect the solenoid cable from the cable connector.

6.   Using a Phillips screwdriver, remove the three screws attaching the solenoid to the front panel.

7.   Remove the solenoid assembly.

14.2.2   Installing a Door-Lock Solenoid

1.   Holding the solenoid in position with one hand, use a Phillips screwdriver to replace the three screws.

2.   Reconnect the white solenoid cable to the cable connector.

3.   Replace the cable ties.

4.   Close any open doors.

5.   Apply power to the library. See **Section 17.3 on page 17-4**.

14.3   Replacing an I/O Port Open Sensor

This section provides instructions for removing an I/O port open sensor. Each I/O port includes a sensor that can detect if the I/O port is open.

Procedure overview: Table 14-3 provides an overview of replacing an I/O port open sensor.

Step	Task	Refer to...
1	Shut down the library and power it off	**Section 6.2 on page 6-1**
2	Remove the I/O port open sensor	**Section 14.3.1**
3	Install the I/O port open sensor	**Section 14.3.2 on page 14-7**
4	Power on the library	**Section 17.3 on page 17-4**

Table 14-3 Overview of replacing an I/O port open sensor

Precautions:

CAUTION

Ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use a grounded static protection wristband. If a wristband is not available, touch a known grounded surface.

Required tools and equipment: Make sure you have the following:

- 1/4-inch nut driver

14.3.1 Removing an I/O Port Open Sensor

To remove an I/O port open sensor, follow these steps:

1. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2. Open the door closest to the I/O port.

3. Look behind the front panel to locate the I/O port open sensor you want to remove. The sensor is located at the top of the I/O port. See **Figure 14-5**.

I/O port-open sensor

Figure 14-5 I/O port open sensor (view of upper left I/O port from the back of the front panel)

4. Disconnect the cable from the I/O port open sensor.

5. Using a 1/4-inch nut driver, remove the two nuts attaching the sensor bracket to the front panel.

> **Important:** Be careful not to drop the nuts.

6. Remove the sensor and the bracket.

14.3.2 Installing an I/O Port Open Sensor

To install an I/O port open sensor, follow these steps:

1. Place the sensor bracket on top of the two screws that protrude from the back of the front panel.

2. Use a 1/4-inch nut driver to replace the two nuts.

3. Reattach the cable to the I/O port open sensor.

4. Close any open doors.

5. Apply power to the library. See **Section 17.3 on page 17-4**.

14.4   Replacing an I/O Port Solenoid

This section provides instructions for removing an I/O port solenoid. Each I/O port includes a solenoid that allows the I/O port to be opened electrically from X-Link.

Procedure overview: Table 14-4 provides an overview of replacing an I/O port solenoid.

Step	Task	Refer to...
1	Shut down the library and power it off	**Section 6.2 on page 6-1**
2	Remove the front panel	**Section 10.1 on page 10-1**
3	Remove the I/O port solenoid	**Section 14.4.1**
4	Install the I/O port solenoid	**Section 14.4.2 on page 14-9**
5	Replace the front panel	**Section 10.2 on page 10-7**
6	Power on the library	**Section 17.4 on page 17-8**

Table 14-4   Overview of replacing an I/O port solenoid

Precautions:

> **CAUTION**
>
> Ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use a grounded static protection wristband. If a wristband is not available, touch a known grounded surface.

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver
- 5/64-inch Allen wrench
- Soft cloth to protect the touch screen

14.4.1   Removing an I/O Port Solenoid

To remove an I/O port solenoid, follow these steps:

1.   Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2. Remove the front panel as described in **Section 10.1 on page 10-1** and lay it flat on the floor, with the touch screen facing down.

CAUTION

The touch screen is easily scratched. Protect the screen with a soft cloth or other padding before placing the front panel on the floor.

---

3. Locate the I/O port solenoid you want to replace behind the front panel, as shown in **Figure 14-6**,

I/O port solenoid

Figure 14-6 I/O port solenoid

4. Use a 5/64-inch Allen wrench to remove the screw connecting the solenoid release to the bracket.

5. Using a Phillips screwdriver, remove the three screws attaching the solenoid to the front panel.

6. Remove the solenoid assembly.

7. Disconnect the white solenoid cable from the cable harness.

14.4.2 Installing an I/O Port Solenoid

To install an I/O port solenoid, follow these steps:

1. Reconnect the white solenoid cable to the cable harness.

2. Line up the solenoid with the release lever and replace the Allen screw.

3. Hold the solenoid in position and use a Phillips screwdriver to replace the three screws.

4. Replace the front panel. See **Section 10.2 on page 10-7**.

5. Refer to **Section 17.4 on page 17-8** to power on the library and scan the fiducials and inventory.

14.5   Replacing Light Curtain Sensors

The light curtain, also known as the Inventor Sentry, consists of a number of emitter and detector pairs installed in the LRM and MEM cabinets. The emitters, mounted on the bottom of the cabinet, project small beams of light up to the corresponding detectors, mounted at the top of the cabinet. The curtain of light formed by the emitters and detectors allows the XLS to precisely monitor all areas within the LRM and MEM cabinets, as follows:

*   The beams of light at the rear of the cabinet can detect whether a cartridge is protruding from a slot. If the door(s) are closed and one of these beams of light is broken, the XLS prevents the handler from moving to avoid hitting a protruding cartridge.

*   The beams of light curtain at the front of the cabinet can detect when someone reaches into the cabinet. If a door is open and one of these beams of light is broken, the XLS detects and logs a potential inventory violation and automatically scans the cartridges and drives in the affected area as soon as all doors are closed.

The light curtain assembly consists of a series of printed circuit board assemblies (PCBAs) and cables. The PCBAs are attached to the cabinet with sheet-metal brackets.

LRM Light Curtain: As shown in **Figure 14-7 on page 14-11**, the light curtain assembly for the LRM includes PCBAs and cables in three locations at the bottom of the cabinet and three locations at the top of the cabinet:

*   Bottom left (emitters)
*   Bottom right (emitters)
*   Bottom rear (emitters)

*   Top left (detectors)
*   Top right (detectors)
*   Top rear (detectors)

.

Figure 14-7 Block diagram of the light curtain assembly in the LRM

MEM Light Curtain: Shown in **Figure 14-8**, the light curtain assembly for the MEM includes PCBAs and cables in four locations at the bottom of the cabinet and four locations at the top of the cabinet.

> **Important:** Unlike in the LRM, the emitters in the MEM are at the top, while the detectors are at the bottom.

- Left access emitters (top)
- Left door emitters (top)
- Right access emitters (top)
- Right door emitters (top)

- Left access detectors (bottom)
- Left door detectors (bottom)
- Right access detectors (bottom)
- Right door detectors (bottom)

Figure 14-8   Block diagram of the light curtain assembly in the MEM

Procedure overview: **Table 14-5** provides an overview of replacing a light curtain sensor.

Step	Task	Refer to...
1	Shut down the library and power it off	**Section 6.2 on page 6-1**
2	Remove the light curtain sensor	**Section 14.5.1**
3	Replace the light curtain sensor	**Section 14.5.2 on page 14-18**
4	Apply power to the library	**Section 17.3 on page 17-4**

Table 14-5   Overview of replacing a light curtain sensor

Precautions:

CAUTION

Ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use a grounded static protection wristband. If a wristband is not available, touch a known grounded surface.

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver

14.5.1   Removing the Light Curtain Sensors

To remove the light curtain sensors, follow these steps:

1. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2. Open the door(s).

3. Locate the light curtain brackets. See **Table 14-9 on page 14-14** for the light curtain locations.

Description	Location	
LRM Bottom left emitter Located in the front of the cabinet on the left side	**XLS-832700**	**XLS-820500 or XLS-812300**
LRM Bottom right emitter Located in the front of the cabinet on the right side		
LRM Bottom rear emitter Located at the rear of the cabinet in front of the bottom-most cartridge or drive bay		
LRM Top left detector Attached to the ceiling of the cabinet on the left side	**XLS-832700**	**XLS-820500 or XLS-812300**

Figure 14-9   Location of the light curtain sensors

Description	Location
LRM Top right detector Attached to the ceiling of the cabinet on the right side	
LRM Top rear detector Attached to the ceiling of the cabinet just in front of the cartridge slots	
MEM Bottom left detectors (access and door)	

Figure 14-9   Location of the light curtain sensors (*continued*)

Description	Location
MEM Bottom right detectors (access and door)	
MEM Top left emitter (access)	
MEM Top left emitter (door)	
MEM Top right emitter (access)	

Figure 14-9 Location of the light curtain sensors (*continued*)

Description	Location
MEM Top right emitter (door)	

Figure 14-9 Location of the light curtain sensors (*continued*)

4. Reach into the cabinet and disconnect the light curtain cable from its connector.

5. Remove the screws holding the light curtain bracket in place.

6. Carefully remove the PCBA and bracket from the cabinet.

7. After removing the light curtain PCBA and bracket from the cabinet, remove the PCBA from the bracket.

   For the rear PCBAs (top and bottom):

   a. Remove the six screws that attach the two interconnected PCBAs to the bracket. See **Figure 14-10**.

Figure 14-10 Location of screws for rear light curtain PCBAs

b. Disconnect the interconnect cable between the PCBAs. See **Figure 14-11**.

Figure 14-11   Light curtain interconnect cable (rear light curtain only)

c. Set the screws and the metal brackets aside; you will reuse these parts when replacing the PCBAs.

For the front PCBAs (left and right, and top and bottom):

a. Remove the three screws that attach the PCBA to the bracket. See **Figure 14-12**.

Figure 14-12   Location of screws for front light curtain PCBA

b. Set the screws and the metal brackets aside; you will reuse these parts when replacing the PCBAs.

14.5.2   Installing the Light Curtain Sensors

To install a light curtain sensor, follow these steps:

1. Determine which of the replacement PCBAs is an emitter and which is a detector by looking at the underside of the card. The emitters have tiny LEDs, while the detectors have no LEDs.

2. Determine which of the replacement PCBAs goes in which position, as follows:

   • The emitter cards are mounted to the bottom of the cabinet
   • The detector cards are mounted to the top of the cabinet

3. Install the PCBAs in the bracket.

For the rear PCBAs (top and bottom):

a.   Locate the correct bracket for each position. (The top bracket has four screw holes, while the bottom bracket has three screw holes.)

b.   Connect the light curtain interconnect cable between the PCBAs. See **Figure 14-13**.

Figure 14-13   Light curtain interconnect cable (rear light curtain only)

c.   Replace the six screws attaching the two interconnected PCBAs to the bracket. See **Figure 14-14**.

Figure 14-14   Location of screws for rear light curtain PCBAs

For the front PCBAs (left and right, and top and bottom):

a.   Locate the correct bracket for each position.

b.   Replace the three screws attaching the PCBA to the bracket. See **Figure 14-15**.

Figure 14-15   Location of screws for front light curtain PCBA

4.   Carefully insert the bracket into its correct position in the cabinet. See **Table 14-9 on page 14-14**.

5.   Replace the screws attaching the bracket to the frame.

6.   Reconnect the cables to the PCBA.

7.   Apply power to the library. See **Section 17.3 on page 17-4**.

15   Replacing MEM Components

This chapter provides instructions for the following procedures

- Installing a MEM (see **Section 15.1**)
- Replacing the MEM's door solenoid assembly (see **Section 15.2 on page 15-21**)
- Replacing the carousel motor (see **Section 15.3 on page 15-23**)

15.1   Installing a MEM

Procedure overview: **Table 15-1** provides an overview of installing a MEM.

Step	Task	Refer to...
1	Shutting down the library and powering it off	**Section 6.2 on page 6-1**
2	Preparing the LRM	**Section 15.1.1 on page 15-3**
3	Removing the X-axis hard stop	**Section 15.1.2 on page 15-4**
4	Releasing the carousel locks	**Section 15.1.3 on page 15-6**
5	Connecting the carousel controller cable	**Section 15.1.4 on page 15-8**
6	Attaching the MEM to the LRM	**Section 15.1.5 on page 15-10**
7	Lowering the leveling feet	**Section 15.1.6 on page 15-11**
8	Lowering the carousel supports	**Section 15.1.7 on page 15-13**
9	Installing the side panel on the MEM	**Section 15.1.8 on page 15-14**
10	Applying power to the library	**Section 15.1.9 on page 15-14**
11	Aligning the gripper with the MEM	**Section 15.1.10 on page 15-16**
12	Updating the hardware configuration	**Section 15.1.11 on page 15-19**
13	Scanning the fiducials and inventory	**Section 15.1.12 on page 15-19**

Table 15-1   Overview of installing a MEM

CAUTION

Before installing a MEM, consider that you will need to allow time for the library to re-scan all fiducials and barcodes.

Required tools: Make sure you have the following:

- 3/4-inch open-end wrench
- #2 Phillips screwdriver
- 3/8-inch Allen wrench
- 5/16-inch Allen wrench
- 5/32-inch Allen wrench
- 1/4-inch Allen wrench
- Precision level

Equipment shipped with the MEM:

- Two bullet-nose alignment pins
- Six 5/16-18 x 1/2-inch socket-head screws
- Gripper alignment cartridge (Qualstar part number: 620059). See **Figure 15-1**.

Figure 15-1 Gripper alignment cartridge

15.1.1 Preparing the LRM

To prepare the LRM, follow these steps:

1. Shut down the library from X-Link and power it off. See **Section 6.2 on page 6-1**.

2. On the side of the LRM where you will install the MEM, locate the two Phillips screws at the base of the side panel.

3. Using a #2 Phillips screwdriver, remove the two screws. See **Figure 15-2**.

Figure 15-2 Removing the screws from the side panel

4. Carefully slide the panel up until you can lift the hooks out of the corresponding slots on the frame. See **Figure 15-3**.

Figure 15-3 Removing a side panel

5. Set the screws and the side panel aside—you will install these on the MEM.

6. On the exposed side of the LRM, locate the carousel controller cable. See **Figure 15-4**.

Figure 15-4 Carousel controller cable on the side of the LRM

7. Cut the cable ties holding the cable to the frame.

15.1.2 Removing the X-Axis Hard Stop

When shipped, the X-axis (horizontal axis) on the handler includes two inner and two outer "hard stops," which are simply #10 cap screws located at each end of the X-axis. See **Figure 15-5**.

Figure 15-5 Outer and inner hard stops on the handler's X-axis (right side shown)

When the inner hard stops are installed, the handler is prevented from traveling too far to the left and right. When an inner hard stop is removed, the handler can reach into an attached MEM.

You need to remove the inner hard stop on the side where you will install the MEM.

CAUTION

To avoid damage to the equipment, never remove the two outer stops.

To remove an inner hard stop, follow these steps:

1. If you will install a MEM to the left of the LRM, locate the inner hard stop on the left side of the X-axis. If you will install a MEM to the right of the LRM, locate the inner hard stop on the right side of the X-axis.

2. Using a 5/32-inch Allen wrench, remove the cap screw from the X-axis. See **Figure 15-6**.

Do not remove!

Figure 15-6   Removing the X-axis hard stop (right side shown)

15.1.3 Releasing the Carousel Locks

<div>

CAUTION

The carousel in the MEM is locked into place for shipping. You must release the carousel locks before installing the MEM.

</div>

To release the carousel locks, follow these steps:

1. Locate the two brackets under the left and right sides of the carousel, as shown in **Figure 15-7**.

One of two carousel shipping brackets (right side of carousel shown)

Figure 15-7   Location of the shipping bracket under the carousel (right side shown)

2. Locate the two socket-head cap screws on each bracket. See **Figure 15-8**.

Left side of MEM   Right side of MEM

Figure 15-8 Location of screws on the carousel shipping locks

– The screws on the left side of the brackets (screws 1 and 2 in **Figure 15-8**) have a stationary PEM nut and function to raise and lower the carousel.

– The screws on the right side of the bracket (screws 3 and 4 in **Figure 15-8**) are shipping locks and function to keep the carousel from rotating.

3. Use a 5/16-inch Allen wrench (right-angled, if possible) to remove the two shipping locks (screws 3 and 4 in **Figure 15-8**).

4. Using the same wrench, gradually lower the carousel as follows:

a. Loosen screw 1 a few turns.

b. Loosen screw 2 a few turns.

c. Repeat steps a and b until screws 1 and 2 can be removed from the brackets.

Important:	To ensure that the carousel is lowered evenly and to avoid equipment damage, be sure to loosen screws 1 and 2 in tandem as described.

      d.   Store the screws in the two holes on the front of each bracket. See
            Figure 15-9.

Figure 15-9   Storing the screws in the bracket

> **Important:**   Be sure to store the screws in the bracket; they may be
>   required later for service use.

5.   Turn the carousel by hand to ensure that it rotates smoothly and without
       encountering any obstructions. The carousel will be hard to turn.

> **CAUTION**
>
> Do not use the edges of the cartridge slots to turn the carousel.

15.1.4 Connecting the Carousel Controller Cable

The carousel controller cable connects the system controller in the LRM to the carousel
controller at the back of the MEM. This cable allows the LRM to provide power and
control to the MEM.

To connect the carousel controller cable, follow these steps:

1. Using a #2 Phillips screwdriver, remove the eleven screws that attach the lower panel to the back of the MEM. See **Figure 15-10**.

Figure 15-10 Removing the MEM's lower back panel

2. Route the cable as follows:

   – Out the side of the LRM
   – Into the side of the MEM
   – Out the back of the MEM

3. Connect the cable to either of the two keyed connectors on the back of the carousel controller in the MEM. See **Figure 15-11**.

Use either connector

Figure 15-11 Connecting the carousel controller cable to the carousel controller

4. Using a #2 Phillips screwdriver, replace the lower panel on the back of the MEM with the eleven screws.

15.1.5 Attaching the LRM to the MEM

To attach the LRM to the MEM, follow these steps:

1. On the side of the MEM closest to the LRM, locate the two alignment holes at the top and bottom.

2. Insert the narrow end of a bullet-nose alignment pin into each hole. See **Figure 15-12**.

Bullet-nose
alignment pin

Figure 15-12   Inserting an alignment pin into the MEM (upper hole shown)

3. Confirm that the pins align with the holes on the LRM.

> **Important:**   If the pins do not align with the holes, adjust the leveling feet on the MEM (see **Section 15.1.6 on page 15-11**).

4. Push the MEM against the LRM and guide the alignment pins into the corresponding holes on the LRM.

5. Locate the three holes on the back of the LRM frame that are used to secure the LRM to the MEM.

6. Open the doors of the MEM and the LRM to access the three holes in the front.

7. Determine the direction of the screws, as follows:

- MEM to the left of the LRM (as viewed from the front):

  - All six screws go from the LRM to the MEM

- MEM to the right of the LRM (as viewed from the front):

  - The three screws in back go from the LRM to the MEM
  - The three screws in front go from the MEM to the LRM

8. From the MEM accessory kit, obtain six 5/16 x 1/2-inch socket-head screws and washers.

9. Insert the screws through their washers and into the holes.

10. Tighten the screws with a 1/4-inch Allen wrench.

> **Important:** If the holes on the MEM do not align with the holes on the LRM, adjust the leveling feet on the MEM (see **Section 15.1.6 on page 15-11**).

15.1.6   Lowering the Leveling Feet

To lower the leveling feet on the MEM, follow these steps:

1. Locate the four leveling feet on the MEM. See **Figure 15-13**.

Figure 15-13   Location of the four leveling feet on the MEM

> **Important:** The MEM also includes front and rear carousel supports, which are located between the leveling feet. The carousel supports are intended to keep the carousel from sagging when it is loaded with cartridges. Do not use these supports to level the MEM.

2. Using a 3/4-inch open-end wrench, turn one of the jam nuts to loosen the leveling foot. See **Figure 15-14**.

Turn jam nut to loosen leveling foot

Figure 15-14   Loosening a leveling foot

3. Using the same wrench, extend the leveling foot until it touches the floor. Then, turn the nut two more complete turns. See **Figure 15-15**.

1. Lower the foot to the floor.
2. Turn the nut 2 more turns.

Figure 15-15   Extending a leveling foot

4. Repeat steps 2 and 3 to extend the three other leveling feet.

5. Check the alignment by placing a precision level on top of the LRM and MEM.

> **Important:**   Depending on the floor conditions, you may need to adjust the leveling feet on the LRM or the MEM up or down. Keep checking the alignment until both the LRM and the MEM are at an even level.

6.   Turn all four jam nuts on the MEM clockwise until they push up against the frame. See **Figure 15-16**.

Turn jam nut until it pushes against the frame

Figure 15-16   Tightening a leveling foot

15.1.7   Lowering the Carousel Supports

The two carousel supports prevent the carousel from sagging when it is loaded with cartridges. These supports must be tight against the floor before you install the cartridges.

CAUTION

To avoid damaging the base of the carousel, do not install cartridges in the carousel slots unless the carousel supports are fully extended and snug against the floor.

To lower the carousel supports, follow these steps:

1.   Locate the front carousel support for the MEM. See **Figure 15-17**.

Figure 15-17   Location of the front carousel support

2.   Using a 3/4-inch open-end wrench, turn the jam nut to loosen the support. See **Figure 15-14 on page 15-12**.

3.   Using the same wrench, extend the support until it touches the floor. See **Figure 15-15 on page 15-12**.

4. Turn the carousel support another 1/4 to 1/8 of a turn until it is tight against the floor.

5. Using a 3/4-inch open-end wrench, turn the jam nut clockwise until it pushes up against the frame. See **Figure 15-16 on page 15-13**.

6. Repeat steps 2–5 to extend the back carousel support.

15.1.8 Installing the Side Panel on the MEM

To install the side panel on the MEM, follow these steps:

1. Holding the side panel with both hands, place the panel next to the MEM and carefully lower it until the hooks on the panel engage with the corresponding slots on the MEM's frame.

2. Insert the two screws in the holes at the bottom of the panel. See **Figure 15-18**.

Figure 15-18   Installing the side panel on the MEM

3. Using a #2 Phillips screwdriver, tighten the screws.

15.1.9 Applying Power

To apply power after installing a MEM, follow these steps:

1. Leave at least one door open (the I/O ports can be open or closed).

2. Move the power switch on the back of the library to On. See **Figure 15-19**.

Figure 15-19 Power switch in on position

3. Wait for the power-on processes to complete. During power-on:

   – The status LEDs on the front panel flash intermittently.

   – The tape drives perform their own power-on processes. For information, refer to the documentation for the tape drives. When the tape drives are receiving power from the XLS, the Drive Status LEDs on the back of the tape drive assemblies are green.

   – X-Link starts and the log-in page is displayed.

4. After the power-on processes are complete, check the status of the LEDs, as follows:

   – From the back of the library, look at each tape drive assembly and confirm that the Drive Status LED is green, indicating that the tape drive is installed and powered on.

   – From the back of the library, look at each power supply and confirm that the PWR Good LED is green and the Fault LED is off.

   – From the back of the library, look at the battery module. If the Charge LED is illuminated, the battery module may not be fully charged. It can take up to 10 minutes for the battery to fully charge after power is reapplied.

   – From the front of the library, look at the Attention LED, which will be flashing, indicating that a door is open.

15.1.10 Aligning the Gripper with the MEM

You must align the gripper to the MEM to ensure that the new slots can be accessed. To align the gripper, follow these steps:

1. Log in to X-Link.

2. Select **Service View** to display the Service portlet, shown in **Figure 15-20**.

Figure 15-20 Service portlet

3.   From the Change Configuration section of the Service portlet, select **View/Edit Hardware Configuration**. The View/Edit Hardware Configuration page opens as shown in **Figure 15-21**.

Figure 15-21   View/Edit Hardware Configuration

4.   From the Robot section, select **Position Robot**, which powers on the robots, homes all axes (including any carousels), and positions the gripper to an easily accessible location.

5.   Open the doors on the MEM and the LRM.

6.   Insert the gripper alignment cartridge into slot 36 of the carousel (use whichever column of slots is facing forward). See **Figure 15-22**.

> **Important:**   Make sure the alignment tool indicates "This side up for Carousel Alignment."

Figure 15-22   Inserting the gripper alignment cartridge into the carousel

7.   Move the X-beam by hand until the gripper assembly is just under the gripper alignment cartridge.

> **Important:**   Make sure the alignment cartridge aligns with the gripper assembly guide rod and that it is flush with the gripper and the cartridge slot.

8.   Select **Get Robot Status**. X-Link displays information about the robot's position.

9.   Write down the values for Theta Position ("TPOS") and X Position ("XPOS").

10.   Move the X-beam down by hand so that it is not blocking the gripper alignment cartridge.

11.   Remove the gripper alignment cartridge.

12.   Make sure there are no cartridges loaded or present in any of the tape drives.

> **Important:**   If cartridges are present, unload them and place them into empty slots on the back wall.

13.   Make sure that a calibration cartridge is located in the reserved slot of the LRM (G50).

14.   Close any open doors.

15.1.11 Updating the Hardware Configuration

To update the hardware configuration after obtaining the Theta Position and X-Position values, follow these steps:

1. From the Change Configuration section of the Service portlet, select **View/Edit Hardware Configuration**.

2. In the Carousels/Pods section of the page, locate whichever drop-down list is appropriate for the MEM you just installed (that is, either **Carousel/Pod installed on left?** or **Carousel/Pod installed on right?**).

3. Select **Carousel18** from the list.

4. Press **Save Configuration**. When you press this button, the XLS adds the new MEM slots to its internal databases.

5. Locate the TPOS and XPOS values you obtained while aligning the gripper to the carousel.

6. Enter the TPOS value in the **Theta 1** field.

7. Enter the XPOS value in the **X 1** field.

8. Press **Update Alignment**. When you press this button, the XLS updates the gripper alignment so it can access the new slots.

15.1.12 Scanning the Fiducials and Inventory

To scan the fiducials and the inventory, follow these steps:

1. From the Fiducials section of the View/Edit Hardware Configuration page, select **I/O Ports** to scan the I/O ports fiducials.

2. From the Fiducials section of the page, select **All Slots,** then wait for the scan to complete.

> **Important:**   Depending on the number of magazines in your library, scanning magazine fiducials can take several hours.

3. When the fiducial scan has completed, select **Dump Database**. The results of the fiducial scan displays, as shown in **Figure 15-23**. This report indicates whether any of the fiducials in the library are unscanned.

```
Diagnostic Command Results

        running /xls/bin/xlsinit_checkFidbScanned -i -d
Sent MsgId ( LIM_WRITEDB_REQ ):
limMsgWriteDB ----------------------
dest id : 61 XLSBOOT
msgID    : 4006 (LIM_WRITEDB_RSP)
src id  : 4 INV
src base: 0
len      : 130
transC  : 56
transL  : 56
time     : Mon Nov 20 15:07:28 2006

status  : 0
srcbase : 0
seq     : 40285
priority: 0
dbId       : 5
status     : 0
outfilename: /xls/tmp/fidbdump.out

=========================================
Following fiducial entries are unscanned


  Drive : 1011,001B00C01011,0x00000000,30106,1833,0,0,0,14971,0,199,0
  Drive : 1013,001B00C01013,0x00000000,16751,1833,0,0,0,14971,0,200,0
  Drive : 1014,001B00C01014,0x00000000,10084,1833,0,0,0,14971,0,199,0
  Drive : 1022,001B00C01022,0x00000000,23438,7333,0,0,0,14971,0,199,0
  Drive : 1023,001B00C01023,0x00000000,16771,7333,0,0,0,14971,0,199,0
  Drive : 1024,001B00C01024,0x00000000,10098,7333,0,0,0,14971,0,199,0

----- Total unscanned fiducuals = 6
```

Figure 15-23   Excerpt from the fiducial scan, showing unscanned tape drives

4. If any of the fiducials display as unscanned, select the appropriate option from the Fiducial section of the page:

   – Select **I/O Ports** to scan the fiducials on the I/O ports
   – Select **All Slots** to scan the fiducials on the cartridge magazines
   – Select **Tape Drives** to scan and calibrate the tape drives

5. When the fiducial scans are complete, select **Calibrate All** to calculate the positions of the fiducials.

6. If you removed or installed cartridges when installing the hardware, select **Scan Inventory** from the Inventory section of the page to scan the cartridges.

7. Wait for the inventory scan to complete, then select **Sync Inventory** to update the logical library inventories with the results of the physical library scan.

8. From the General section of the page, select **Lock Doors**.

9. Press **Done** to return to the Home page.

10. As required, add the new cartridge slots to the logical library partitions, put the library in logical mode, and restart the applications.

15.2 Replacing the MEM's Door Solenoid Assembly

The door solenoid assembly, located behind the air filter cover on the front of MEM, controls the electronic lock for the MEM doors.

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver

15.2.1 Removing the Door Solenoid Assembly

1. Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2. Remove the air filter cover on the front of the MEM. See **Section 10.1.2 on page 10-3**.

3. Locate the plate that forms the back of the solenoid assembly. See **Figure 15-24**.

Figure 15-24   Back of the door solenoid assembly for the MEM

4. Using a Phillips screwdriver, remove the four screws that hold the solenoid assembly in place.

5.   Remove the solenoid assembly from the frame. See **Figure 15-25**.

Figure 15-25   Door solenoid removed from the frame

6.   Disconnect the white cable at the connector.

15.2.2   Installing the Door Solenoid Assembly

To install the door solenoid assembly, follow these steps:

1.   Attach the white cable from the solenoid to the red and yellow cable inside the XLS.

> **Important:**   The cable is keyed and can be attached in only one way. Make sure that the connector snaps into place.

2.   Insert the post on the top of the solenoid assembly into the corresponding hole on the frame.

3.   Using a Phillips screwdriver, replace the four screws. See **Figure 15-24 on page 15-21**.

4.   Replace the air filter cover. **Section 10.2.3 on page 10-10**.

5.   Apply power to the library. See **Section 17.2 on page 17-3**.

15.3   Replacing the Carousel Motor

The carousel motor, located at the back of the MEM, controls the rotation of the carousel.

> **Important:**   The XLS can remain powered on when you replace the carousel motor.

Procedure overview: **Table 15-2** provides an overview of replacing the carousel motor.

Step	Task	Refer to...
1	Power off the carousel controller	**Section 15.3.1 on page 15-23**
2	Remove the carousel motor	**Section 15.3.2 on page 15-25**
3	Replace the carousel motor	**Section 15.3.3 on page 15-28**
4	Power on the carousel controller	**Section 15.3.4 on page 15-30**

Table 15-2   Overview of replacing the carousel motor

Required tools and equipment: Make sure you have the following:

- #2 Phillips screwdriver
- 3/16-inch Allen wrench
- Standard pliers
- Cable tie cutters
- Replacement cable ties
- Small metric ruler or calipers
- 1/4-inch Allen wrench (if the MEM is to the left of the LRM)

15.3.1 Powering Off the Carousel Controller

Before removing the carousel motor, you need to power off the carousel controller. Powering off the controller shuts down the carousel motor, the door-lock solenoids in the MEM, and the MEM light curtain sensors.

To power off the carousel controller, follow these steps:

1.   Make sure that no backup operations are in process, then shut down the applications. Refer to the documentation for the software applications.

2.   Log in to X-Link.

3. From the X-Link Home page, select **Service View** or **Show All** to display the Service portlet, shown in **Figure 15-26**.

Figure 15-26 Service portlet

4. From the Change Mode section, select **Physical Mode** to put the library in physical mode. See **Section 5.4.3 on page 5-10** for more information.

5. From the Run Diagnostics section, select **Service Utilities**. The Service Utilities page opens, as shown in **Figure 15-27**.

Figure 15-27 Service Utilities page

6.   Power off the left or right carousel, as follows:

–   If you want to power off the carousel attached to the *left* side of the LRM, select **Power Off Carousel Left** from the Carousels section of the page.

–   If you want to power off the carousel attached to the *right* side of the LRM, select **Power Off Carousel Right** from the Carousels section of the page.

When the carousel controller is powered off, you will hear a click as the door-lock solenoids are disengaged.

15.3.2 Removing the Carousel Motor

To remove the carousel motor, follow these steps:

1.   Access the carousel motor bracket and alignment pin, as follows:

–   If the MEM is to the right of the LRM, remove the right side panel from the MEM, as described in **Section 10.3.1 on page 10-11**.

or

–   If the MEM is to the left of the LRM, use a 1/4-inch Allen wrench to remove the six 5/16 x 1/2-inch socket-head screws securing the LRM to the MEM. Refer to the instructions in **Section 15.1.5 on page 15-10**.

Important:	You can leave the XLS powered on when you remove the side panel or the MEM. However, if you remove the MEM from the LRM, be aware that you will need to rescan all fiducials and cartridges after reattaching the MEM.

2. Using a #2 Phillips screwdriver, remove the eleven screws that attach the lower panel to the back of the MEM. See **Figure 15-28**.

Figure 15-28   Removing the MEM's lower back panel

3. Disconnect the carousel motor encoder and power cables from the carousel controller card, then cut the cable ties. See **Figure 15-29**.

Carousel motor encoder and power cables

Figure 15-29   Location of the carousel motor encoder and power cable

4.   On the carousel motor mount, locate the top and bottom Allen adjustment screws. See **Figure 15-30**.

Adjustment screws

Figure 15-30   Location of the adjustment screws on the carousel motor mount

5.   Using a 3/16-inch Allen wrench, remove the top and bottom screws and washers. Save these parts; you will use them on the replacement motor.

6.   On the carousel motor mount, locate the belt-tensioning screw. See **Figure 15-31**.

Belt-tensioning screw

Figure 15-31   Location of the belt-tensioning screw on the carousel motor mount

7.   Use a 3/16-inch Allen wrench to remove the screw and nut. Save these parts; you will use them on the replacement motor.

8.   Push the motor toward the center of the MEM and release the carousel belt from the carousel gear and pulley assembly.

9. Locate the alignment pin on the carousel motor mount. See **Figure 15-32**.

Carousel
motor mount
alignment pin

Figure 15-32   Location of the alignment pin on the carousel motor mount

10. Using pliers, carefully pull up on the pin until it is completely free of the motor mount and mounting bracket.

11. Remove the carousel motor assembly from the back of the MEM.

15.3.3   Installing the Carousel Motor

To install the carousel motor, follow these steps:

1. From the back of the MEM, position the carousel motor assembly into the mounting bracket.

2. Align the motor with the mounting bracket, and carefully push down on the alignment pin to lock the motor into place. See **Figure 15-32 on page 15-28**.

3. Replace the carousel belt as follows:

   a. Place the belt around the carousel pulley.

   b. Slide the belt around the gear assembly under the carousel.

   c. Push the carousel motor toward the left pillar on the MEM frame and confirm that the belt does not slip off the gear or the pulley.

4. Use a 3/16-inch Allen wrench to replace the belt-tensioning screw, shown in **Figure 15-31 on page 15-27**.

> **Important:**   Keep the belt-tensioning screw slightly loose.

5. Use a 3/16-inch Allen wrench to replace the top and bottom adjustment screws and washers, shown in **Figure 15-30 on page 15-27**.

> **Important:** Keep the adjustment screws slightly loose.

6. Using a small metric ruler or calibers, measure the gap between the bracket and the motor mount. It should measure between 5 and 6 mm. See **Figure 15-33**.

Gap should be 5 to 6 mm

Figure 15-33 Measuring the gap between the bracket and the motor mount

7. If the gap is too large, tighten the belt-tensioning screw.

   or

   If the gap is too small, loosen the belt-tensioning screw.

8. When the belt is tensioned correctly, tighten the top and bottom adjustment screws.

9. Reconnect the motor encoder and power cables to the carousel controller card and replace the cable ties. See **Figure 15-29 on page 15-26**.

10. Using a #2 Phillips screwdriver, replace the lower panel on the back of the MEM with the eleven screws.

11. If you unattached the MEM from the LRM, refer to **Section 15.1.5 on page 15-10** for instructions for reinstalling it.

    or

    If you removed the MEM's side panel, refer to **Section 10.3 on page 10-11** for instructions for replacing the side panel.

15.3.4 Powering the Carousel Controller Back On

To power the carousel controller back on after replacing the carousel motor, follow these steps:

1. From the Home page in X-Link, select **Service View** or **Show All** to display the Service portlet, shown in **Figure 15-26 on page 15-24**.

2. From the Change Mode section, select **Physical Mode** to put the library in physical mode. See **Section 5.4.3 on page 5-10** for more information.

3. From the Run Diagnostics section, select **Service Utilities**. The Service Utilities page opens, as shown in **Figure 15-27 on page 15-24**.

4. Power on the carousel controller using the appropriate command, as follows:

   – If you want to power on the carousel attached to the *left* side of the MEM, select **Power On Carousel Left** from the Carousels section of the page.

   – If you want to power on the carousel attached to the *right* side of the LRM, select **Power On Carousel Right** from the Carousels section of the page.

5. Wait while the XLS automatically homes the carousel.

6. If you detached the MEM from the LRM to access the carousel motor, follow the instructions in **Section 15.1.12 on page 15-19** to scan the fiducials and the cartridges.

7. As required, put the XLS in logical mode and restart the applications. See **Section 5.4.4 on page 5-11**.

16   Installing an Expansion Pod

This chapter provide instructions for attaching an expansion pod to an XLS-812300. Each expansion pod provides storage for an additional 120 cartridges.

> **Important:**   For instructions for attaching an expansion pod before the XLS-812300 has been powered on and configured, refer to the *XLS Library Installation Manual*.

Procedure overview: Table 16-1 provides an overview of installing an expansion pod.

Step	Task	Refer to...
1	Shut down the library and power it off	**Section 6.2 on page 6-1**
2	Remove the side panels from the XLS-812300	**Section 16.1 on page 16-2**
3	Install the expansion pod mounting hardware	**Section 16.2 on page 16-5**
4	Remove the X-axis hard stop	**Section 16.3 on page 16-9**
5	Attach the expansion pod to the XLS-812300	**Section 16.4 on page 16-10**
6	Reinstall the rear side panel	**Section 16.5 on page 16-13**
7	Apply power to the library	**Section 16.6 on page 16-13**
8	Align the gripper to the expansion pod	**Section 16.7 on page 16-15**
9	Update the hardware configuration	**Section 16.8 on page 16-18**
10	Scan the fiducials and inventory	**Section 16.9 on page 16-19**

Table 16-1   Overview of installing an expansion pod

Required tools: Make sure you have the following:

- #2 Phillips screwdriver
- T20 Torx driver
- 5/32-inch Allen wrench
- **Right expansion pod:** 1/4-inch Allen wrench
- **Left expansion pod:** 5/16-inch Allen wrench
- Cable tie cutters

Items shipped with the expansion pods:

- Top hinge mount
- Bottom hinge mount
- Front L brace
- Alignment pins (2)
- Plastic shims (4)
- 6-32 x 5/16 Torx screws (5)
- 6-32 x 3/4 flat-head screws (6)
- 10-32 x 1-1/4 socket-head screws (3)
- **Right expansion pod:**
  - 5/16-18 x 1/2 socket-head screws (3)
  - 5/16 flat washers (3)
- **Left expansion pod:**
  - 3/8-16 x 1/2 socket-head screws (3)
  - 3/8 flat washers (3)

16.1   Removing the Side Panels from the XLS-812300

To remove the side panels from the XLS-812300, follow these steps:

1.   On the side of the XLS-812300 where you will install the expansion pod, locate the front and back side panels.

2.   Using a #2 Phillips screwdriver, remove the single screw at the bottom that secures the front side panel to the frame. See **Figure 16-1**.

Figure 16-1   Location of screw for the front side panel

3.   Carefully slide the panel up until you can lift the hooks out of the corresponding slots on the frame. See **Figure 16-2**.

Figure 16-2   Removing the front side panel

4.   Repeat steps 2 and 3 to remove the rear side panel.

5.   Use a T20 Torx driver to remove the five screws that secure the attachment plate to the rear side panel. Save these screws; you will use them to reattach the rear panel to the XLS-812300.

6. Using a #2 Phillips screwdriver, remove the six screws that attach the center mounting rail to the side of the XLS-812300. See **Figure 16-3**.

Figure 16-3   Removing the center mounting rail from the side of the XLS-812300

16.2 Installing the Expansion Pod Mounting Hardware

To install the mounting hardware for the expansion pod, follow these steps:

1. On the exposed side of the XLS-812300, locate the expansion-pod controller cable. See **Figure 16-4**.

Figure 16-4 Expansion-pod controller cable on the side of the XLS-812300

2. Cut the cable ties holding the cable to the frame.

3. In the accessory kit for the expansion pod, locate the top and bottom hinge mounts, the two alignment pins, and the six flat-head screws.

4. Insert the narrow ends of the alignment pins into the corresponding holes on the top and bottom hinge mounts. See **Figure 16-5**.

Figure 16-5 Inserting an alignment pin into a hinge mount

5.   Insert the bullet-nose end of the alignment pin into the hole at the top of the XLS-812300.

6.   Secure the top hinge mount using three flat-head screws. Ensure that the hinge pins point upward. See **Figure 16-6**.

Make sure hinge pins
point up

Figure 16-6   Attaching the top hinge mount

7. Hold the bottom hinge mount against the XLS-812300 and route the expansion-pod controller cable through the channel on the bottom hinge mount. See **Figure 16-7**.

Figure 16-7 Routing the expansion-pod controller cable through the bottom hinge mount

8. Attach the bottom hinge mount to the XLS-812300 using one alignment pin and three flat-head screws.

9. Install a plastic shim on the four hinge pins. See **Figure 16-8**.

Plastic shim

Figure 16-8 Installing a plastic shim on a hinge pin

10. Attach the front L brace to the XLS-812300 as shown in **Figure 16-9**. Note that:

– If the expansion pod to the *right* of the XLS-812300:

• Use three 5/16 x 1/2 socket-head screws and three 5/16-inch flat washers.

• Install the screws from the outside of the XLS. That it, insert them into the brace, then into the pem nuts on the XLS frame.

– If the expansion pod is to the *left* of the XLS-812300:

• Use three 3/8 x 1/2 socket-head screws and three 3/8-inch flat washers

• Install the screws from the inside of the XLS. That is, insert them into the XLS frame, then into the pem nuts on the brace.

Important:	• If a fixed port assembly is installed on the upper left position, you need to remove the fixed port to install the middle screw. Refer to **Section 11.2.1 on page 11-7**. • If an I/O port is installed in the upper left position, press the I/O port solenoid to open the port. See **Figure 11-2 on page 11-2**.

Figure 16-9   Front L brace on the left side of the XLS-812300

16.3 Removing the X-Axis Hard Stop

When shipped, the X-axis (horizontal axis) on the handler includes two inner and two outer "hard stops," which are simply #10 cap screws located at each end of the X-axis. See **Figure 16-10**.

Inner hard stop

Outer hard stop

Figure 16-10 Outer and inner hard stops on the handler's X-axis (right side shown)

When the inner hard stops are installed, the handler is prevented from traveling too far to the left and right. When an inner hard stop is removed, the handler can reach into an attached expansion pod.

You need to remove the inner hard stop on the side where you will install the expansion pod.

> **CAUTION**
>
> To avoid damage to the equipment, never remove the two outer stops.

To remove an inner hard stop, follow these steps:

1. If you will install an expansion pod to the left of the XLS-812300, locate the inner hard stop on the left side of the X-axis. If you will install an expansion pod to the right of the XLS-812300, locate the inner hard stop on the right side of the X-axis.

2. Using a 5/32-inch Allen wrench, remove the appropriate inner hard stop from the X-axis. See **Figure 16-11**.

Do not remove!

Figure 16-11 Removing the X-axis hard stop (right side shown)

16.4 Attaching the Expansion Pod to the XLS-812300

To attach the expansion pod to the XLS-812300, follow these steps:

1. If necessary, lower the leveling feet on the XLS-812300. See **Section 15.1.6 on page 15-11** for instructions.

2.   Lift the pod up and insert the four hinge pins on the XLS-812300 into the corresponding holes on the pod. See **Figure 16-12**.

Figure 16-12   Attaching an expansion pod (left side shown with fixed port removed)

3.   Connect the expansion-pod controller cable to the keyed connector on the pod controller card. See **Figure 16-13**.

Figure 16-13   Connecting the expansion-pod controller cable to the pod controller

4. Push the expansion pod against the XLS-812300 and guide the top and bottom alignment pins on the XLS-812300 into the corresponding holes on the expansion pod. See **Figure 16-14**.

Top hole   Top alignment pin

Figure 16-14   Aligning the expansion pod with the XLS-812300

5. Insert three 10-32 x 1-1/4 socket-head screws through the three holes on the outside of the expansion pod. See **Figure 16-15** for the location of the top-most hole.

Figure 16-15   Location of top-most hole for securing an expansion pod to the XLS-812300

6. Using a 5/32-inch Allen wrench, tighten the screws to secure the expansion pod to the XLS-812300.

16.5 Reinstalling the Rear Side Panel

To reinstall the rear side panel on the XLS-812300, follow these steps:

1. Holding the side panel with both hands, place the panel next to the XLS-812300 and secure it with the five Torx screws you removed in **Section 16.1 on page 16-2**. See **Figure 16-16** for the location of the three top screws.

Figure 16-16   Installing the side panel on the expansion pod

2. Insert one screw in the hole at the bottom of the panel. Using a #2 Phillips screwdriver, tighten the screw.

3. After installing the expansion pod, power on the XLS as described in **Section 16.6**.

16.6 Applying Power

To apply power after installing an expansion pod, follow these steps:

1. Open the door on the XLS-812300 (the I/O port(s) can be open or closed).

2. Move the power switch on the back of the library to On. See **Figure 16-17**.

Figure 16-17 Power switch in on position

3. Wait for the power-on processes to complete. During power-on:

   – The status LEDs on the front panel flash intermittently.

   – The tape drives perform their own power-on processes. For information, refer to the documentation for the tape drives. When the tape drives are receiving power from the XLS, the Drive Status LEDs on the back of the tape drive assemblies are green.

   – X-Link starts and the log-in page is displayed.

4. After the power-on processes are complete, check the status of the LEDs, as follows:

   – From the back of the library, look at each tape drive assembly and confirm that the Drive Status LED is green, indicating that the tape drive is installed and powered on.

   – From the back of the library, look at each power supply and confirm that the PWR Good LED is green and the Fault LED is off.

   – From the back of the library, look at the battery module. If the Charge LED is illuminated, the battery module may not be fully charged. It can take up to 10 minutes for the battery to fully charge after power is reapplied.

   – From the front of the library, look at the Attention LED, which will be flashing, indicating that a door is open.

16.7   Aligning the Gripper to the Expansion Pod

You must align the gripper to both columns of slots in the expansion pod to ensure that the new slots can be accessed. To align the gripper, follow these steps:

1.   Log in to X-Link.

2.   Select **Service View** to display the Service portlet, shown in **Figure 16-18**.

Figure 16-18   Service portlet

3. From the Change Configuration section of the Service portlet, select **View/Edit Hardware Configuration**. The View/Edit Hardware Configuration page opens as shown in **Figure 16-19**.

Figure 16-19 View/Edit Hardware Configuration

4. From the Robot section, select **Position Robot**, which powers on the robots, homes all axes (including any carousels), and positions the gripper to an easily accessible location.

5. When the robot has stopped, reach into the cabinet of the XLS-812300 to access the slots on the expansion pod.

6. Insert the gripper alignment cartridge into slot 36 of either of the two columns. See **Figure 16-20**.

> **Important:** Make sure the alignment tool indicates "This side up for Carousel Alignment."

Figure 16-20   Inserting the gripper alignment cartridge into the expansion pod

7.   Align the gripper with the first column of slots as follows:

   a.   Move the X-beam by hand until the gripper assembly is just under the gripper alignment cartridge.

   > **Important:**   Make sure the alignment cartridge aligns with the gripper assembly guide rod and that it is flush with the gripper and the cartridge slot.

   b.   Select **Get Robot Status**. X-Link displays information about the robot's position.

   c.   Write down the values for Theta Position ("TPOS") and X Position ("XPOS").

   d.   Move the X-beam down by hand so that it is not blocking the gripper alignment cartridge.

   e.   Remove the gripper alignment cartridge.

8.   Insert the gripper alignment cartridge into slot 36 of the other column.

9.   Repeat the procedure outlined in step 7 to align the gripper to the slots.

10. Make sure there are no cartridges loaded or present in any of the tape drives.

> **Important:** If cartridges are present, unload them and place them into empty slots on the back wall.

11. Make sure that a calibration cartridge is located in the reserved slot (G50).

12. Close the door.

16.8 Updating the Hardware Configuration

To update the hardware configuration after obtaining the Theta Position and X-Position values, follow these steps:

1. From the Change Configuration section of the Service portlet, select **View/Edit Hardware Configuration**.

2. In the Carousels/Pods section of the page, locate whichever drop-down list is appropriate for the expansion pod you just installed (that is, either **Carousel/Pod installed on left?** or **Carousel/Pod installed on right?**).

3. Select **Pod2** from the list.

4. Press **Save Configuration**. When you press this button, the XLS adds the new expansion pod slots to its internal databases.

5. Enter the TPOS and XPOS values you obtained while aligning the gripper to the expansion pod, as follows:

   – In the **Theta 1** field, enter the TPOS value for the first column.
   – In the **X 1** field, enter the XPOS value for the first column.
   – In the **Theta 2** field, enter the TPOS value for the second column.
   – In the **X 2** field, enter the XPOS value for the second column.

6. Press **Update Alignment**. When you press this button, the XLS updates the gripper alignment so it can access the new slots.

16.9 Scanning the Fiducials and Inventory

To scan the fiducials and the inventory, follow these steps:

1. From the Fiducials section of the View/Edit Hardware Configuration page, select **I/O Ports** to scan the I/O ports fiducials.

2. From the Fiducials section of the page, select **All Slots,** then wait for the scan to complete.

> **Important:** Depending on the number of magazines in your library, scanning magazine fiducials can take several hours.

3. When the fiducial scan has completed, select **Dump Database**. The results of the fiducial scan displays, as shown in **Figure 16-21**. This report indicates whether any of the fiducials in the library are unscanned.

```
Diagnostic Command Results

      running /xls/bin/xlsinit_checkFidbScanned -i -d
Sent MsgId ( LIM_WRITEDB_REQ ):
limMsgWriteDB ----------------------
dest id : 61 XLSBOOT
msgID   : 4006 (LIM_WRITEDB_RSP)
src id  : 4 INV
src base: 0
len     : 130
transC  : 56
transL  : 56
time    : Mon Nov 20 15:07:28 2006

status  : 0
srcbase : 0
seq     : 40285
priority: 0
dbId        : 5
status      : 0
outfilename: /xls/tmp/fidbdump.out

=======================================
Following fiducial entries are unscanned

  Drive :  1011,001B00C01011,0x00000000,30106,1833,0,0,0,14971,0,199,0
  Drive :  1013,001B00C01013,0x00000000,16751,1833,0,0,0,14971,0,200,0
  Drive :  1014,001B00C01014,0x00000000,10084,1833,0,0,0,14971,0,199,0
  Drive :  1022,001B00C01022,0x00000000,23438,7333,0,0,0,14971,0,199,0
  Drive :  1023,001B00C01023,0x00000000,16771,7333,0,0,0,14971,0,199,0
  Drive :  1024,001B00C01024,0x00000000,10098,7333,0,0,0,14971,0,199,0

----- Total unscanned fiducuals = 6
```

Figure 16-21 Excerpt from the fiducial scan, showing unscanned tape drives

4. If any of the fiducials display as unscanned, select the appropriate option from the Fiducial section of the page:

   – Select **I/O Ports** to scan the fiducials on the I/O ports
   – Select **All Slots** to scan the fiducials on the cartridge magazines
   – Select **Tape Drives** to scan and calibrate the tape drives

5. When the fiducial scans are complete, select **Calibrate All** to calculate the positions of the fiducials.

6. If you removed or installed cartridges when installing the hardware, select **Scan Inventory** from the Inventory section of the page to scan the cartridges.

7. Wait for the inventory scan to complete, then select **Sync Inventory** to update the logical library inventories with the results of the physical library scan.

8. From the General section of the page, select **Lock Doors**.

9. Press **Done** to return to the Home page.

10. As required, add the new expansion-pod slots to the logical library partitions, put the library in logical mode, and restart the applications.

11. Use the I/O port(s) to import new cartridges into the expansion-pod slots.

CAUTION

Never attempt to swing the pod open to install cartridges. The pod was not designed to be opened and closed with cartridges in place. In addition, the slots must be recalibrated whenever the pod is opened and closed.

---

17   Restarting the XLS

This chapter describes how to restart the XLS after it has been shut down for a service procedure using the instructions in **Chapter 6, "Shutting Down the XLS."**

> **Important:**   If this is the first time you have powered on the library, refer to the instructions in *XLS Library Installation*.

As described in **Section 17.1**, the process for restarting the XLS depends on what service operations occurred when the XLS was shut down.

17.1   Overview of Restarting the XLS

Figure 17-1 on page 17-2 provides an overview of the four procedures for restarting the XLS after service. As shown in the figure, the steps for restarting the XLS depends on what occurred when the XLS was shut down, as follows:

- **All doors remained closed**. For example, you replaced a component at the back of the library such as an HBA or the power/PC bay. For instructions, see **Section 17.2 on page 17-3**.

- **A door was opened, but the fiducial positions and hardware configuration were unchanged.** For example, you replaced a light curtain sensor, X- or Y-motor, or door sensor. For instructions, see **Section 17.3 on page 17-4**.

- **A door was opened and the fiducial positions were altered.** However, the hardware configuration remained the same. For example, you replaced a cartridge magazine or drive bay or reinstalled the front panel. For instructions, see **Section 17.4 on page 17-8**.

- **A door was opened and the hardware configuration was changed.** For example, you upgraded a cartridge bay to a drive bay or installed new door slots or an I/O port. For instructions, see **Section 17.5 on page 17-12**.

Restarting the XLS After Service

Shut down XLS from X-Link
↓
Perform service procedure
↓
Was a door opened? — No → Keep doors closed → Apply power → Login to X-Link → Go to logical mode ① 1
↓ Yes

Could a fiducial position have been changed? — No → Close doors → Apply power → Login to X-Link → Audit Library → Go to logical mode ② 2
↓ Yes

Keep at least one door open
↓
Apply power
↓
Login to X-Link
↓
Service View
↓
Was the h/w configuration changed? — No →
↓ Yes

View/Edit Hardware Configuration	Service Utilities
Close doors	Close doors
Scan and calibrate fiducials	Scan and calibrate fiducials
Scan/sync inventory	Scan/sync inventory
Lock doors	Lock doors
Go to logical mode	Go to logical mode
④ 4	③ 3

Use this procedure to restart the XLS if...

All doors remained closed. For example, an HBA or power/PC bay was replaced. ① 1

A door was opened, but the fiducial positions and hardware configuration were unchanged. For example, a light curtain sensor or a motor was replaced. ② 2

A fiducial position could have been changed, but the hardware configuration remained the same. For example, a cartridge magazine or cartridge bay was replaced or the front panel was removed and replaced. ③ 3

The hardware configuration was changed. For example, a cartridge bay was upgraded to a drive bay or door slots or an I/O port were added. ④ 4

Figure 17-1   Overview of the procedures for restarting the XLS after a shut down

17.2   Restarting the XLS if All Doors Remained Closed

This section includes instructions for applying power to the XLS. Use the instructions in this section if all doors remained closed while the library was shut down. For example, you would use these instructions after installing a component in the rear of the library, such as an HBA or replacing the power/PC bay.

To apply power if all doors remained closed, follow these steps:

1. Close any open I/O ports.

2. Move the power switch on the back of the library to On. See **Figure 17-2**.

Figure 17-2   Power switch in on position

3. Wait for the power-on processes to complete. During power-on:

    –   The status LEDs on the front panel flash intermittently.

    –   The tape drives perform their own power-on processes. For information, refer to the documentation for the tape drives. When the tape drives are receiving power from the XLS, the Drive Status LEDs on the back of the tape drive assemblies are green.

    –   X-Link starts and the log-in page is displayed.

    –   The XLS scans the fiducial targets and cartridge slots in the I/O ports, then moves the handler to its home position. If a MEM is attached, the carousel rotates to its home position.

    –   The XLS locks the door(s).

4. After the power-on processes are complete, check the status of the LEDs, as follows:

    –   From the back of the library, look at each tape drive assembly and confirm that the Drive Status LED is green, indicating that the tape drive is installed and powered on.

    –   From the back of the library, look at each power supply and confirm that the PWR Good LED is green and the Fault LED is off.

    –   From the back of the library, look at the battery module. If the Charge LED is illuminated, the battery module may not be fully charged. It can take up to 10 minutes for the battery to fully charge.

    –   From the front of the library, look at the Attention LED, which should be off.

5. As required, log into X-Link and put the XLS in logical mode. See **Section 5.4.4 on page 5-11**.

17.3   Restarting the XLS if a Door was Opened

This section includes instructions for applying power to the XLS and scanning the cartridge inventory. Use the instructions in this section if you opened a door while the library was shut down, but did not change the fiducial positions or the hardware configuration. For example, you would use these instructions after replacing any of the following components:

*   A door interlock sensor
*   A door-lock solenoid
*   An I/O port open sensor
*   A light curtain sensor
*   X-motor assembly
*   Y-motor assembly

Important:	Do not use the instructions in this section if you: • Removed the front panel • Installed or removed a cartridge magazine • Installed or removed a cartridge bay • Installed or removed a drive bay • Installed or removed an I/O port • Installed or removed a MEM or expansion pod Instead, refer to **Section 17.4 on page 17-8** or **Section 17.5 on page 17-12**.

17.3.1 Applying Power

To apply power if one or more doors were opened while the library was shut down, follow these steps:

1. Close any open door(s).

2. Close any open I/O ports.

3. Move the power switch on the back of the library to On. See **Figure 17-3**.

Figure 17-3   Power switch in on position

4. Wait for the power-on processes to complete. During power-on:

    – The status LEDs on the front panel flash intermittently.

    – The tape drives perform their own power-on processes. For information, refer to the documentation for the tape drives. When the tape drives are receiving power from the XLS, the Drive Status LEDs on the back of the tape drive assemblies are green.

    – X-Link starts and the log-in page is displayed.

    – The XLS scans the fiducial targets and cartridge slots in the I/O ports, then moves the handler to its home position. If a MEM is attached, the carousel rotates to its home position.

    – The XLS locks the door(s).

5. After the power-on processes are complete, check the status of the LEDs, as follows:

   – From the back of the library, look at each tape drive assembly and confirm that the Drive Status LED is green, indicating that the tape drive is installed and powered on.

   – From the back of the library, look at each power supply and confirm that the PWR Good LED is green and the Fault LED is off.

   – From the back of the library, look at the battery module. If the Charge LED is illuminated, the battery module may not be fully charged. It can take up to 10 minutes for the battery to fully charge after the library's power is restored.

   – From the front of the library, look at the Attention LED, which should be off.

17.3.2 Performing an Audit

Whenever a door is opened while the XLS is shut down, the cartridge inventory becomes suspect. In most cases, you should force the XLS to update its cartridge inventory after you reapplying power.

> **Important:** You can skip this procedure if you are completely certain that no cartridges were added, removed, or rearranged while the door was open.

To manually update the cartridge inventory after restarting the library, follow these steps:

1. Log in to X-Link.

2. If necessary, press the **Home** button in the upper right corner of any page to return to the Home page.

3. Select **Service View** or **Show All** to display the Service portlet, shown in **Figure 17-4**.

Figure 17-4 Service portlet

4. If required, select **Physical Mode** from the Change Mode section to put the library in physical mode.

5. From the Run Diagnostics section, select **Audit Library.** The Audit Library page opens, as shown in **Figure 17-5**.

Figure 17-5 Audit Library page

6. Select **Audit entire library**.

7. Press **Yes** to confirm that you want to start the audit and wait for the inventory scan to complete.

> **Important:** Depending on the number of cartridges and MEMs, auditing the library can take 30 minutes to an hour or more.

8. As required, select **Logical Mode** from the Change Mode section to put the library in logical mode.

17.4 Restarting the XLS if the Fiducial Positions were Altered

This section includes instructions for applying power to the XLS if a fiducial position could have changed while the XLS was shut down, even though the hardware configuration remained the same. Use the instructions in this section if you replaced a drive bay or any other component containing a fiducial target. Components containing fiducial targets include cartridge magazines, cartridge bays, I/O ports, and MEMs.

CAUTION

Since the I/O ports and fixed port assemblies contain fiducial targets, you must scan fiducials and targets whenever you remove and replace the front panel.

For example, you would use these instructions after performing any of the following procedures:

- Replacing a cartridge magazine

- Replacing a cartridge bay with another cartridge bay

- Replacing a drive bay with another drive bay

- Removing and replacing the front panel in order to service an internal component (such as the touch screen or an I/O port solenoid)

- Replacing an I/O port

- Reattaching a MEM after removing it to access an internal component, such as the carousel motor assembly

- Replacing a fixed port assembly

Important: Do not use the instructions in this section if you:
- Replaced a cartridge bay with a drive bay (or vice versa)
- Replaced a fixed port assembly with an I/O port (or vice versa)
- Installed or removed door slots
- Installed or removed a MEM or expansion pod

Instead, refer to **Section 17.5 on page 17-12**.

17.4.1 Applying Power

To apply power if the front panel was removed or a drive bay, cartridge magazine, or I/O port was replaced, follow these steps:

1. Leave at least one door open (the I/O ports can be open or closed).

2. Move the power switch on the back of the library to On. See **Figure 17-6**.

Figure 17-6 Power switch in on position

3. Wait for the power-on processes to complete. During power-on:

    –   The status LEDs on the front panel flash intermittently.

    –   The tape drives perform their own power-on processes. For information, refer to the documentation for the tape drives. When the tape drives are receiving power from the XLS, the Drive Status LEDs on the back of the tape drive assemblies are green.

    –   X-Link starts and the log-in page is displayed.

4. After the power-on processes are complete, check the status of the LEDs, as follows:

    –   From the back of the library, look at each tape drive assembly and confirm that the Drive Status LED is green, indicating that the tape drive is installed and powered on.

    –   From the back of the library, look at each power supply and confirm that the PWR Good LED is green and the Fault LED is off.

    –   From the back of the library, look at the battery module. If the Charge LED is illuminated, the battery module may not be fully charged. It can take up to 10 minutes for the battery to fully charge after power is reapplied.

– From the front of the library, look at the Attention LED, which will be flashing, indicating that a door is open.

17.4.2 Scanning the Fiducials and Inventory

To scan the fiducials and the inventory after applying power, follow these steps:

1. Make sure that there are no cartridges in any of the tape drives and that the calibration cartridge is installed in slot G50.

2. Close any open door(s) and I/O ports.

3. Log in to X-Link.

4. From the Home page, select **Service View** to display the Service portlet.

5. From the Run Diagnostics section of the Service portlet, select **Service Utilities**. The Service Utilities page opens, as shown in **Figure 17-7**.

Figure 17-7 Service Utilities page

6. From the Fiducials section of the page, select **Scan I/O Port Fiducials**, then wait for the I/O port scan to complete.

7. From the Fiducials section of the page, select **Scan Magazine Fiducials,** then wait for the scan to complete.

> **Important:** Depending on the number of magazines in your library, scanning magazine fiducials can take several hours.

8. When the fiducial scan has completed, select **Dump Fiducial Database**. The results of the fiducial scan displays, as shown in **Figure 17-8**. This report indicates whether any of the fiducials in the library are unscanned.

```
Diagnostic Command Results

      running /xls/bin/xlsinit_checkFidbScanned -i -d
Sent MsgId ( LIM_WRITEDB_REQ ):
limMsgWriteDB ----------------------
dest id : 61 XLSBOOT
msgID   : 4006 (LIM_WRITEDB_RSP)
src id  : 4 INV
src base: 0
len     : 130
transC  : 56
transL  : 56
time    : Mon Nov 20 15:07:28 2006

status  : 0
srcbase : 0
seq     : 40285
priority: 0
dbId       : 5
status     : 0
outfilename: /xls/tmp/fidbdump.out

=========================================
Following fiducial entries are unscanned


  Drive : 1011,001B00C01011,0x00000000,30106,1833,0,0,0,14971,0,199,0
  Drive : 1013,001B00C01013,0x00000000,16751,1833,0,0,0,14971,0,200,0
  Drive : 1014,001B00C01014,0x00000000,10084,1833,0,0,0,14971,0,199,0
  Drive : 1022,001B00C01022,0x00000000,23438,7333,0,0,0,14971,0,199,0
  Drive : 1023,001B00C01023,0x00000000,16771,7333,0,0,0,14971,0,199,0
  Drive : 1024,001B00C01024,0x00000000,10098,7333,0,0,0,14971,0,199,0

----- Total unscanned fiducuals = 6
```

Figure 17-8 Excerpt from the fiducial scan, showing unscanned tape drives

9. If any of the fiducials display as unscanned, select the appropriate option from the Fiducial section of the page:

– Select **Scan I/O Port Fiducials** to scan the fiducials on the I/O ports

– Select **Scan Magazine Fiducials** to scan the fiducials on the cartridge magazines

– Select **Scan/Calibrate Tape Drives** to scan and calibrate the tape drives

10. When the fiducial scans are complete, select **Calibrate Fiducials** to calculate the positions of the fiducials.

11. If you removed or installed cartridges when replacing the hardware, select **Scan Inventory** from the Inventory section of the page to scan the cartridges.

12. Wait for the inventory scan to complete, then select **Sync Inventory** to update the logical library inventories with the results of the physical library scan.

13. From the General section of the page, select **Lock Doors**.

14.   As required, put the XLS in logical mode. See **Section 5.4.4 on page 5-11**.

17.5   Restarting the XLS if the Hardware Configuration was Changed

This section includes instructions for applying power to the XLS, updating the hardware configuration, and scanning fiducials and cartridges. Use the instructions in this section if you opened one or more doors when the XLS was shut down *and* changed the hardware configuration. For example, you would use these instructions after performing any of the following procedures:

- Replacing a drive bay with a cartridge bay (or vice versa)
- Replacing a fixed port assembly with an I/O port (or vice versa)
- Installing or removing door slots

Important: • If you installed a MEM, refer to **Section 15.1, "Installing a MEM," on page 15-1**.
  • If you installed an expansion pod (XLS-812300), refer to **Chapter 16, "Installing an Expansion Pod."**

17.5.1 Applying Power

To apply power if one or more doors were open when the XLS was shut down *and* a drive bay, cartridge bay, I/O port, or door slots were installed or removed, follow these steps:

1.   Leave at least one door open (the I/O ports can be open or closed).

2.   Move the power switch on the back of the library to On. See **Figure 17-9**.

Figure 17-9   Power switch in on position

3.   Wait for the power-on processes to complete. During power-on:

–   The status LEDs on the front panel flash intermittently.

–   The tape drives perform their own power-on processes. For information, refer to the documentation for the tape drives. When the tape drives are receiving power from the XLS, the Drive Status LEDs on the back of the tape drive assemblies are green.

–   X-Link starts and the log-in page is displayed.

4.   After the power-on processes are complete, check the status of the LEDs, as follows:

–   From the back of the library, look at each tape drive assembly and confirm that the Drive Status LED is green, indicating that the tape drive is installed and powered on.

–   From the back of the library, look at each power supply and confirm that the PWR Good LED is green and the Fault LED is off.

–   From the back of the library, look at the battery module. If the Charge LED is illuminated, the battery module may not be fully charged. It can take up to 10 minutes for the battery to fully charge after power is reapplied.

–   From the front of the library, look at the Attention LED, which will be flashing, indicating that a door is open.

17.5.2 Updating the Hardware Configuration

This section provides instructions for updating the hardware configuration from X-Link. You must update the hardware configuration whenever you change the physical geometry of the XLS by adding or removing drive bays or cartridge slots. Specifically, you must update the hardware configuration after you:

- Add or remove door slots (see **Section 9.3 on page 9-4**)
- Replace a cartridge bay with a drive bay (see **Section 9.4 on page 9-10**)
- Replace a drive bay with a cartridge bay (see **Section 9.5 on page 9-16**)

Important:	You do not need to update the hardware configuration if you:
	• Replaced a drive bay with another drive bay
	• Replaced a cartridge bay with another cartridge bay. This is because these changes do not affect the physical geometry of the XLS. Instead, follow the instructions in **Section 17.4 on page 17-8**.

CAUTION

If you *remove* resources (such as cartridge slots, I/O ports, drive bays, MEMs, or expansion pods) from the XLS, be aware that any logical libraries will be deleted as soon as you update the hardware configuration from X-Link. The XLS will create a single logical library containing all resources.

To update the hardware configuration, follow these steps:

1. Continue to leave at least one door open.

2. Log in to X-Link.

3.   From the Home page, select **Service View** to display the Service portlet, shown in **Figure 17-10**.

Figure 17-10   Service portlet

4.   From the Change Configuration section of the Service portlet, select **View/Edit Hardware Configuration**. The View/Edit Hardware Configuration page opens, as shown in **Figure 17-11**.

Figure 17-11   View/Edit Hardware Configuration page

5.   If **Logical Mode** is displayed at the top of the page, select **Go to Physical Mode** from the Misc section to put the XLS into physical mode.

6.   In the Bays, Doors, or I/O Ports section of the page, select the position, then specify the component you installed. For example, if you replaced a cartridge bay with a drive bay in bay position D:

   a.   In the Bays section of the page, locate the drop-down list for **Bay D**.

   b.   Select **Drive Bay** from the list.

   Similarly, if you installed door slots on the left door:

   a.   In the Doors section of the page, locate the drop-down list for **Left door has slots?**

   b.   Select **Yes** from the list.

7. Press **Save Configuration** and wait while the XLS updates its internal databases. The revised databases allow it to locate any new resources and to stop accessing any removed resources.

8. Refer to **Section 17.5.3 on page 17-17** to scan the fiducials and the inventory.

17.5.3 Scanning the Fiducials and Inventory

To scan the fiducials and the inventory after applying power, follow these steps:

1. Make sure that there are no cartridges in any of the tape drives and that the calibration cartridge is installed in slot G50.

2. Close any open doors and I/O ports.

3. Access the View/Edit Hardware Configuration page as described in **Section 17.5.2 on page 17-14**.

4. From the Fiducials section of the page, select **I/O Ports**, then wait for the I/O port scan to complete.

5. From the Fiducials section of the page, select **All Slots,** then wait for the scan to complete.

Important:	Depending on the number of magazines in your library, scanning magazine fiducials can take several hours.

6. When the fiducial scan has completed, select **Dump Database**. The results of the fiducial scan displays, as shown in . This report indicates whether any of the fiducials in the library are unscanned.

```
Diagnostic Command Results

      running /xls/bin/xlsinit_checkFidbScanned -i -d
Sent MsgId ( LIM_WRITEDB_REQ ):
limMsgWriteDB ----------------------
dest id : 61 XLSBOOT
msgID   : 4006 (LIM_WRITEDB_RSP)
src id  : 4 INV
src base: 0
len     : 130
transC  : 56
transL  : 56
time    : Mon Nov 20 15:07:28 2006

status  : 0
srcbase : 0
seq     : 40285
priority: 0
dbId        : 5
status      : 0
outfilename: /xls/tmp/fidbdump.out

=========================================
Following fiducial entries are unscanned


  Drive : 1011,001B00C01011,0x00000000,30106,1833,0,0,0,14971,0,199,0
  Drive : 1013,001B00C01013,0x00000000,16751,1833,0,0,0,14971,0,200,0
  Drive : 1014,001B00C01014,0x00000000,10084,1833,0,0,0,14971,0,199,0
  Drive : 1022,001B00C01022,0x00000000,23438,7333,0,0,0,14971,0,199,0
  Drive : 1023,001B00C01023,0x00000000,16771,7333,0,0,0,14971,0,199,0
  Drive : 1024,001B00C01024,0x00000000,10098,7333,0,0,0,14971,0,199,0

----- Total unscanned fiducuals = 6
```

Figure 17-12   Excerpt from the fiducial scan, showing unscanned tape drives

7. If any of the fiducials display as unscanned, select the appropriate option from the Fiducial section of the page:

   – Select **I/O Ports** to scan the fiducials on the I/O ports
   – Select **All Slots** to scan the fiducials on the cartridge magazines
   – Select **Tape Drives** to scan and calibrate the tape drives

8. When the fiducial scans are complete, select **Calibrate All** to calculate the positions of the fiducials.

9. If you removed or installed cartridges when replacing the hardware, select **Scan Inventory** from the Inventory section of the page to scan the cartridges.

10. Wait for the inventory scan to complete, then select **Sync Inventory** to update the logical library inventories with the results of the physical library scan.

11. From the General section of the page, select **Lock Doors**.

12. Press **Done** to return to the Service portlet.

13. As required, put the XLS in logical mode. See .

Part IV: Reference

Notes:

Appendix A Library Addresses

This appendix lists physical addresses for every possible cartridge slot or tape drive location in the XLS-832700, XLS-820500, or XLS-812300.

You may need to know the library's physical addresses when you install the tape drives and cartridges and when you perform various operations on the physical library. These physical addresses are fixed and cannot be changed. In this way, they differ from the SCSI element addresses for a logical library, which are assigned when the logical libraries are created.

To determine the physical address for a particular cartridge slot or tape drive within the physical library, refer to the figures listed in **Table A-1**:

Model	For physical addresses of...	Refer to...
XLS-832700	All cartridge slots on the rear wall and the optional door slots	**Figure A-1 on page A-2**
	The rear wall assuming that drive bays are installed instead of cartridge bays	**Figure A-2 on page A-3**
	The tape drives as viewed from the back	**Figure A-3 on page A-4**
XLS-820500	All cartridge slots on the rear wall and the optional door slots	**Figure A-4 on page A-5**
	The rear wall assuming that drive bays are installed instead of cartridge bays	**Figure A-5 on page A-6**
	The tape drives as viewed from the back	**Figure A-6 on page A-7**
XLS-812300	All cartridge slots on the rear wall and the optional door slots	**Figure A-7 on page A-8**
	The rear wall assuming that drive bays are installed instead of cartridge bays	**Figure A-8 on page A-9**
	The tape drives as viewed from the back	**Figure A-9 on page A-10**
	The slots in the expansion pods	**Figure A-10 on page A-11**
All Models	Left and right door slots, assuming that all possible cartridge slots are installed.	**Figure A-11 on page A-12**
	The I/O port slots	**Figure A-12 on page A-13**
	The fixed port slots	**Figure A-13 on page A-13**
MEM	The cartridge slots on the carousel (XLS-832700 and XLS-820500)	**Figure A-14 on page A-14**

Table A-1 Physical addresses for the XLS

A.1　Addresses for the XLS-832700

Figure A-1 shows the physical addresses for the rear wall of the XLS-832700 and for the optional door slots. The figure shows eight cartridge bays installed in positions B01–G01 to B40–G40. While this is technically an invalid configuration (the XLS must include at least one drive bay), refer to this figure to learn the fixed address of each potential cartridge position on the rear wall.

Note:　Slot G50 is reserved for the calibration cartridge, and slots G46–G49 are reserved for the cleaning cartridges used by the physical library.

Left Door Slots (optional)　　Rear Wall Slots　　Right Door Slots (optional)

Calibration Cartridge Slot (1)

Cleaning Cartridge Slots (4)

8 Cartridge Bays

Figure A-1　Physical addresses for the rear wall of the XLS-832700, with 8 cartridge bays installed in positions B01–G40 (view from the front with the doors open)

Figure A-2 shows the physical addresses for the rear wall of the XLS-832700, assuming that eight drive bays are installed (that is, no cartridge bays are installed). This figure shows the fixed address for each tape drive position as viewed from the front.

Figure A-2 Physical addresses for the rear wall of the XLS-832700, with 8 drive bays installed in positions 1A–4H (view from the front with the doors open)

Figure A-3 shows the physical addresses of the tape drives in the XLS-832700, as viewed from the back.

	4	3	2	1
H	4H	3H	2H	1H
G	4G	3G	2G	1G
F	4F	3F	2F	1F
E	4E	3E	2E	1E
D	4D	3D	2D	1D
C	4C	3C	2C	1C
B	4B	3B	2B	1B
A	4A	3A	2A	1A

Figure A-3 Physical addresses for the tape drives in the XLS-832700, as viewed from the back

A.2 Addresses for the XLS-820500

Figure A-4 shows the physical addresses for the rear wall of the XLS-820500 and for the optional door slots. The figure shows five cartridge bays installed in positions B01–G01 to B25–G25. While this is technically an invalid configuration (the XLS must include at least one drive bay), refer to this figure to learn the fixed address of each potential cartridge position on the rear wall.

Note: Slot G50 is reserved for the calibration cartridge, and slots G46–G49 are reserved for the cleaning cartridges used by the physical library.

Rear Wall Slots

Right Door Slots (optional)

B	C	D	E	F	G		N	P
B60	C60	D60	E60	F60	G60		N60	P60
B59	C59	D59	E59	F59	G59		N59	P59
B58	C58	D58	E58	F58	G58		N58	P58
B57	C57	D57	E57	F57	G57		N57	P57
B56	C56	D56	E56	F56	G56		N56	P56
B55	C55	D55	E55	F55	G55		N55	P55
B54	C54	D54	E54	F54	G54		N54	P54
B53	C53	D53	E53	F53	G53		N53	P53
B52	C52	D52	E52	F52	G52		N52	P52
B51	C51	D51	E51	F51	G51		N51	P51
B50	C50	D50	E50	F50	G50		N50	P50
B49	C49	D49	E49	F49	G49		N49	P49
B48	C48	D48	E48	F48	G48		N48	P48
B47	C47	D47	E47	F47	G47		N47	P47
B46	C46	D46	E46	F46	G46		N46	P46
B45	C45	D45	E45	F45	G45		N45	P45
B44	C44	D44	E44	F44	G44		N44	P44
B43	C43	D43	E43	F43	G43		N43	P43
B42	C42	D42	E42	F42	G42		N42	P42
B41	C41	D41	E41	F41	G41		N41	P41
B40	C40	D40	E40	F40	G40		N40	P40
B39	C39	D39	E39	F39	G39		N39	P39
B38	C38	D38	E38	F38	G38		N38	P38
B37	C37	D37	E37	F37	G37		N37	P37
B36	C36	D36	E36	F36	G36		N36	P36
B35	C35	D35	E35	F35	G35		N35	P35
B34	C34	D34	E34	F34	G34		N34	P34
B33	C33	D33	E33	F33	G33		N33	P33
B32	C32	D32	E32	F32	G32		N32	P32
B31	C31	D31	E31	F31	G31		N31	P31
B30	C30	D30	E30	F30	G30		N30	P30
B29	C29	D29	E29	F29	G29		N29	P29
B28	C28	D28	E28	F28	G28		N28	P28
B27	C27	D27	E27	F27	G27		N27	P27
B26	C26	D26	E26	F26	G26		N26	P26
B25	C25	D25	E25	F25	G25		N25	P25
B24	C24	D24	E24	F24	G24		N24	P24
B23	C23	D23	E23	F23	G23		N23	P23
B22	C22	D22	E22	F22	G22		N22	P22
B21	C21	D21	E21	F21	G21		N21	P21
B20	C20	D20	E20	F20	G20		N20	P20
B19	C19	D19	E19	F19	G19		N19	P19
B18	C18	D18	E18	F18	G18		N18	P18
B17	C17	D17	E17	F17	G17		N17	P17
B16	C16	D16	E16	F16	G16		N16	P16
B15	C15	D15	E15	F15	G15		N15	P15
B14	C14	D14	E14	F14	G14		N14	P14
B13	C13	D13	E13	F13	G13		N13	P13
B12	C12	D12	E12	F12	G12		N12	P12
B11	C11	D11	E11	F11	G11		N11	P11
B10	C10	D10	E10	F10	G10		N10	P10
B09	C09	D09	E09	F09	G09		N09	P09
B08	C08	D08	E08	F08	G08		N08	P08
B07	C07	D07	E07	F07	G07		N07	P07
B06	C06	D06	E06	F06	G06		N06	P06
B05	C05	D05	E05	F05	G05			
B04	C04	D04	E04	F04	G04			
B03	C03	D03	E03	F03	G03			
B02	C02	D02	E02	F02	G02			
B01	C01	D01	E01	F01	G01			

Calibration Cartridge Slot (1)

Cleaning Cartridge Slots (4)

5 Cartridge Bays

Figure A-4 Physical addresses for the rear wall of the XLS-820500, with 5 cartridge bays installed in positions B01–G25 (view from the front with the door open)

Figure A-5 shows the physical addresses for the rear wall of the XLS-820500, assuming that five drive bays are installed (that is, no cartridge bays are installed). This figure shows the fixed address for each tape drive position as viewed from the front.

Figure A-5 Physical addresses for the rear wall of the XLS-820500, with 5 drive bays installed in positions 1A–4E (view from the front with the door open)

Figure A-6 shows the physical addresses of the tape drives in the XLS-820500, as viewed from the back.

	4	3	2	1
E	4E	3E	2E	1E
D	4D	3D	2D	1D
C	4C	3C	2C	1C
B	4B	3B	2B	1B
A	4A	3A	2A	1A

Figure A-6   Physical addresses for the tape drives in the XLS-820500, as viewed from the back

A.3   Addresses for the XLS-812300

Figure A-7 shows the physical addresses for the rear wall of the XLS-812300 and for the optional door slots. The figure shows one drive bay and two cartridge bays in positions B11–G11 to B20–G20.

Note: Slot G50 is reserved for the calibration cartridge, and slots G46–G49 are reserved for the cleaning cartridges used by the physical library.

Figure A-7   Physical addresses for the rear wall of the XLS-812300, with 2 cartridge bays installed in positions B11–G20 (view from the front with the door open)

Figure A-8 shows the physical addresses for the rear wall of the XLS-812300, assuming that all three drive bays are installed (that is, no cartridge bays are installed). This figure shows the fixed address for each tape drive position as viewed from the front.

Figure A-8 Physical addresses for the rear wall of the XLS-812300, with 3 drive bays installed in positions 1C–4E (view from the front with the door open)

Figure A-9 shows the physical addresses of all possible tape drives in the XLS-812300, as viewed from the back.

	4	3	2	1
E	4E	3E	2E	1E
D	4D	3D	2D	1D
C	4C	3C	2C	1C

Figure A-9 Physical addresses for the tape drives in the XLS-812300, as viewed from the back

Figure A-10 shows the physical addresses for the cartridge slots in an XLS-812300 expansion pod.

Important:	The XLS keeps track of whether the expansion pod is to the left or the right of the base unit. For this reason, left and right expansion pods use the same physical addresses.

Expansion Pod
(left or right)

B60	A60
B59	A59
B58	A58
B57	A57
B56	A56
B55	A55
B54	A54
B53	A53
B52	A52
B51	A51
B50	A50
B49	A49
B48	A48
B47	A47
B46	A46
B45	A45
B44	A44
B43	A43
B42	A42
B41	A41
B40	A40
B39	A39
B38	A38
B37	A37
B36	A36
B35	A35
B34	A34
B33	A33
B32	A32
B31	A31
B30	A30
B29	A29
B28	A28
B27	A27
B26	A26
B25	A25
B24	A24
B23	A23
B22	A22
B21	A21
B20	A20
B19	A19
B18	A18
B17	A17
B16	A16
B15	A15
B14	A14
B13	A13
B12	A12
B11	A11
B10	A10
B09	A09
B08	A08
B07	A07
B06	A06

Figure A-10 Physical addresses for the slots in a left or right XLS-812300 expansion pod

A.4   Addresses for Doors, I/O Ports, and Fixed Port Slots

Figure A-11 shows the physical addresses for the left and right door slots, if installed. In this figure, the columns are labeled from left to right as if the door(s) were open. Left door slots are available for the XLS-832700 only.

Left Door Slots (XLS-832700 only)

J60	K60
J59	K59
J58	K58
J57	K57
J56	K56
J55	K55
J54	K54
J53	K53
J52	K52
J51	K51
J50	K50
J49	K49
J48	K48
J47	K47
J46	K46
J45	K45
J44	K44
J43	K43
J42	K42
J41	K41
J40	K40
J39	K39
J38	K38
J37	K37
J36	K36
J35	K35
J34	K34
J33	K33
J32	K32
J31	K31
J30	K30
J29	K29
J28	K28
J27	K27
J26	K26
J25	K25
J24	K24
J23	K23
J22	K22
J21	K21
J20	K20
J19	K19
J18	K18
J17	K17
J16	K16
J15	K15
J14	K14
J13	K13
J12	K12
J11	K11
J10	K10
J09	K09
J08	K08
J07	K07
J06	K06

Right Door Slots

N60	P60
N59	P59
N58	P58
N57	P57
N56	P56
N55	P55
N54	P54
N53	P53
N52	P52
N51	P51
N50	P50
N49	P49
N48	P48
N47	P47
N46	P46
N45	P45
N44	P44
N43	P43
N42	P42
N41	P41
N40	P40
N39	P39
N38	P38
N37	P37
N36	P36
N35	P35
N34	P34
N33	P33
N32	P32
N31	P31
N30	P30
N29	P29
N28	P28
N27	P27
N26	P26
N25	P25
N24	P24
N23	P23
N22	P22
N21	P21
N20	P20
N19	P19
N18	P18
N17	P17
N16	P16
N15	P15
N14	P14
N13	P13
N12	P12
N11	P11
N10	P10
N09	P09
N08	P08
N07	P07
N06	P06

Figure A-11   Physical addresses for door slots, if installed (view from the front with door(s) open)

Figure A-12 shows the physical addresses for all possible I/O port slots. The XLS-820500 and XLS-812300 can have two I/O ports in the upper left and upper right positions only.

Upper Left	Upper Right
L20	M20
L19	M19
L18	M18
L17	M17
L16	M16
L15	M15
L14	M14
L13	M13
L12	M12
L11	M11

Lower Left	Lower Right
L10	M10
L09	M09
L08	M08
L07	M07
L06	M06
L05	M05
L04	M04
L03	M03
L02	M02
L01	M01

Figure A-12 Physical addresses for the I/O port slots, if installed (view from the front)

Figure A-13 shows the physical addresses for the 40 fixed port slots. Note that all libraries include at least one I/O port, typically in positions M11–M20.

L20	M20
L19	M19
L18	M18
L17	M17
L16	M16
L15	M15
L14	M14
L13	M13
L12	M12
L11	M11
L10	M10
L09	M09
L08	M08
L07	M07
L06	M06
L05	M05
L04	M04
L03	M03
L02	M02
L01	M01

Fixed Port Slots
(if installed)

Figure A-13 Physical addresses for the fixed port slots, if installed (view from the front)

A.5 Addresses for the Media Expansion Module (MEM)

Figure A-14 shows the physical addresses for the cartridge slots on the carousel in the Media Expansion Module (MEM). The five slots A46–A50 are reserved for pass through.

Figure A-14   Physical addresses for the slots in a Media Expansion Module

Appendix B   Packing the XLS

This appendix provides instructions for packing the XLS library in preparation for shipping it to another location.

> # WARNING!
>
> Not including tape drives or cartridges, the LRM weighs close to 800 lbs (360 kg). To avoid injury or equipment damage, use a pallet jack or forklift when moving the packaged XLS.

Required tools and equipment: Obtain the following:

- Phillips screwdriver
- 1/2-inch socket or open-end wrench
- 5/16-inch hex wrench
- Original packaging or replacement materials ordered from Qualstar Corporation
- Ramps
- Pallet

Procedure overview: Packing the XLS involves the following steps:

- Preparing the library for shipment (see **Section B.1**)
- Packing the library (see **Section B.2 on page B-5**)

B.1   Preparing the Library

Table B-2 provides an overview of preparing the XLS for shipment.

Step	Task	Refer to...
1	Disconnect the cables	**Section B.1.1 on page B-2**
2	Remove the cartridges, tape drives, and drive filler assemblies	**Section B.1.2 on page B-2**
3	Remove the equipment rack, if installed	**Section B.1.3 on page B-4**

Table B-1   Overview of preparing the XLS for shipment

B.1.1   Disconnecting the Cables

To disconnect the cables attached to the library, follow these steps:

1.   Shut down the library and power it off. See **Section 6.2 on page 6-1**.

2.   Unplug the power cord. Use your thumb to release the latch.

3.   Using a Phillips screwdriver, loosen the three capture screws that attach the EMI shield to the system controller. See **Figure B-1**.

Figure B-1   Location of the screws for the EMI shield

4.   Remove the EMI shield and disconnect the cables connected to the HBAs.

5.   Replace the EMI shield.

6.   Disconnect the Ethernet cable from ENET0.

7.   Disconnect the cables attached to the tape drives.

B.1.2   Removing the Cartridges

To remove the cartridges and tape drives, follow these steps:

1.   Open the door(s).

2.   Remove all cartridges from their slots. Be sure to remove any cartridges in the fixed port slots behind the front panel.

3.   For each I/O port, locate the I/O port solenoid behind the front panel, as shown in **Figure B-2**.

I/O port
solenoid —

Figure B-2   I/O port solenoid

4.   Press the solenoid release to open the I/O port. See **Figure B-3**.

Figure B-3   Pressing the I/O port solenoid release

5.   Remove the I/O port magazine and push the port closed.

6.   Repeat steps 3 to 5 for each I/O port.

7.   From the back of the library, remove all tape drives and drive filler assemblies. See **Section 8.4 on page 8-6**.

B.1.3 Removing the Equipment Rack

To remove the equipment rack if one is installed, follow these steps:

1. Power off any equipment installed in the rack.

2. Disconnect any cables or cords connected to the equipment and remove the equipment from the rack.

3. Lift up on the pins and remove them from the lanyards on the left and right sides of the rack. See **Figure B-4**.

Figure B-4   Removing the pin from the lanyard

4. Pull down on the bottom hinge latches and pull up on the top hinge latches to release them from the holes in the frame. See **Figure B-5**.

Figure B-5 Removing the hinge latches from the frame

5. Slide the rack out of the frame.

6. As required, remove the mounting hardware for the 8U rack.

B.2 Packing the XLS

Table B-2 provides an overview of packing the XLS.

Step	Task	Refer to...
1	Attach ramps to the pallet	**Section B.2.1**
2	Roll the cabinet onto the pallet	**Section B.2.2 on page B-6**
3	Install the shipping restraints	**Section B.2.1 on page B-6**
4	Attach the web straps	**Section B.2.3 on page B-8**
5	Attach the cardboard surround	**Section B.2.2 on page B-6**

Table B-2 Overview of unpacking the XLS

Important:	Before packing the XLS, move it to the location from which it will be shipped. With the packaging in place, the library will not fit through standard door openings.

B.2.1   Attaching Ramps to the Pallet

To attach the ramps to the pallet, follow these steps:

1. Locate the ramp slots on the pallet.

> **Important:**   The ramp includes two sets of slots. Be sure to use the correct slots for your equipment, as follows:
> - **XLS-832700:** Use the two wider-spaced slots.
> - **XLS-820500, XLS-812300, or MEM:** Use the two narrower-spaced slots.

2. Attach the ramps to the pallet.

> **CAUTION**
>
> To avoid equipment damage, securely attach the ramps to the pallet and make sure they are positioned directly in front of the wheels on the cabinet.

B.2.2   Rolling the Cabinet onto the Pallet

After attaching the ramps, you can roll the LRM or MEM onto the pallet. Follow these steps:

1. On the bottom of the cabinet, screw the levelling feet all the way up and tighten the jam nuts. See **Figure B-6**.

Raise leveling foot, then tighten jam nut

Figure B-6   Raising the levelling feet

2.   Carefully roll the cabinet up the ramps and onto the center of the pallet. See **Figure B-7**.

Figure B-7   Attaching the ramps to the pallet (XLS-832700 shown)

WARNING!

To avoid injury or equipment damage, use three or more people when rolling the equipment onto the pallet.

3.   Remove the ramps from the pallet.

4.   Slide the ramps under the cabinet from left to right.

5.   Use two drywall screws to secure the two ramps to the pallet. See **Figure B-8**.

Figure B-8   Location of ramps

B.2.3   Installing the Shipping Restraints

The LRM is bolted to the pallet with four shipping restraints: two in the back and two in the front. As described in this section, the procedure for installing the shipping restraints is slightly different for the XLS-832700 than for the XLS-820500 or XLS-812300.

XLS-832700

To install the back and front shipping restraints, follow these steps:

1.   Locate the holes for the two shipping restraints at the back.

2.   Using a 5/16-inch hex wrench, install the shipping restraints. See **Figure B-9**.

Shipping restraints

Figure B-9   Location of the back shipping restraints

3. Open the doors.

4. Locate the holes for the two shipping restraints at the front.

5. Install the front shipping restraints. **Figure B-10** shows the location of the shipping restraint behind the right door; the shipping restraint on the left is located behind the left door.

Shipping restraint

Figure B-10   Location of a front shipping restraint (right side shown)

6. Close the door).

XLS-820500 or XLS-812300

1. Locate the holes for the two shipping restraints.

2. Using a 5/16-inch hex wrench (Qualstar part number 736-004504), install the shipping restraints in the back. See **Figure B-11**.

Shipping restraints

Figure B-11   Location of the back shipping restraints

3. To install the front shipping restraint on the right, follow these steps:

      a.   Open the door.

      b.   Locate the hole for the shipping restraint behind the door.

      c.   Install the shipping restraint. See **Figure B-12**.

Shipping restraint

Figure B-12   Location of a front shipping restraint (right side shown)

      d.   Close any open doors.

4.   To install the front shipping restraint on the left, follow these steps:

      a.   Locate the two captive screws at the top of the air filter cover.

      b.   Using a #2 Phillips screwdriver, loosen the screws.

      c.   Release the top edge of the air filter cover from the frame.

      d.   Remove the air filter cover by lifting the tabs up and out of the slots. e.

         Locate the hole for the left shipping restraint on the floor of the LRM.

      f.   Install the shipping restraint.

      g.   Replace the air filter cover.

B.2.4   Installing the Web Straps

To install the four web straps, follow these steps:

1.   Place the plastic sheeting over the cabinet.

2. Using a 1/2-inch socket or open-end wrench, install the four shipping brackets on the top of the cabinet. See **Figure B-13**.

Figure B-13   Installing a shipping bracket

3. Hook the four yellow straps to the upper and lower eye bolts.

> **Important:**   To avoid scratching the library, make sure that the hooks point outward.

4. Use the ratchet to apply tension to the straps. See **Figure B-14**.

Figure B-14   Ratchet on the web strap

> **Important:**   To avoid pulling the bolts out of the pallet, do not apply too much tension to the straps.

B.2.5   Installing the Packaging

To install the packaging, follow these steps:

1. With the cabinet positioned as shown in **Figure B-15**, wrap the cardboard pieces around the library

Figure B-15   XLS-832700 ready to have crating material installed

2. Using a Phillips screwdriver, install drywall screws to secure the cardboard to the pallet.

3. Install the cardboard cap on the top.

4.   If possible, install shrink-wrap around the cardboard. See **Figure B-16**

Figure B-16   XLS-832700 in shrink-wrapped shipping carton

5.   Pack the tape drives, the equipment rack, and any accessory boxes you intend to ship.

Notes:

Appendix C   Torque Values

This appendix lists the standard torque values in inch-pounds for the screw sizes and materials used in the XLS.

Screw Size	Torque in inch-pounds for this material...		
	Stainless Steel	Brass	Nylon and Delrin
2-56	2.2	2.0	0.3
2-64	2.7	2.5	
4-40	4.7	4.3	0.9
4-48	5.9	5.4	
6-32	8.7	7.9	1.6
6-40	10.9	9.9	
8-32	17.8	16.2	3.2
8-36	19.8	18.0	
10-24	20.8	18.6	4.9
10-32	29.7	25.9	6.1
1/4-20	65.0	61.5	12.0
1/4-28	90.0	77.0	15.6
5/16-18	129	107	26.1
5/16-24	139	116	
3/8-16	212	192	
3/8-24	232	212	
7/16-14	338	317	
7/16-20	361	327	
1/2-13	465	422	
1/2-20	487	443	

Table C-1   Standard torque values in inch-pounds

Notes:

Glossary

alert
A notification sent to specified users when an event occurs in the library.

barcode reader
The device on the library's gripper assembly that scans and reads barcode labels and *fiducials*.

brushless DC motor
Brushless direct current motor. A permanent magnet motor that is electronically commutated.

calibration
The process used by the XLS to calculate the exact position of every storage slot and tape drive. Calibration can occur after the XLS performs a scan to locate all of the *fiducials*.

calibration cartridge
A special cartridge containing a triangular target (*fiducial*) that is inserted into each tape drive during calibration.

CAN
Control Area Network. A two-wire, multi-drop, multimaster serial bus for local communications.

carousel
The rotating mechanism in a Media Expansion Module (MEM) that holds the cartridges.

cartridge bay
The removable hardware that contains slots for 30 cartridges and is interchangeable with a drive bay.

cartridge inventory
The internal data base of cartridge locations that is maintained by the system controller.

cartridge slot
Any of the locations in the library that can store a cartridge. A cartridge slot is referred to as a *storage element* in the SCSI standard.

DCBs
Distributed control boards. Small printed circuit boards distributed throughout the XLS that contain digital signal processors.

digital signal processor
A microprocessor with extended capabilities to process digital signals in real time.

door slot	Any of the cartridge slots that can be installed on the inside of the library's doors.
drive bay	The removable hardware in the library that can contain up to four tape drives and that is interchangeable with a cartridge bay.
drive carrier assembly	The hardware that encloses the tape drives and provides power, SCSI or Fibre Channel connectors, communications with the system controller, status LEDs, and cooling fans.
elements	The addressable locations in the library, including the tape drives, the cartridge slots, the handler, and the I/O ports slots.
EMI	Electro magnetic interference.
Ethernet	A local area networking technology. Ethernet can transport any of several upper layer protocols, the most popular of which is TCP/IP.
event	A change of condition to a library component or a change of state that can be recorded in the event log. When an event occurs, an e-mail or pager alert can be sent to specified users.
expansion pod	An option for the XLS-812300. An expansion pod can be attached to either side of the XLS-812300. Each expansion pod holds 120 cartridges.
facet	One of the columns of cartridge slots in a Media Expansion Module (MEM).The carousel in a MEM contains 18 facets, with 60 slots (rows) per facet.
Fibre Channel	One of the communication protocols supported by the library. Fibre Channel is a set of standards for a serial I/O bus.
fixed port assembly	A group of 10 cartridge slots that can be installed on the inside of the library's front panel instead of an I/O port.
fiducial	The black and white triangles mounted on either side of every cartridge magazine. There is also a fiducial on the calibration cartridge, which is inserted in each tape drive to precisely locate the tape drive position.
fiducial scan	The process during which the barcode reader on the handler tries to locate and scan every *fiducial* installed in the library. For example, the handler moves up and down and across the cartridge slots on the back wall until it detects all fiducials.
gripper assembly	The mechanism containing the Theta axis (rotating) and the Z axis (in and out) of the robotic cartridge handler. The gripper assembly also contains the barcode reader and the mechanism that grabs the cartridge.

handler	The library assembly that includes the gripper assembly. The handler moves side to side on the X-axis, up and down on the Y-axis, and in and out on the Z-axis. It rotates on the Theta-axis. The handler is referred to as a *medium transport element* in the SCSI standard.
HBA	Host bus adapter card. A circuit board installed in one of the system controller's four expansion slots that allows the library to attach to and communicate with a SCSI bus or Fibre Channel network. The HBAs supported by the library have two ports, which means you can connect two networks or SCSI buses to each card.
hot swappable	A library component, such as tape drive assemblies, fans, and power supplies, that can be replaced without removing system power.
I/O port	An opening on the front of the library through which cartridges can be inserted or removed without exposing internal library components.
Inventory Sentry	The beams of invisible, infrared light that extend from the bottom of the XLS to the top. A detector looks at each beam of light and can detect when a cartridge is protruding from a slot or when someone has reached into the library. Also referred to as the *light curtain*.
LED	Light emitting diode. The library contains five LEDs on its front panel to indicate its operating status. Additional LEDs are used on each power supply and tape drive assembly.
library	A robotic media handler that is capable of storing multiple pieces of removable media and loading and unloading them from one or more tape drives in arbitrary order.
Library Resource Module (LRM)	The main library module that contains the system controller, touch screen, status LEDs, controller/power bay, handler, tape drives, I/O ports, cartridge slots, and optional equipment rack.
light curtain	The beams of infrared light that extend from the bottom of the XLS to the top. A detector looks at each beam of light and can detect whether a cartridge is protruding from a slot or whether someone has reached into the library. Also referred to as the *Inventory Sentry*.
logical library	One of up to eight partitions of the physical library. Logical libraries ensure that each software application has dedicated and secure access to specific tape drives, cartridge slots, and I/O ports. The handler is shared among all logical libraries.
LRM	Library Resource Module. The XLS base cabinet.
LTO	Linear Tape Open. An industry standard 1/2-inch tape format also known as Ultrium.

LUN	Logical unit number. A number between 0 and 7 assigned to each logical library.
Management Information Base (MIB)	The specification and formal description of a set of objects and variables that can be read and possibly written using the SNMP protocol.
Media Expansion Module (MEM)	The auxiliary library module that contains a motor-driven carousel with storage for 1,080 cartridges. You can connect one or two MEMs to each LRM.
medium changer	The library's SCSI controller. The medium changer responds to SCSI commands sent by initiators (or host applications) and sends instructions to the system controller to move cartridges between tape drives, cartridge slots, and I/O ports.
MEM	Media Expansion Module. The XLS expansion cabinet that contains a carousel.
MIB	Management Information Base.
nexus setting	A unique combination of port ID, target (or SCSI) ID, and logical unit number (LUN) that describes each logical library connection.
optical encoder	An optoelectronic device that senses changes in the angle of a motor shaft. This information is processed by circuitry to produce shaft angle and shaft speed information.
parallel SCSI	One of the communication protocols supported by the library. The parallel SCSI protocol defines the rules and processes for transmitting and receiving data over a parallel (multi-signal) I/O bus.
physical library	The entire library, including all tape drives, cartridge slots, the robotics, and the I/O ports.
pick	The act of removing a cartridge from a storage slot or a tape drive and putting it on the robotic handler.
place	The act of moving a cartridge from the robotic handler and putting it in a storage slot or a tape drive.
portlet	One of the following sections on the Home page: Configuration, Events, Logical Libraries, Physical Library, Settings & Policies, Users & Groups, and Service. The portlets on the Home page can be rearranged or closed to suit the needs of each user.
power/PC bay	The library assembly that contains the system controller, two cooling fans, the power supplies, the AC power switch, and the AC power connector.

power supply	An electronic device used to convert electrical power from alternating current to direct current, or from one direct current voltage to another direct current voltage.
robotics	Any part of the library that moves automatically, including the carousel, the gripper, the I/O ports, and the handler.
SCSI	Small Computer System Interface.
Simple Mail Transfer Protocol (SMTP)	A protocol for sending e-mail messages between servers and between a mail client and a mail server.
Simple Network Management Protocol (SNMP)	A protocol for monitoring and managing systems and devices in a network. The data being monitored and managed is defined by a MIB. The functions supported by the protocol are the request and retrieval of data, the setting or writing of data, and traps that signal the occurrence of events.
SMTP	Simple Mail Transfer Protocol.
SNMP	Simple Network Management Protocol.
SNMP trap	A message sent by the XLS to an SNMP host indicating that a certain type of event has occurred.
solenoid	A two-position electromechanical actuator device. Solenoids are used in the XLS for door locks, I/O ports, and the cartridge gripping mechanism.
system controller	The PC within the library that manages and controls all library activities.
tape cartridge	A small cartridge that contains magnetic tape.
tape drive	The devices used to write and read data. Tape drives are mounted in drive carriers. Tape drives are referred to as *data transfer elements* in the SCSI standard.
tape drive assembly	The tape drive plus the drive carrier. Tape drive assemblies are installed in the drive bays.
touch screen	The 15-inch color LCD on the library's front panel used to display X-Link.
user group	A collection of library users that has been assigned a common set of permissions.
virtual keyboard	A feature of the library's touch screen display that allows you to enter text without needing a real keyboard.
XMI	The X-Link interface.

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