



4560SLX Tape Library

User's Guide

Important:

To maintain your new IBM 4560SLX Tape Library at peak performance and reliability, follow the maintenance procedures described in Chapter 5, "Maintenance" on page 43. Failure to do so may impact your product warranty.



4560SLX Tape Library

User's Guide

Note: Before using this information and the product it supports, read the information in Appendix E, “Warranty information” on page 99 and Appendix F, “Notices” on page 111.

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Safety

Before installing this product, read the Safety Information.

مج، يجب قراءة دات السلامة

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 **Safety Information**
(安全信息)。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας
(safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się
z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

安裝本產品之前，請先閱讀「安全資訊」。

Preface

This manual provides step-by-step installation instructions and information required for ongoing use and maintenance of the IBM® 4560SLX Tape Library. This manual is written for the installer and user of this equipment. The following information is contained in this manual:

- **Chapter 1, "Introduction"** provides an introduction to the 4560SLX Tape Library, along with a brief description of the library parts.
- **Chapter 2, "Installation"** provides installation procedures and descriptions of interface connections and configuration options.
- **Chapter 3, "Library configuration"** explains how to configure the 4560SLX Tape Library for normal operation.
- **Chapter 4, "Operation"** explains how to use the touch screen and tape cartridges.
- **Chapter 5, "Maintenance"** explains how to run and replace a cleaning cartridge.
- **Chapter 6, "Troubleshooting"** provides problem diagnosis, error recovery procedures, and fault symptom codes to aid in troubleshooting potential error conditions.
- **Chapter 7, "Using the NeoCenter utility"** explains how to configure the 4560SLX Tape Library using the NeoCenter utility. Sections in this chapter include setting IP addresses, passwords, and parameters.
- **Chapter 8, "Web TLC"** describes the web-based graphical interface that enables you to monitor and control your automated tape library through any terminal connected on your network or the Internet.
- **Appendix A, "Adding a tape drive"** contains procedures for adding an additional tape drive.
- **Appendix B, "Adding a library module"** contains procedures for adding an additional library module.
- **Appendix C, "Specifications"** contains specific device specifications and EMI compliance information.
- **Appendix D, "Field replaceable units (FRUs)"** provides a list of field replaceable units (FRUs).
- **Appendix E, "Warranty information"** provides warranty information.
- **Appendix F, "Notices"** contains trademarks and legal notices.

Product Registration

Thank you for purchasing this IBM® product. Take a few moments to register your product and provide us with information that will help IBM to better serve you in the future. Your feedback is valuable to us in developing products and services that are important to you, as well as in developing better ways to communicate with you. Register your option on the <http://www.ibm.com/pc/register/> IBM Web site.

IBM will send you information and updates on your registered product unless you indicate on the Web site questionnaire that you do not want to receive further information.

Chapter 1. Introduction

The IBM 4560SLX Tape Library is a backup and restore solution for high-end xSeries™ servers. The library provides many features and functions not normally found in similarly classed products. Please read this document in its entirety before attempting to install or use the library.

This chapter provides an introduction to the 4560SLX Tape Library. Sections in this chapter include:

- Contents
- Configurations
- Library interfaces
- Front panel
- Magazine doors
- Magazines
- Mail slots
- Power supply
- Tape drives
- Library controller board
- Robotics
- Multi-module library systems

Contents

In addition to this CD, you should have received the following:

- Base library module
- External SCSI cable
- External SCSI terminator
- Power cord
- Rack installation hardware
- Cleaning cartridge
- 4560SLX Tape Library Quick Installation Guide

Configurations

Depending on your final configuration, the following options might be used with the 4560SLX Tape Library, but are purchased separately:

- SDLT drive upgrade option (Part number: 59P6660)
 - Base SDLT drive sled
 - SCSI jumper cable
 - 4560SLX Tape Library Quick Installation Guide
- LTO drive upgrade option (Part number: 59P6658)
 - Base LTO drive sled
 - SCSI jumper cable
 - 4560SLX Tape Library Quick Installation Guide
- Fibre channel option (Part number: 59P6657)

- Fibre Channel Option (FCO) card
- Interface cables (two)
- Fibre Option User Guide
- SDLT magazine option (Part number: 59P6661)
 - Left magazine
 - Right magazine
 - Barcode pack
 - 4560SLX Tape Library Quick Installation Guide
- LTO magazine option (Part number: 59P6659)
 - Left magazine
 - Right magazine
 - Barcode pack
 - 4560SLX Tape Library Quick Installation Guide
- Cartridge elevator option (Part number: 59P6662)
 - Ethernet router
 - Base mechanism
 - Interconnect cables (three)
 - 4560SLX Tape Library Quick Installation Guide
- Cartridge elevator extension option (Part number: 59P6663)
 - Base mechanism
 - 4560SLX Tape Library Quick Installation Guide

Note: You may also purchase additional 4560SLX Tape Libraries to construct multi-module library configurations.

Contact your place of purchase if an item is missing or damaged. Be sure to retain your proof of purchase. It might be required to receive warranty service. See “Service and support” on page 99 for technical support information.

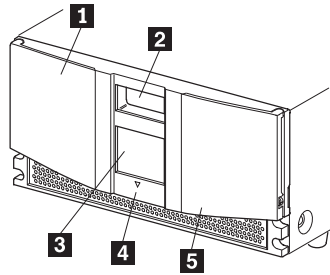
Library interfaces

The 4560SLX Tape Library includes a SCSI interface-to-host system that supports Low Voltage Differential (LVD). The tape drives and robotics use separate SCSI connections and SCSI ID addresses. The drive SCSI I/O is provided through VHDCI 68-pin SCSI connectors located at the rear of the unit directly under the tape drives. The Robotics SCSI I/O are provided through VHDCI 68-pin SCSI connectors located on the library controller board.

The library can also be attached to fibre channel networks using a Fibre Channel Option (FCO) card (part number: 59P6657).

Front panel

The front panel of the library includes the left and right magazine doors, an internal viewing window, a touch screen, and a library status LED as shown in Figure 1 on page 3.



- 1** Left magazine door
- 2** Internal viewing window
- 3** Touch screen
- 4** Library status LED
- 5** Right magazine door

Figure 1. Library front panel

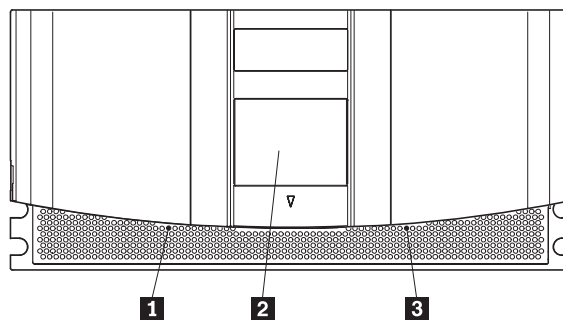
Table 1 describes the different indicator settings of the library status LED.

Table 1. Library front panel indicators

Library	Indicators
Solid Green	The library is operating correctly under normal conditions.
Flashing Green	The library is operating correctly. However, a change is being made through the touch screen that is interrupting the current library operation.
Solid Amber	The library is in a fault state as indicated by the fault message on the touch screen.

Magazine doors

The magazine doors have an electrical release on the touch screen and a manual release (**1** and **3** in Figure 2). Always open the doors using the touch screen. In an emergency, the doors can be manually opened by pushing in on the mechanical releases directly behind the front panel.



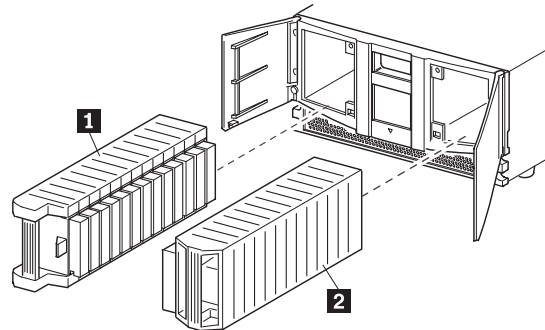
- 1** Left magazine door release
- 2** Touch screen
- 3** Right magazine door release

Figure 2. Magazine door mechanical release

Magazines

The 4560SLX Tape Library contains two removable tape cartridge magazines that are accessible through the magazine doors as shown in Figure 3. The magazine doors are opened using the touch screen.

Note: The magazine must match the installed tape drive. For example, an LTO magazine should be installed on an LTO drive and an SDLT magazine should be installed on an SDLT drive.



- 1** Left magazine with integrated mail slot
- 2** Right magazine

Figure 3. Magazines

Mail slots

As viewed from the front of the 4560SLX Tape Library, the left tape magazine includes a *mail slot*, which is accessible when the left magazine slot door is open as shown in Figure 4. This mail slot enables you to insert or remove a single media cartridge without interrupting library operation. If a full tape cartridge magazine is required, you can configure the library to disable the mail slot feature. The right tape magazine contains fixed cartridge slots (no mail slot feature), so it retains its full capacity at all times.

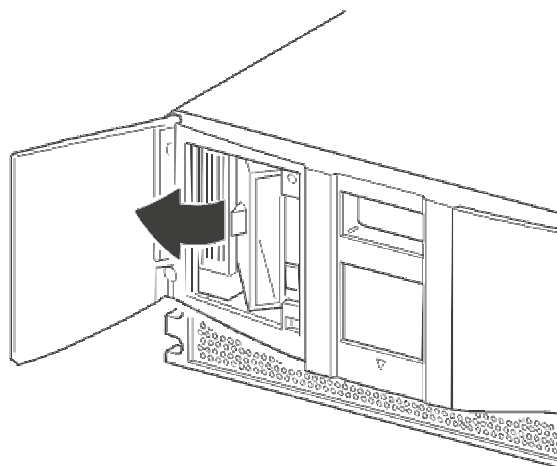


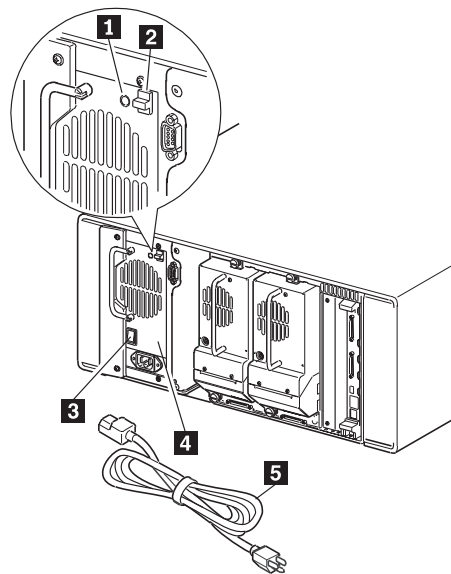
Figure 4. Mail slot

Power supply

The power supply is accessible from the rear of the library as shown in Figure 5. These auto-ranging power supplies are capable of using any nominal ac voltage between 100 and 240 V power at 50 Hz or 60 Hz.

Power to the library is supplied through the cord on the rear panel of the power supply. Library power is controlled from the touch screen. However, a manual power disconnect switch, located on the rear of the power supply, can also be used.

Note: Only trained service personnel should remove the power supply. Hazardous voltage is present in the cavity if the power cord is removed.



- 1** Power on LED (lights after touching the touch screen)
- 2** Power supply release latch
- 3** Power switch
- 4** Power supply
- 5** Power cord

Figure 5. Power supply

Tape drives

The 4560SLX Tape Library supports a 0-drive, 1-drive, or 2-drive configuration as shown in Figure 6. All *inactive* tape drives are hot-swap capable. SCSI I/O is accomplished through two VHDCI-series 68-pin SCSI connectors located on the rear of the library directly under each tape drive as shown in Figure 7.

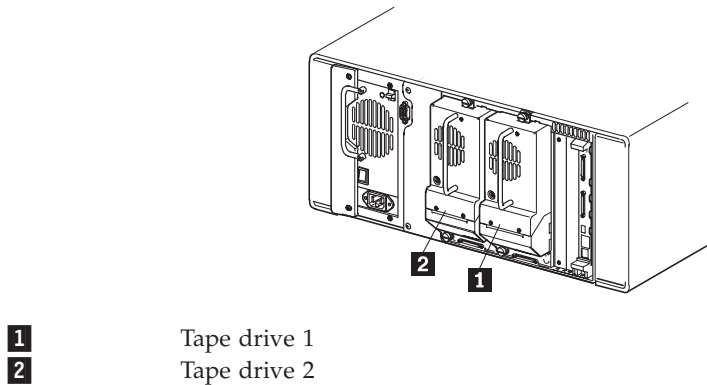


Figure 6. Tape drive locations

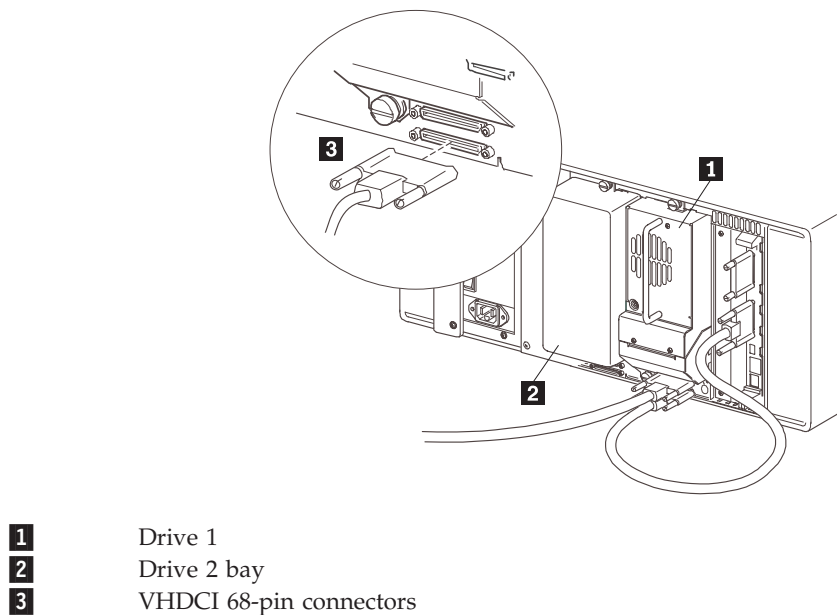
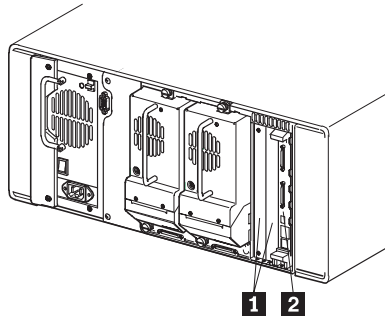


Figure 7. Tape drive connectors

Library controller board

The library contains a rear-access adapter cage (see Figure 8 on page 7) and a PCI backplane. This backplane contains the plug-in connectors for the library controller board and FCO card.



- 1** Rear access card cage
- 2** Library controller board

Figure 8. Library controller adapter and PCI slots

The library controller board contains a single microprocessor and associated logic devices to control all robotics operations and manage overall library functions. The microprocessor enables the SCSI interface between the library and the host system, including Web TLC (Total Library Control).

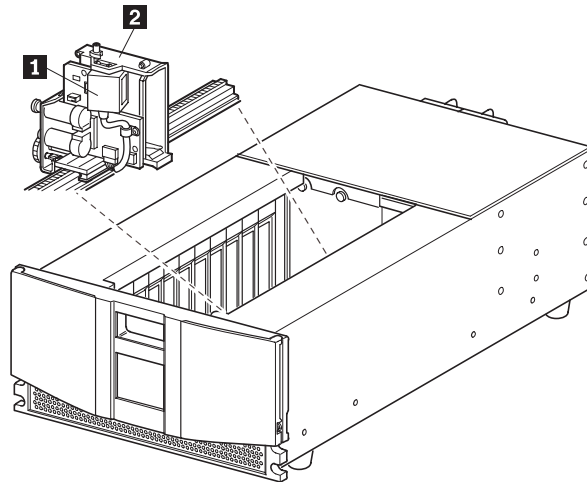
Web TLC is built into the library controller board. Web TLC enables you to remotely monitor and control the tape library from any terminal on a local network or access the internet. For more information on Web TLC, see Chapter 8, “Web TLC” on page 63.

Robotics

The library contains robotics which consist of a cartridge shuttle, motor hardware, motor drives, and other support electronics. The robotics can pick up and place tapes throughout a 180° arc that consists of the tape drives, tape cartridge magazines, and an optional cartridge elevator.

The cartridge shuttle assembly includes a mounted bar code reader for scanning tape cartridges installed in the magazines and tape drives as shown in Figure 9 on page 8.

A full bar code reader scan and a physical scan are conducted each time the library is powered up or a tape magazine is exchanged.



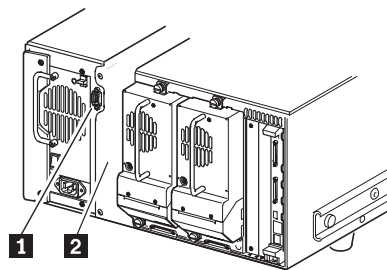
- 1** Bar code reader
- 2** Cartridge shuttle assembly

Figure 9. Library robotics

Multi-module library systems

The 4560SLX Tape Library is an expandable tape library that can be configured in a variety of module and drive combinations. The drives are mounted in a removable drive *shoe* that enables easy installation and removal. Therefore, a failed drive can be swapped without the server or library power needing to be cycled.

The library can be stacked with additional library modules to form a multi-module, rack-mounted configuration. All multi-module libraries in the stack can operate together as a single virtual library system through a rear-mounted cartridge elevator as shown in Figure 10. Stacked units are interconnected through their rear panel Ethernet connections and an external Ethernet router mounted to the rack.



- 1** Interface connector
- 2** Cartridge elevator location

Figure 10. Cartridge elevator mounting location and connector

Any combination of modules, not exceeding a height of 40U can comprise a library module system. A library module system appears to the host computer system and

library control software as a single library. For multi-module applications, the top library module becomes the primary master module and all other libraries become slave modules.

The library robotics pick up and place tape cartridges into an elevator so that individual tapes can be passed up or down between libraries in a multi-unit library configuration.

The 4560SLX Tape Library supports fail-over protection for multi-unit library configurations. In the event of a master module failure, a pre-selected slave module can become the fail over master. For example, if the primary master library fails, you can invoke the library system fail-over mode. In this mode, one of the connected slave units serves as the secondary master library, communicating with the host system through the SCSI interface. The source of power to the cartridge elevator drive motor is switched from the original primary master library to the newly-assigned secondary master library.

Chapter 2. Installation

This chapter explains how to install the 4560SLX Tape Library. Sections in this chapter include:

- Setup
- SCSI cable configurations
- Turning on the library

Setup

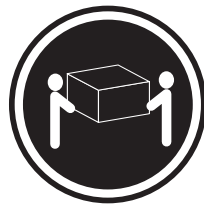
Before rack mounting the library, make sure there is adequate space available in the rack. See “Installation considerations” on page 96, for considerations relating to multi-unit rack-mounted environments.

Note: When lifting the library use a mechanical lifter or a two person minimum.

Statement 4



CAUTION:



≥18 kg (37 lbs)



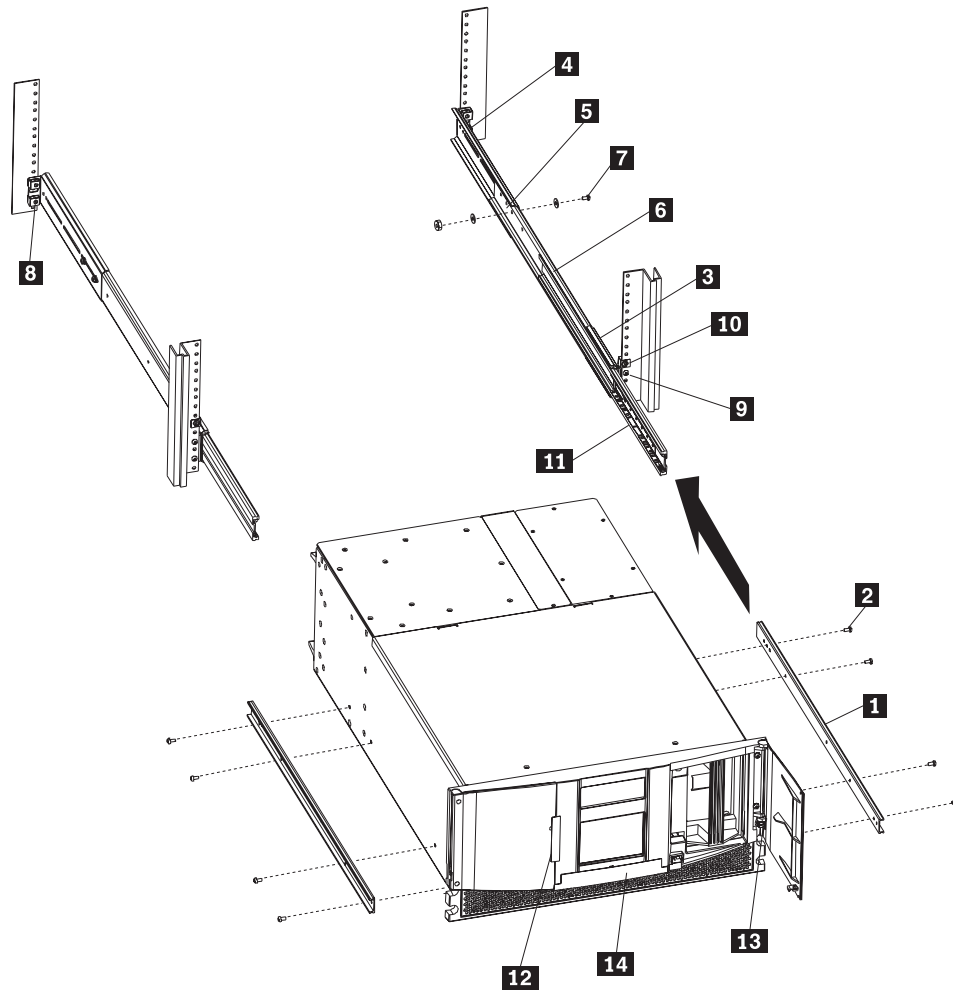
≥32 kg (70.5 lbs)



≥55 kg (121.2 lbs)

Use safe practices when lifting.

Figure 11 on page 12 identifies the parts needed for a rack-mount installation.



- | | | | |
|----------|---|-----------|-------------------------------|
| 1 | Inner slide member | 8 | Clip or cage nut (eight 8-32) |
| 2 | Hex screw (eight M4 x 8mm) | 9 | Screw (eight 10-32 x 5/8) |
| 3 | Front mounting bracket | 10 | Clip or cage nut (two 10-32) |
| 4 | Rear mounting bracket | 11 | Ball bearing slide member |
| 5 | Outer slide member | 12 | Sticker |
| 6 | Middle slide member | 13 | Thumbscrew (two 10-32) |
| 7 | Screw, flat washer, lock washer, nut (eight sets) | 14 | Door latch insert |

Note: If you are installing the library on the IBM Netbay42 Enterprise rack, clip nuts (**8** and **10**) are provided. If you are installing a Netbay11, Netbay25, or Netbay42 standard rack, cage nuts are provided.

Figure 11. Rack mounting the library

Attaching the slide members to the library

To attach the slide members to the library, complete the following procedures:

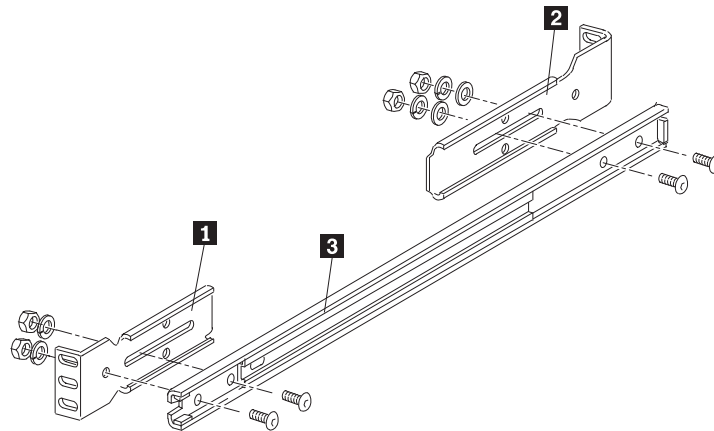
1. Remove the inner slide member (**1**) from each rack-mount slide.
2. Attach the inner slide members to the sides of the chassis using eight hex screws (**2**).

Attaching the slide members to the rack

To attach the slide members to the rack, complete the following procedure:

1. Attach the front (shorter) and rear (longer) mounting brackets to the outer and middle slide members as shown in Figure 12.

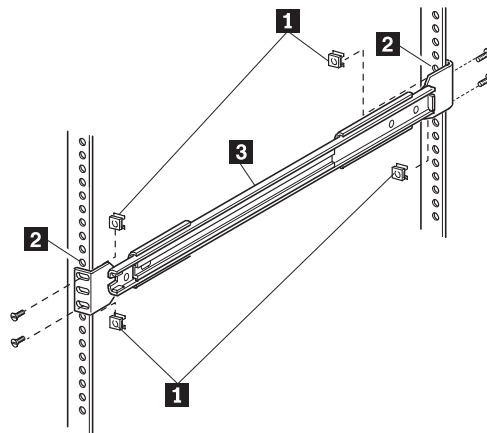
IMPORTANT: Fully tighten the front mounting bracket screws. Leave the rear mounting bracket screws “finger tight” to prevent binding when mounting the library module. Once the distance between rails is set, the screws should be fully tightened.



- 1** Front mounting bracket
- 2** Rear mounting bracket
- 3** Middle slide member

Figure 12. Installing the slide members

2. Depending on the type of rack you are installing, use the clip or cage nuts to attach the slide member assembly to the rack as shown in Figure 13.



- 1** Clip or cage nuts
- 2** Vertical member mounting holes
- 3** Middle slide member

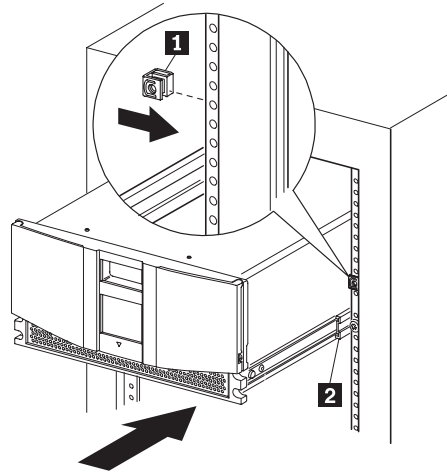
Figure 13. Installing slide member fasteners

3. Push the middle slide member as far as possible to the front of the slide member assembly.

Installing a library in the rack

To install a library in the rack, complete the following procedure:

1. Install a clip or cage nut on each side of the front vertical rails as shown in Figure 14.



- 1** Clip or cage nut
- 2** Vertical member mounting holes

Figure 14. Installing the library module

2. Lighten the library module by removing the drives.
3. Lift the library and visually align the inner and middle slide members. (It is good practice to use a mechanical lifter to lift the library.)
4. Carefully insert the chassis inner slide members into the extended rack-mounted middle slide members. Ensure that the ball bearing slide members are located in the front position.
5. Slide the library completely into the rack until the front panel touches the rack.
6. Remove the stickers that hold the doors in a closed position.
7. With the doors open, attach the library to the rack using two 10-32 captive thumbscrews (located on the front panel inside the front doors). (See **1** and **2** in Figure 15 on page 15.)

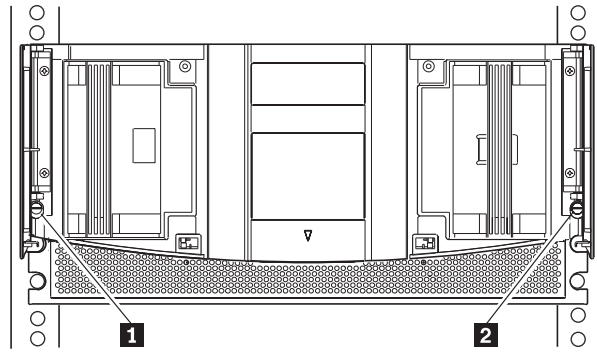


Figure 15. Retaining screws

8. Remove the door latch insert (the red tab located on the front panel).
9. Re-insert the drives.
10. Fully tighten the rear mounting bracket screws.
11. Close the doors.
12. Connect the ac power supply to the library.

SCSI cable configurations

The 4560SLX Tape Library supports multiple SCSI cable configurations on single and dual host systems.

SCSI interface connectors

The library should be attached to a low voltage differential SCSI bus. Each tape drive in the library and its robotics is a separate SCSI device. When two or more devices are connected to the same SCSI bus, each SCSI device must be assigned a unique SCSI ID. For information on assigning SCSI IDs, see “Setting a SCSI ID” on page 21.

To connect a library to a host system, the host system must have at least one wide LVD controller and the appropriate device driver software.

Interface cable specifications

The library is a high-performance system. To avoid degradation of performance, use the highest quality interface cables from a reputable manufacturer of computer cables. All SCSI cables used with the library should meet the following cable specifications:

- Shielded or double-shielded as required to meet EMI specifications
- Impedance match with cable terminators that meet current SCSI specifications
- Characteristic impedance 115 ohms

All SCSI cables used with the library should meet the following usage guidelines:

- Each end of a twisted pair ground connected to chassis ground
- Maximum cable length of 39 ft. (12 m) for an LVD SCSI bus
- Cables of different impedances should not be used together

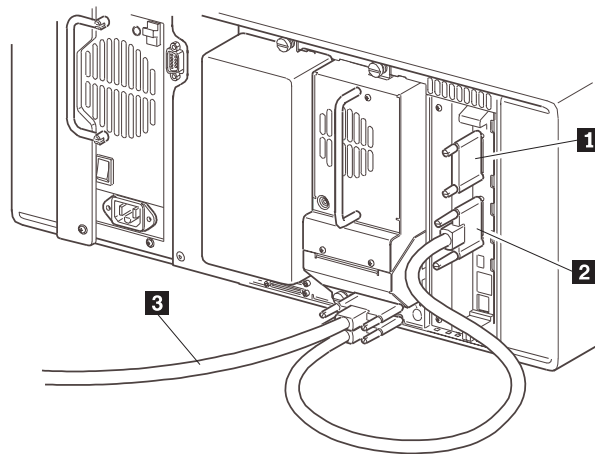
Additional specifications to ensure the highest SCSI performance can be found in the current version of ANSI X3.131.

SCSI configuration

Your specific configuration will depend on the speed of your host and SCSI controller. The library uses high performance tape drives. The tape drive performance might be degraded if you attach too many drives to a single SCSI host controller.

One tape drive on a single host system

Figure 16 shows a typical SCSI cable configuration for a library with one tape drive (drive 1) installed.

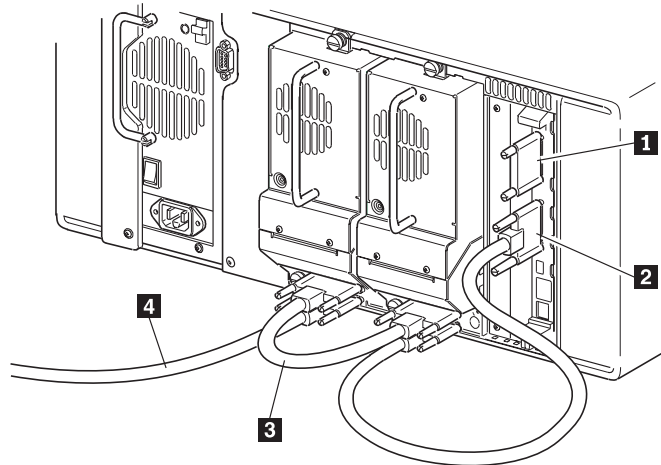


- 1** SCSI terminator
- 2** To library controller card
- 3** To host system

Figure 16. One tape drive single host

Two tape drives on a single host system

Figure 17 on page 17 shows a typical SCSI cable configuration for a library with two tape drives installed using a single host system.

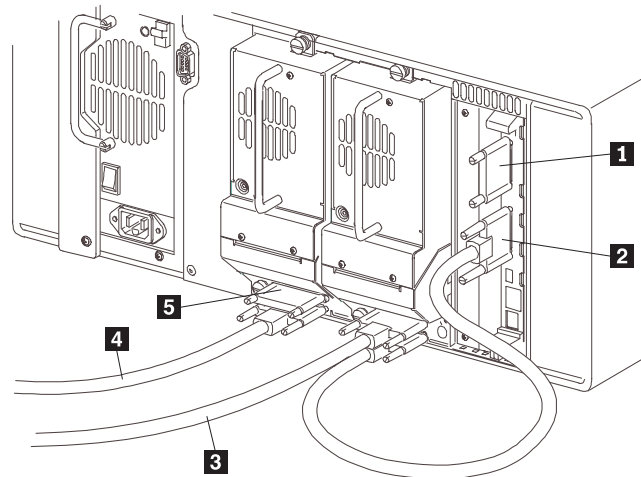


- | | | | |
|----------|----------------------------|----------|----------------|
| 1 | SCSI terminator | 3 | Jumper cable |
| 2 | To library controller card | 4 | To host system |

Figure 17. Two tape drives single host

Two tape drives on a dual host system

Figure 18 shows a typical SCSI cable configuration for a library with two tape drives installed using a dual host system.

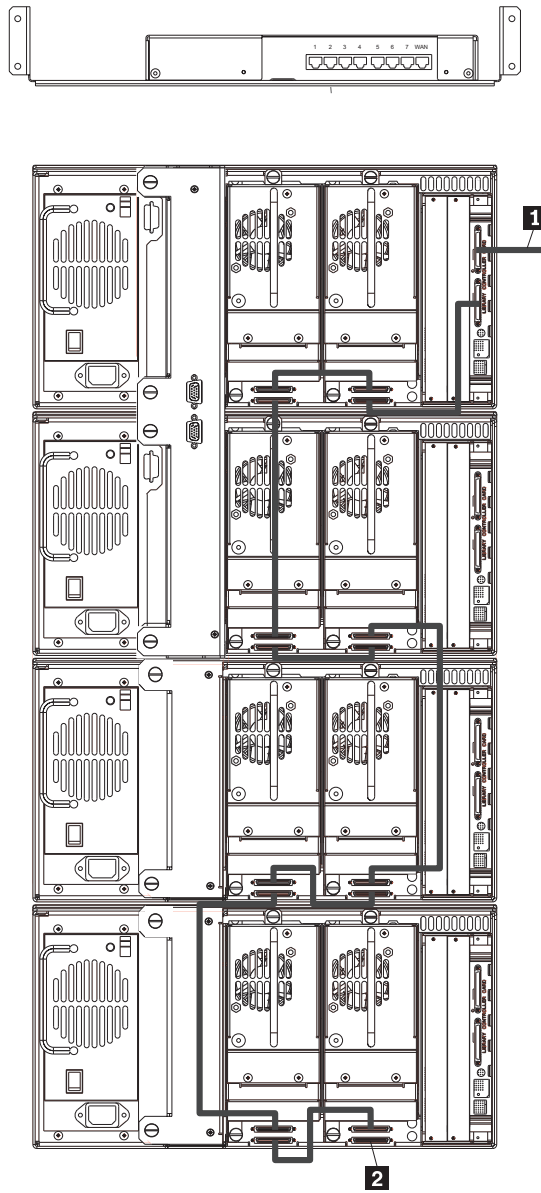


- | | | | |
|----------|----------------------------|----------|-------------------|
| 1 | SCSI terminator | 4 | To host (drive 2) |
| 2 | To library controller card | 5 | SCSI terminator |
| 3 | To host (drive 1) | | |

Figure 18. Two tape drives dual host

Multiple libraries on a single host system

Figure 19 shows a typical SCSI cable configuration for a multi-unit library with a varying number of drives using a single host system.



1
2

To host system
SCSI terminator

Figure 19. Single host multi-unit system

Multiple libraries on a dual host system

Figure 20 shows a typical SCSI cable configuration for a library with multiple libraries and tape drives installed using a dual host system.

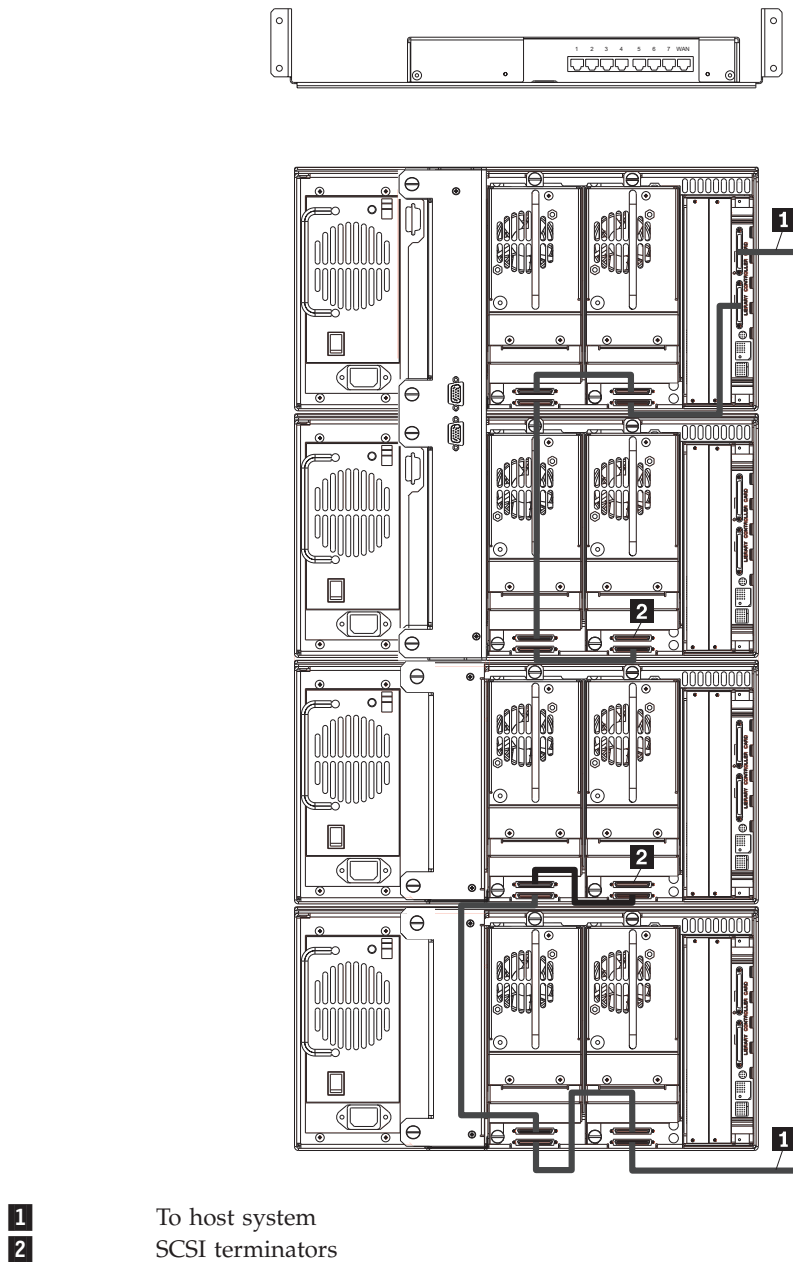
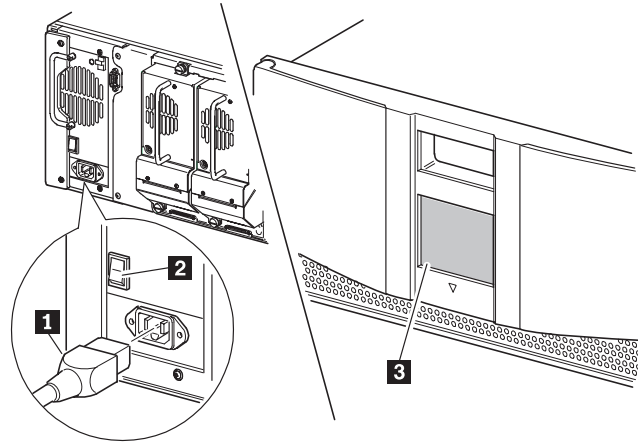


Figure 20. Dual host multi-unit system

Turning on your library

Use the following instructions to apply power to the library:

1. Connect the supplied power cord to the ac receptacle located on the back of the library module as shown in Figure 21 on page 20.



- 1** Power cord
- 2** Power switch
- 3** Touch screen

Figure 21. Powering library module

2. Toggle the power switch to on “|”.
3. Press the touch screen to activate the display.
When power is first applied to the libraries, a series of Power-On Self Test (POST) diagnostics are performed. After the POST completes, the Initialization screen will appear.
4. Select **Continue**.
The library default screen will display.

Chapter 3. Library configuration

The library provides several configuration options to support a variety of applications and platforms. The settings for each of the available options are stored in non-volatile memory in the library. For most applications, you do not have to change the default settings. However, if you need to change the configuration, use the instructions provided in the following sections. If you are uncertain whether you need to change a setting, contact your authorized service provider.

You can change configuration settings using the touch screen. For information on operating the touch screen, see Chapter 4, "Operation" on page 27.

Setting a SCSI ID

Each tape drive installed in the library requires a unique SCSI ID.

To set a SCSI ID, complete the following procedure:

1. Turn the library on and wait until the Power-On Self Test (POST) completes. The library default screen appears on the display as shown in Figure 22.



Figure 22. Library default screen

2. Select the **Menu** option.
3. Enter the appropriate password. For instructions on how to set passwords, see "Passwords" on page 38.
4. Select **SCSI** in the Edit Options area to display the screen shown in Figure 23 on page 22.

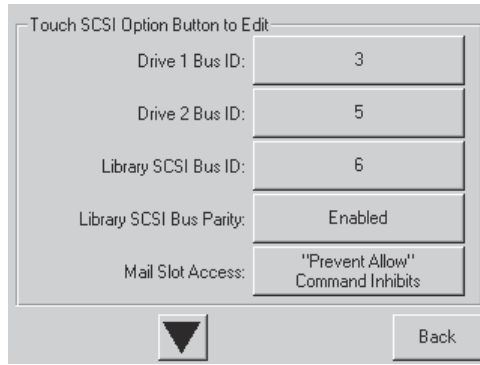


Figure 23. SCSI ID selection screen

5. Select the button next to the SCSI ID you want to set. The screen will display the current setting as shown in Figure 24.

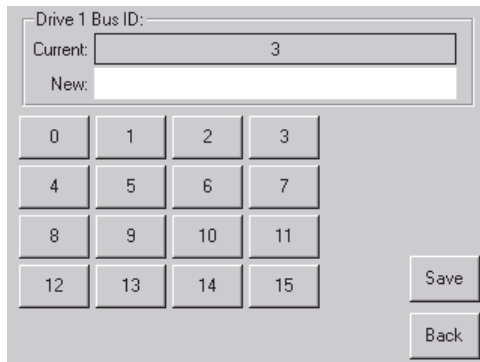


Figure 24. SCSI ID editing screen

6. Enter a new value for the SCSI ID. This places your request in the New data field.
7. Select **Save**. A confirmation screen appears on the display as shown in Figure 25.

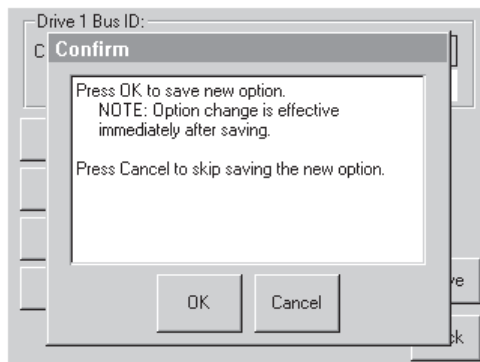


Figure 25. SCSI ID Confirmation screen

8. Select **OK** to confirm. The newly selected SCSI ID flashes for a few seconds while the drive is being updated, then remains solid indicating that the operation is complete.

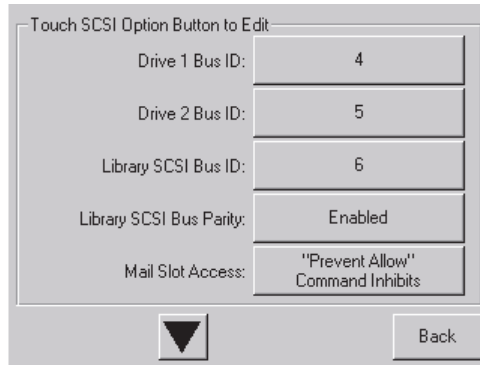


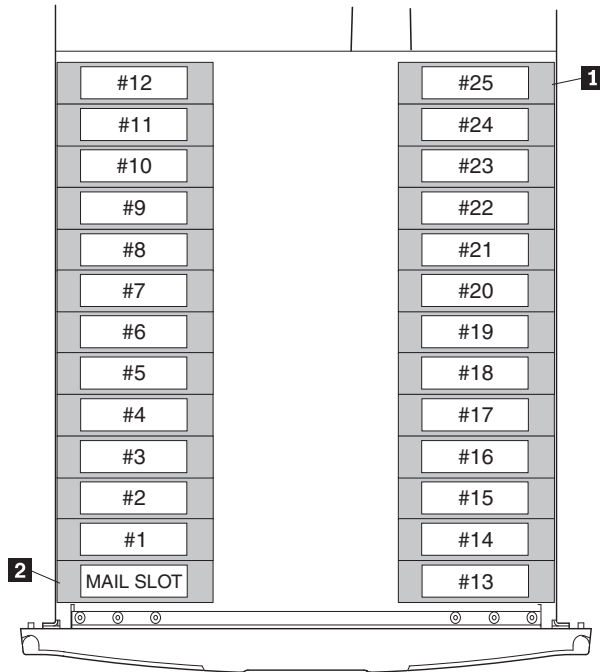
Figure 26. Drive 1 Bus 3 Data Field screen

9. Press the **Back** button to return to the Main menu screen. Repeat this procedure to set any remaining SCSI IDs.

Setting up reserved tape cartridge slots

You might want to reserve tape cartridge slots to meet licensing requirements or dedicate them as cleaning slots.

Standard tape cartridge slots are numbered from the front of the magazine to the rear as shown in Figure 27 on page 24. When you reserve a slot, it becomes reserved slot #1 in the last slot of the magazine. Additional reserved slots are added in a rear-to-front pattern. If your software license limits you to less than the full magazine capacity, reserved slot #1 always follows the last unreserved data tape cartridge.



- 1** Reserved slot #1
- 2** Mail slot (left magazine only)

Figure 27. Slot numbering

To reserve a slot, complete the following procedure:

1. From the Menu screen, select the **Library** option from the Edit Options area.
2. From the Library options screen, press the down arrow to scroll to the screen that contains the Total Reserved Slots option as shown in Figure 28.

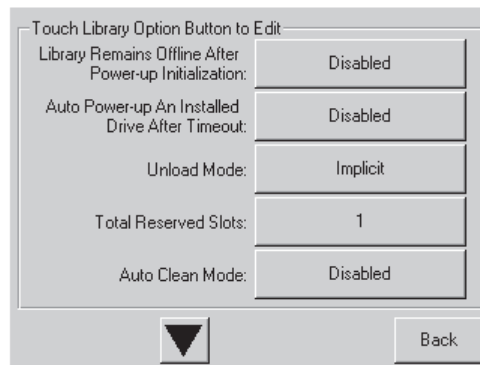


Figure 28. Total Reserved Slots screen

3. Press the box next to the Total Reserved Slots option. A numeric keypad appears on the display as shown in Figure 29 on page 25.

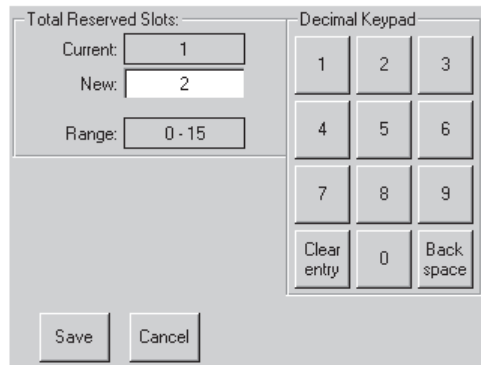


Figure 29. Reserved slots numeric keypad

4. Enter a new value and select **Save**. A confirmation screen appears on the display as shown in Figure 30.

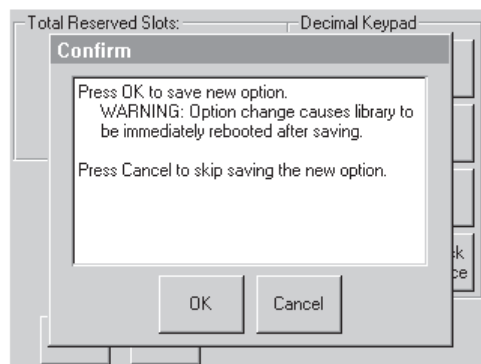


Figure 30. Total Reserved Slots Confirmation screen

5. Press the **Back** button until you return to the Main menu screen. Your change will take effect the next time you boot the library.

Chapter 4. Operation

This chapter describes how to operate the 4560SLX Tape Library.

Using the touch screen

The touch screen enables you to set up and configure the library. This section describes the following options that are available from the library default screen:

- Technical support information
- Mail slot access
- Magazine access
- Move media
- LCD contrast control
- Menu
- Online
- Status
- Power

Technical support information

Select the **Contact IBM** button on the top left corner of the library default screen to display technical support information as shown in Figure 31.



Figure 31. Technical Support Assistance screen

Mail Slot Access (left magazine only)

Select this option to display the Mail Slot Access screen as shown in Figure 32 on page 28. This option enables you to access the mail slot while the library is online. Simply select the mail slot you want to open. The locked icon will change to unlocked and the left side door of the selected library will open.

The mail slot is always the first tape cartridge slot in the left magazine. It can be password protected.



Figure 32. Mail Slot Access screen

Note: In a scaled multi-module library system, selecting the **Mail Slot Access** button on the master library touch screen displays the mail slots of all the libraries in the stack. This is the only way to access the mailslots of the other libraries.

Magazine Access

Select this option to display the Magazine Access screen as shown in Figure 33. The Magazine Access option enables you to access the magazine doors for tape cartridge placement or removal. Access is gained by selecting the library you want to access and then selecting left, right, or both. The lock icons will change to unlocked and the doors of the selected library will open.

Magazine access can be password protected.

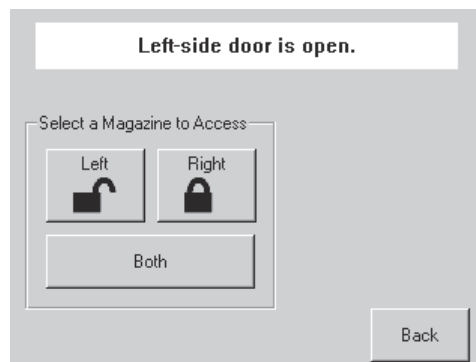


Figure 33. Magazine Access screen

Note: In a scaled multi-module library system, selecting the **Magazine Access** button on the master library touch screen is the only way to access the left and right magazines of all libraries in the stack.

Move Media

Select this option to display the Move Media screen as shown in Figure 34 on page 29. The Move Media option enables you to remove cartridges from a tape drive, load cartridges into a drive, or move cartridges within the library.

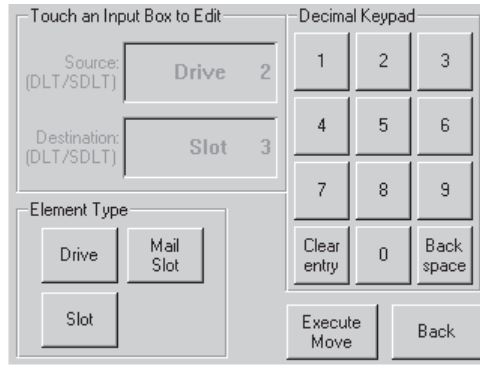


Figure 34. Move Media screen

To move a cartridge, complete the following procedure:

1. Touch the **Source** box or **Source Element Type** from the Move Media screen. The **Source** box will change from gray to an active state as shown in Figure 35.

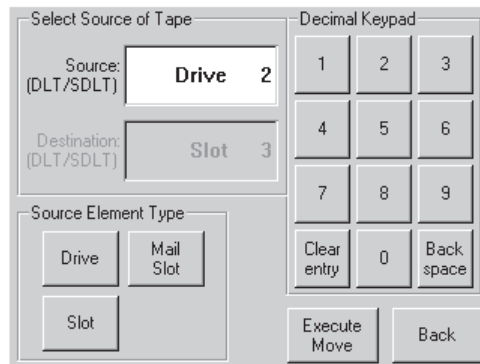


Figure 35. Move Media screen (source)

2. From the Source Element Type area, select the element type you want to move. Drive 2 is used for this example.
3. Touch the **Destination** box on the Move Media screen. The **Destination** box will change from gray to an active state as shown in Figure 36.

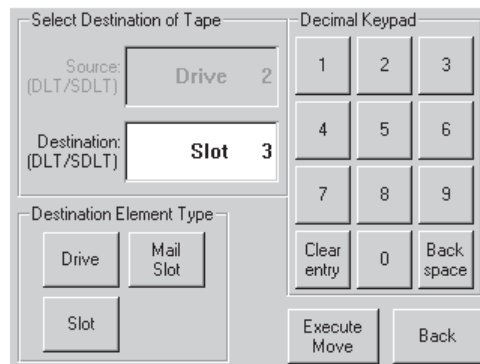


Figure 36. Move Media screen (destination)

4. From the Destination Element Type area, select the element type you want to move media to. Continue selecting the destination option until the desired

option is displayed in the **Destination** box. For example, touching **Slot** three times displays Slot 3 in the **Destination** box.

5. Select the **Execute Move** button. The library robotics moves the cartridge to the destination you selected.

LCD contrast controls

This option enables you to increase or decrease the contrast of the LCD display. Incremental steps are set by adjusting the LCD contrast controls using the up and down arrows from the upper right corner of the library default screen.

Menu

Select **Menu** on the library default screen to operate and configure the library. Figure 37 shows the Menu option interface which displays three distinct areas:

- View System Data
- Utilities
- Edit Options

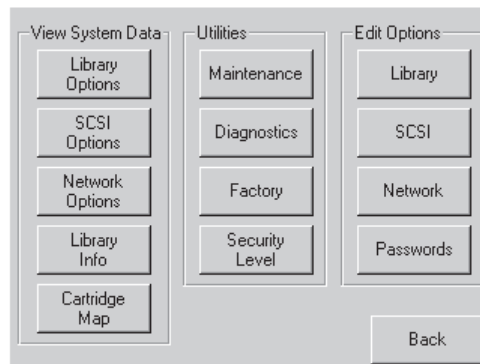


Figure 37. Menu screen

View System Data

The View System Data area enables you to view the following information:

- Library options
- SCSI options
- Network options
- Library information
- Cartridge map

Library Options: This option enables you to view, but not modify, the library settings as defined in the Library option of the Edit Options area as shown in Figure 38 on page 31. For descriptions of the available options, see Table 2.

Note: You can view the next sequential Library Options screen by selecting the down arrow. To return to the Menu screen, press the **Back** button.

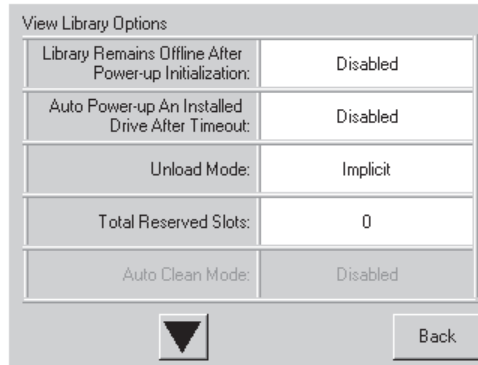


Figure 38. View Library Options screen (initial screen)

Table 2 describes the available Library options.

Table 2. Library options

Option	Description
Library Stays Offline After Power-up Initialization	The library does not go online after power-up initialization. You must select the online option from the menu screen on the touch screen. The default is disabled.
Auto Power-up an Installed Drive	This option enables a tape drive to be automatically powered up after replacing a tape drive. The default is disabled.
Unload Mode	This option selects the unload mode for library tape drives. If the mode is implicit, the library unloads a tape drive before attempting to move a cartridge from that tape drive. If the mode is explicit, the host must issue a SCSI UNLOAD command to a tape drive before each MOVE MEDIUM command that removes a cartridge from that tape drive. The default is implicit.
Total Reserved Slots	This option enables you to remove a specified number of slots from use. Some host software impose size limits on library magazines for licensing purposes. The default is 0.
Auto Clean Mode	This option enables you to establish an automatic cleaning cycle. To use this option, reserve a slot for a cleaning cartridge using the Total Reserved Slots option. The default is enabled.
Drive and Slot Numbering	This option enables you to specify SCSI elements in the library displayed as zero-based or one-based numbers. This only affects the touch screen, not the actual SCSI addresses. The default is one-based.
Library Mode	This option enables you to set the robotics operating mode to random or sequential. The default is random.
Sequential Mode	This option enables you to select a normal or recirculate frequency mode. The default is normal. Note: This is only available if Library Mode is set to sequential.
LCD Contrast Adjust	This option enables you to increase or decrease the contrast of the LCD display.
Mail Slot Mode	This option enables the mail slots in a library. The default is mail slot enabled.

Table 2. Library options (continued)

Option	Description
Barcode Label Size	This option enables you to limit the maximum number of characters of the bar code label. Possible settings are 1 through 8. The default is 8.
Barcode Label Alignment	This option enables you to specify the alignment of a bar code label. The options are left or right. When used in conjunction with the label size option, this option strips unwanted trailing characters (left alignment) or leading characters (right alignment). The default is left align.
Barcode Label Check Digit	This option enables you to specify whether to enable or disable the verification of a check digit character in the barcode label. The default is disabled.
Barcode Reader	This option enables you to specify whether the barcode reader will retry reading barcode labels. The default is retries enabled.
Module Configuration	This option enables you to specify the library module configuration. Three options are available: <ul style="list-style-type: none"> • Standalone - This option is used when the library contains a single module. • Master - This option is used to select the module which controls the pass-thru mechanism in a multi-module library. • Slave - This option is used to select the other modules in a multi-module library.

SCSI Options: This option enables you to view the settings defined from the SCSI option in the Edit Options area as shown in Figure 39.

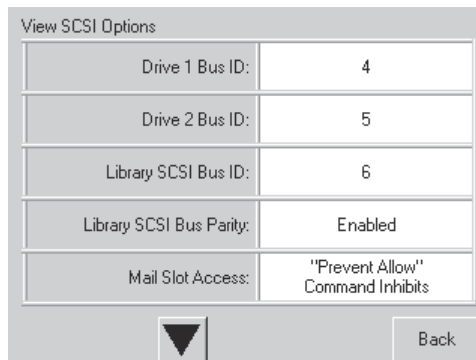


Figure 39. View SCSI Options screen (initial screen)

Table 3 describes the available SCSI options.

Table 3. SCSI configuration options

Definition	Option and default description	Default value
Drive n Bus ID	This option enables you to set the SCSI addresses of the drives. The designators Drive 1 (outer tape drive) through Drive n refer to the first through nth drives. (one based default)	Drive 1 = 1 Drive 2 = 2
Library SCSI Bus ID	This option enables you to set the SCSI addresses for the library robotics.	6

Table 3. SCSI configuration options (continued)

Definition	Option and default description	Default value
Library SCSI Bus Parity	This option enables you to set the library robotics SCSI bus parity checking.	Enabled
SCSI Mode	This option defines the loader as SCSI-2 or SCSI-3.	SCSI-3
Mailslot access	This option defines when the mailslot is accessible.	Prevent/Allow Medium Command Determines Access
Unit Attention Reporting	This option enables you to select reporting of all or only one stacked-unit attention conditions. If set to all, the unit reports all unit attention conditions in sequence. If set to one, the unit reports only the highest priority condition.	Report All
Init Element Status	This option enables you to specify the library response to the SCSI INITIALIZE ELEMENT STATUS command. The possible settings are no inventory, force inventory, and force label scan.	No Inventory
Test Unit Ready Reporting	This option enables you to specify the response to a TEST UNIT READY command if the library is in sequential mode. The possible settings are standard or custom. Standard returns check condition not ready and custom returns good status.	Standard
Device Capability Page Length	This option enables you to choose between two lengths of the mode sense/select device capabilities page (SCSI page 1Fh), which are short (14 bytes) and long (18 bytes), to accommodate different SCSI device implementations of this page.	Short (14 bytes)
Transport Element Base Address	This option enables you to set the base address for the robotics mechanism.	0
Storage Element Base Address	This option enables you to set the base address for the magazine slots.	20
Transfer Element Base Address	This option enables you to set the base address for the tape drives.	1E0
Import/Export Element Base Address	This option enables you to set the base address for the mail slot.	1C0
Product Identification	This option enables you to specify the response of the library robotics to the SCSI INQUIRY command in the product ID fields.	4560SLX
Vendor Identification	This option enables you to specify the response of the library robotics to the SCSI INQUIRY command in the vendor ID field.	IBM
Post Recovered Errors	This option enables you to set the post recovered errors.	Disabled

Table 3. SCSI configuration options (continued)

Definition	Option and default description	Default value
TapeAlert Mode	<p>This option enables you to specify the conditions for logging and reporting the following tape alert data options:</p> <ul style="list-style-type: none"> • Logging Disabled: Inhibits the logging feature. • No Exceptions: Prohibits the library from reporting information exceptions. • Generate Unit Attention: Reports information exceptions with a Unit Attention sense key and an ASC/ASCQ of 5D/00. • Conditionally Generate Recovered Error: Reports information exceptions with a Recovered Error sense key and an ASC/ASCQ of 5D/00, if Recovered Error Reporting is enabled. • Unconditionally Generate Recovered Error: Reports information exceptions unconditionally with a Recovered Error sense key and an ASC/ASCQ of 5D/00. • Generate No Sense: Reports information exceptions with a No Sense sense key and an ASC/ASCQ of 5D/00. • Report on Unsolicited Request Sense: Reports information exceptions with a No Sense sense key and an ASC/ASCQ of 5D/00, only in response to an unsolicited REQUEST SENSE command. 	Logging Disabled
Abort Move Status	This option enables you to specify the SCSI response while aborting a SCSI command. The possible settings are busy or not ready.	Busy
Door Open Response	This option enables you to specify the SCSI response when a library door is open. The settings are ready or not ready.	Not Ready
Initiate Wide Data Transfer Negotiation	This option enables you to set the library to initiate a SCSI synchronous and wide data transfer negotiation with the host. The settings are do not initiate or initiate.	Initiate
Data Speed Transfer	This option enables you to set the SCSI data transfer rate to Synchronous, 10 MB/sec, 5 MB/sec or Asynchronous Only.	Synchronous, 10 MB/sec

Network Options: This option enables you to view the settings defined in the Network option in the Edit Options area as shown in Figure 40 on page 35.

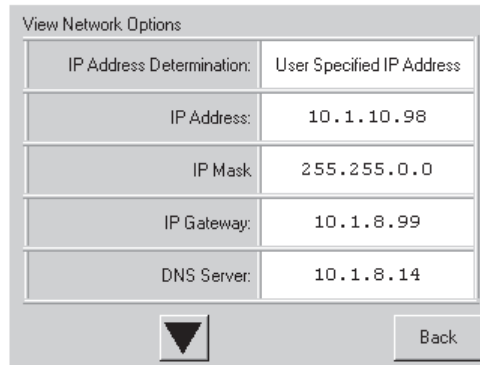


Figure 40. View Network Options screen

Table 4 describes the available Network options.

Table 4. Network configuration options

Definition	Option and default description	Default value
IP Address Determination	This option enables you to set the way an IP address is determined. The possible choices are: Obtain An IP Address From a DHCP Server and User Specified IP Address.	Obtain An IP Address From a DHCP Server
Private IP Base Address	This option enables you to specify a private IP base address. Note: Master configurations only; ignored otherwise.	92.168.1.1
Private IP Subnet	This option enables you to specify a private IP subnet. Note: Master configurations only; ignored otherwise.	255.255.255.0
Private IP Gateway	This option enables you to specify a private IP gateway. Note: Master configurations only; ignored otherwise.	192.168.1.1
Note: These options are only valid if the IP Address Determination Option is set to User Specified IP Address.		

Library Info: This option enables you to display miscellaneous library information. The **Miscellaneous Library Info** screen displays the library firmware revision, IP address, and the library serial number as shown in Figure 41 on page 36.

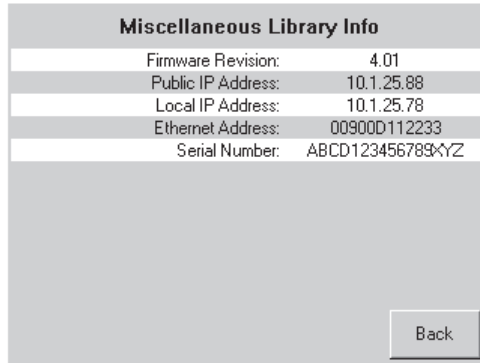


Figure 41. View Library Info screen

Cartridge Map: This option provides a visual indication of all library drives, mail slots and magazine slots, including whether there is a cartridge present and corresponding barcode label, if available.

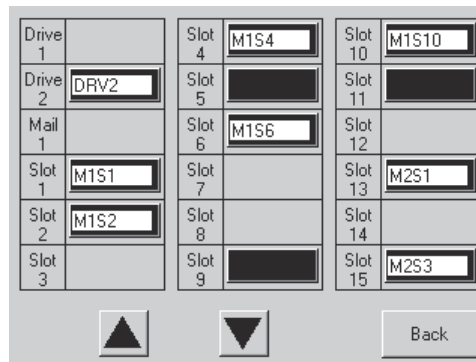


Figure 42. Cartridge map

Utilities

The Utilities area contains the following screens:

- Maintenance
- Diagnostics
- Factory
- Security Level

Maintenance: This option enables you to:

- Set slave defaults
- Reboot server
- Fail-over to secondary master

Diagnostics: This option enables you to select and run several self-diagnostic library tests.

Factory: This option is for factory use only.

Security Level: This option enables you to set passwords for one of the four available security levels as shown in Figure 43 on page 37.

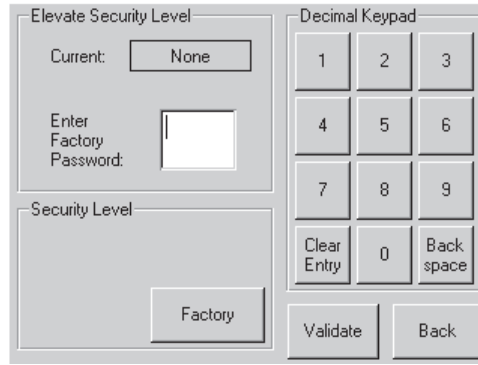


Figure 43. Security Level screen

Table 5. Security level options

Security level	Access
User Level 1	Mail slot access only
User Level 2	Mail slot and magazine access only
Service	User and Service menus
Factory	User, Service, and Factory menus

Edit Options

The Edit Options area contains the following screens:

- Library
- SCSI
- Network
- Passwords

Library: This option enables you to define the library options used to configure the library for your specific needs. Defined options can be viewed in the View System Data area as shown in Figure 44. For a description of the available Library options, see Table 2 on page 31.

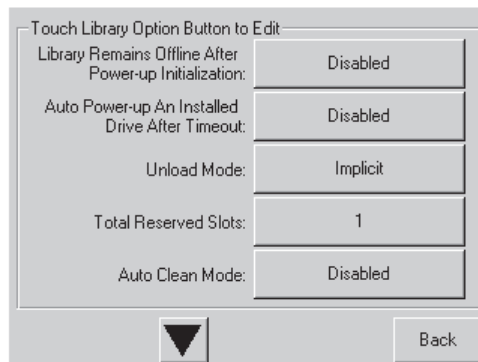


Figure 44. Edit Library Options screen

SCSI: Select this option to define the SCSI options used to configure the library for your specific needs as shown in Figure 45 on page 38. For a description of the available SCSI options, see Table 3 on page 32.

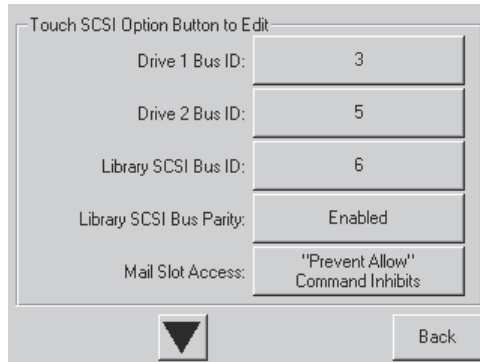


Figure 45. Edit SCSI Options screen

Network: This option enables you to define the network options used to configure the library for your specific needs as shown in Figure 46. For a description of the available network options, see Table 4 on page 35.

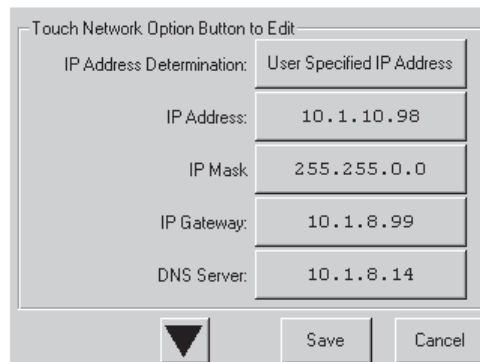


Figure 46. Edit Network Options screen

Passwords: This option enables you to define the password options used to configure the library for your specific needs as shown in Figure 47 on page 39.

The Password screen offers three levels of security.

- **User level 1** - This is the lowest level, which allows users access to the mail slot.
- **User level 2** - This level allows magazine access and allows users to move media.
- **Service** - This is the highest level, which allows users access to the menu that enables them to view and edit library and SCSI options.

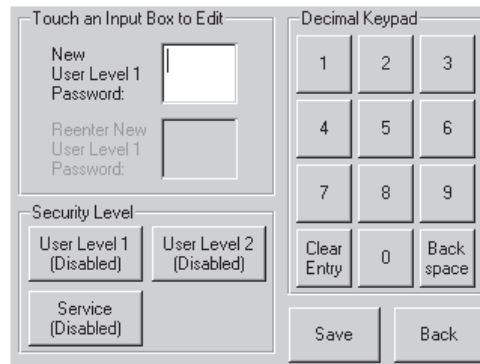


Figure 47. Edit Passwords Options screen

Each password is represented by four decimal digits that are stored in NVRAM (non-volatile memory) in a range of 0001 to 9999. 0000 is used to disable password verification for that level.

Enabling a password causes all disabled higher levels to also be enabled to that value. As a result, prior to accessing a higher level operation, you are prompted first to enter the higher level password. This prevents someone from entering an unprotected Menu mode and changing the lower-level password to defeat it.

You can also use a higher level password to gain access to a lower level operation. For example, you can use the Service password to access the Move Media operation. This gives full access (without validating) to the service operations.

Media can also be locked by software running on the host. The library does not provide a touch screen override for this command. Usually, exiting the host software restores media access. In the event of host failure, you can restore media access by cycling the library power. Procedures for locking and unlocking magazine doors and media are described later in this chapter.

Online

This option enables you to place the library online or offline. By default the library comes online after a power-up initialization.

Status

This option displays the Library Initialization screen. You can identify a tape drive type and view physical tape drive status, tape drive cleaning information, and tape cartridge information by opening the corresponding areas on the screen as shown in Figure 48 on page 40.

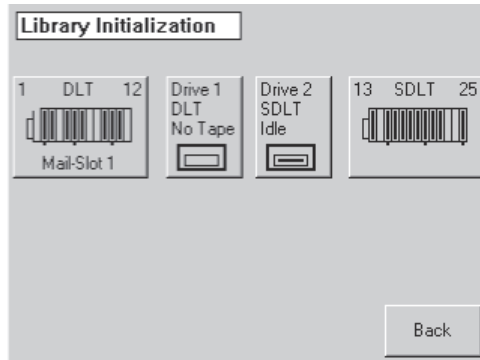


Figure 48. Status screen

Power

This option initiates a library power-down operation. Figure 49 shows the confirmation screen that is displayed when this option is selected. The library moves the shuttle assembly to the parked position before powering down.

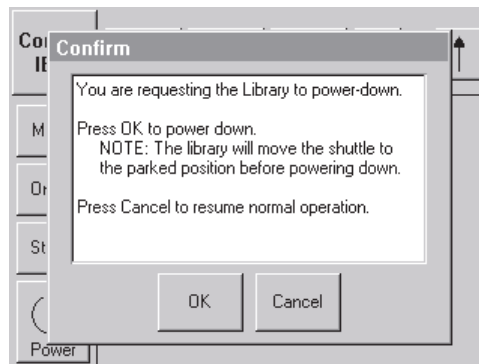


Figure 49. Power Down Initiation screen

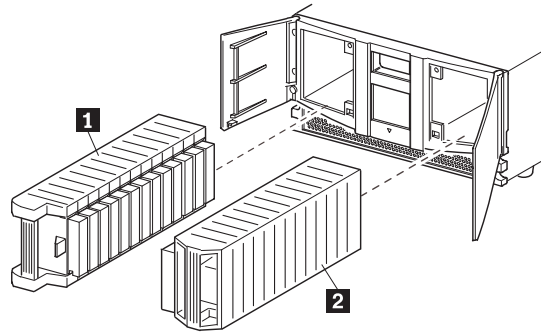
Using tape cartridges

This section describes how to remove magazines, insert cartridges into a magazine, use the mail slot, and use bar codes.

Removing magazines

A magazine must be removed from the library in order to replace tape cartridges. Before you remove a magazine, make sure the slot you want to use is not already reserved for a tape cartridge that is in a tape drive. The safest way to do this is to unload all tape drives before removing a magazine. You can unload all the tape drives either through your host system software or by using the Move Media option on the library default screen.

You must manually remove the library magazines. To access the magazines, use the Magazine Access Option Default screen. This option enables you to open the left or right magazine doors separately or both magazine doors at the same time. After opening the appropriate magazine door, pull the magazine out and away from the library chassis as shown in Figure 50 on page 41.



- 1** Left magazine
- 2** Right magazine

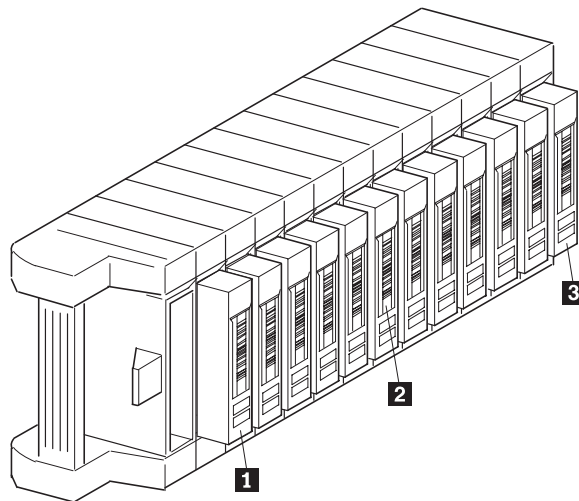
Figure 50. Removing tape cartridge magazines

Inserting cartridges into a magazine

A full magazine is shown in Figure 51. Note that the lowest numbered tape cartridge slot is the one closest to the front of the magazine.

Insert tape cartridges so that the bar code labels are facing outward.

Note: Handle and store tape cartridges in a clean and dust-free environment.



- 1** Lowest numbered tape cartridge slot
- 2** Bar code label
- 3** Highest numbered tape cartridge slot

Figure 51. Tape magazine with tape cartridges installed

Using the mail slot (left magazines only)

The mail slot is used only with host system software that supports this feature. The mail slot feature enables you to insert or remove a single tape without removing the entire magazine. You access the mail slot using the Mail Slot Access option from the library default screen. This option enables you to open the left

magazine door for mail slot access. After opening the left magazine door, pivot the mail slot forward to insert a tape cartridge as shown in Figure 52.

IMPORTANT: The mail slot must be enabled (factory default) using the Mail Slot Mode option from the Edit Library Options menu. For more information on Library options, see Table 2 on page 31.

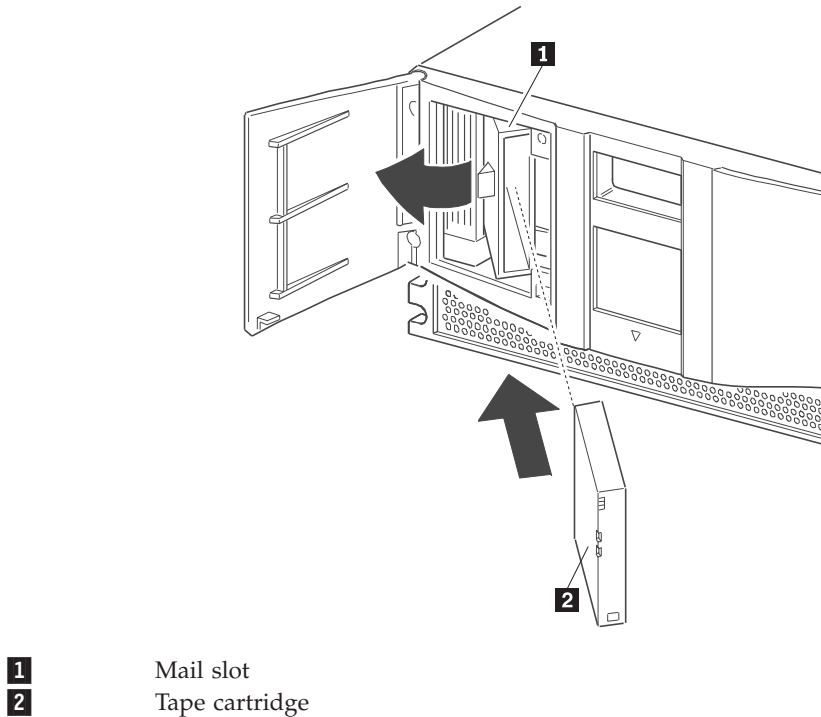


Figure 52. Left magazine mail slot

Bar code labels

Sample bar code labels are included with your purchase. Also included are instructions on ordering additional labels. Figure 53 shows you how to install a bar code label onto a tape cartridge.

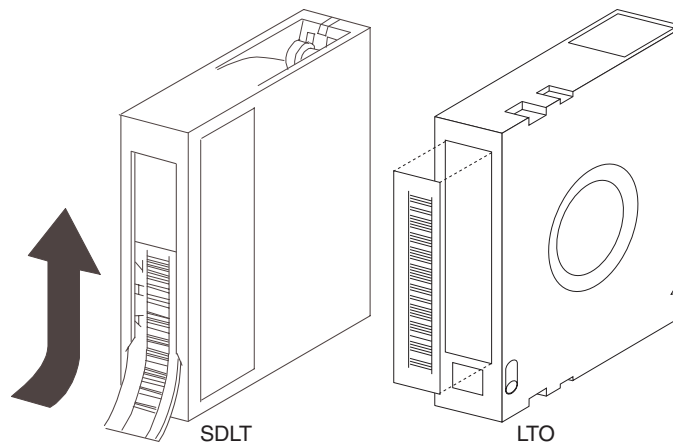


Figure 53. Bar code label installation

Chapter 5. Maintenance

This chapter describes how to replace and run cleaning cartridges in the 4560SLX Tape Library.

Note: Only qualified service technicians should perform the other menu options contained in the Maintenance submenu.

Supported media

IBM supports the following brands of data and cleaning cartridges:

- SDLT data cartridges
 - IBM (Part number: 35L1119)
 - Maxell (Part number: SDLT1/1800)
 - Quantum (Part number: MR-SAMCL-01)
- SDLT cleaning cartridges
 - IBM (Part number: 19P4357)
 - Quantum (Part number: MR-SACCL-01)
- LTO data cartridges
 - IBM (Part number: 08L9120)
 - Fuji (Part number: 26120010)
 - Maxell (Part number: LTOU1/100)
 - Imation (Part number: 0-51122-41089-5)
- LTO cleaning cartridges
 - IBM (Part number: 08L9124)

Note: This list can change as new media is introduced. For a current list of supported brands of data and cleaning cartridges, search for "supported media" on the <http://www.pc.ibm.com/support> IBM Web site.

Running a cleaning cartridge

You can manage the cleaning of the installed tape drives automatically by enabling Auto Clean mode or manually by selecting the Clean Drive menu option from the Maintenance submenu on the front panel display.

Note: It is good practice to run a cleaning cartridge using the Auto Clean Mode.

Automatically running a cleaning cartridge

You can configure the library to automatically run the cleaning cartridge. If a tape drive needs cleaning, it sends a message to the library. This activates an automatic cleaning cycle (if the cleaning cartridge slot has been reserved and Auto Clean mode has been selected from the Options menu).

To automatically run a cleaning cartridge using Auto Clean mode, reserve a cleaning cartridge slot and enable the Auto Clean mode.

Manually running a cleaning cartridge

You can manually run a cleaning cartridge from three locations:

- **The mail slot** - Running a cleaning cartridge from this location does not require a magazine to be removed, a data cartridge slot to be used, or a cleaning cartridge slot to be reserved.
- **A data cartridge slot** - Running a cleaning cartridge from this location requires a magazine to be removed so that a cleaning cartridge can be inserted in a data cartridge slot.
- **The cleaning slot** - Running a cleaning cartridge from this location requires the last data cartridge slot be reserved for exclusive use as a cleaning cartridge slot. The advantage of this method is that the cleaning cartridge is stored in the library and is always available for use. It only needs to be handled when it needs to be replaced.

Running a cleaning cartridge from the mail slot

To run a cleaning cartridge from the mail slot, complete the following procedure:

1. Install a cleaning cartridge into the mail slot.
2. Select the **Clean Drive** menu option from the Maintenance submenu on the Menu screen.
3. Select **Source** and then **Mail Slot** in the **Element Type** box.
4. Select **Cleaning**. If the default entry is not the tape drive to be cleaned, select **Drive** in the **Destination Element Type** box to sequence through the available tape drive choices. You can also use the keypad to enter the tape drive number.
5. Select **Execute Clean** when the source and destination entries are correct. When the cleaning cycle completes, the library returns the cleaning cartridge to the mail slot.
6. Select **Mail Slot Access** from the Status screen to remove the cleaning cartridge.

Running a cleaning cartridge from a data cartridge slot

To run a cleaning cartridge from a data cartridge slot, complete the following procedure:

1. Install a cleaning cartridge into the appropriate data cartridge slot.
2. Select the **Clean Drive** menu option from the Maintenance submenu on the Menu screen.
3. Select **Source**. If the default entry is not the slot with the cleaning cartridge, select **Slot** in the **Element Type** box to sequence through the available cartridge slots. You can also use the Decimal Keypad Backspace and Numeric Keys to enter the slot number.
4. Select **Cleaning**. If the default entry is not the tape drive to be cleaned, select **Drive** in the **Destination Element Type** box to sequence through the available tape drive choices. You can also use the Decimal Keypad Backspace and Numeric Keys to enter the tape drive number.
5. Select **Execute Clean** when the source and destination entries are correct. When the cleaning cycle completes, the library returns the cleaning cartridge to the data cartridge slot.
6. Select **Magazine Access** from the Status screen to remove the cleaning cartridge.

Running a cleaning cartridge from the cleaning slot

To run a cleaning cartridge from the cleaning slot, complete the following procedure:

1. Reserve the cleaning cartridge slot. For more information, see “Setting up reserved tape cartridge slots” on page 23.
2. Install a cleaning cartridge in the reserved slot.
3. Select the **Clean Drive** menu option from the Maintenance submenu on the Menu screen. The Source window defaults to the cleaning slot (cleaning slot 0).
4. Select **Cleaning**. If the default entry is not the tape drive to be cleaned, select **Drive** in the **Destination Element Type** box to sequence through the available tape drive choices. You can also use the Decimal Keypad Backspace and Numeric Keys to enter the tape drive number.
5. Select **Execute Clean**, when the destination entry is correct. When the cleaning cycle completes, the library returns the cleaning cartridge to the cleaning cartridge slot.

Replacing a cleaning cartridge in a reserved slot

When the cleaning cartridge has been exhausted, a message appears on the touch screen indicating that the cleaning cartridge has expired. Examine the Status screen to make sure that the cleaning cartridge has been unloaded from the tape drive. If not, unload the cleaning cartridge using the Move Media menu option from the Status screen.

A cleaning cartridge can be removed and replaced by removing the right magazine or by using the mail slot.

Replacing a cleaning cartridge in the right magazine

To replace a cleaning cartridge in the right magazine, complete the following procedure:

1. Select **Magazine Access** from the Status screen.
2. Remove the magazine from the library.
3. Remove the expired cleaning cartridge from the last slot. Mark it EXPIRED and then properly dispose of it.
4. Place a new cleaning cartridge in the last slot of the magazine.
5. Replace the right magazine.

Replacing a cleaning cartridge in the mail slot

To replace a cleaning cartridge in the mail slot, complete the following procedure:

1. Select the **Move Media** menu option from the Status screen.
2. Select **Source** and then select **Cleaning Slot** in the **Source Element Type** box.
3. Select **Destination** and then select **Mail Slot** in the **Destination Element Type** box.
4. Select **Execute Move** to place the cleaning cartridge in the mail slot.
5. When the move completes, press the **Back** button to access the library default screen.
6. Select **Mail Slot Access** from the Status screen.
7. Remove the expired cleaning cartridge. Mark it EXPIRED and then properly dispose of it.
8. Place a new cleaning cartridge in the mail slot.
9. Select the Move Media option from the Status screen.
10. Select **Source** and then select **Mail Slot** in the Source Element Type box.

11. Select **Destination** and then select **Cleaning Slot** in the **Destination Element Type** box.
12. Select **Execute Move** to put the new cleaning cartridge in the reserved slot.

Chapter 6. Troubleshooting

The following information might be useful if you experience problems using the 4560SLX Tape Library.

Platform problems

Incorrectly installing or configuring the 4560SLX Tape Drive can cause platform problems. In this occurs, the library appears to be operating normally, but no data can be interchanged. An error code might be displayed on the touch screen. To identify this type of problem, check your installation and configuration setup. For information on how to correctly install and configure the library, see Chapter 2, "Installation" on page 11.

General drive errors usually result from a miscommunication between the library and tape drive, or from a mechanical malfunction within the library. The touch screen displays error messages and fault symptom codes (FSCs) when platform problems and general drive errors occur. Use the FSCs to report errors to IBM technical support or to determine a recovery procedure.

Error recovery procedures (ERPs)

Figure 54 on page 48 outlines the troubleshooting steps for error recovery.

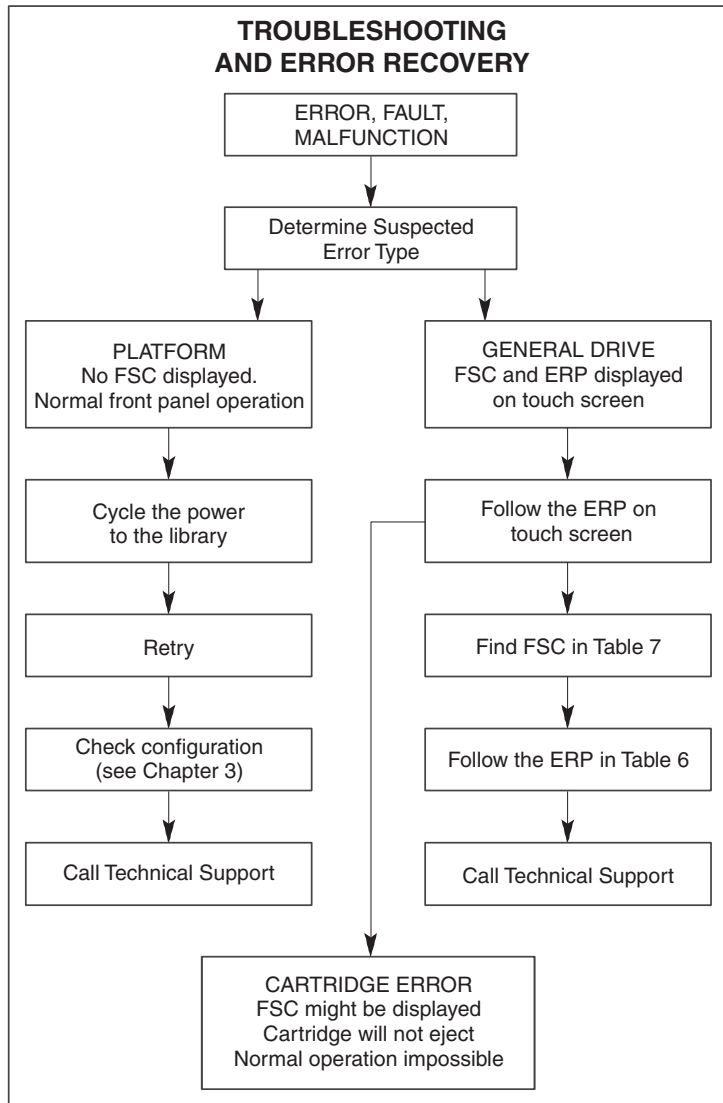


Figure 54. Troubleshooting flow chart

Table 6 lists ERPs reported on the touch screen of the library. This list includes only those procedures that can be safely performed by a user. For a list of FSCs and their related ERPs, see Table 7 on page 49.

Table 6. Error recovery procedures

ERP code	Procedure/Description
C	Cycle power to the library using the power option on the touch screen. Wait 30 seconds to power on again.
D	Turn off power to the library and inspect connectors and cables.
F	Invalid operation. Select parameters correctly and try again.
G	Call IBM technical support.

Fault symptom codes (FSCs)

Table 7 lists the FSCs and their related ERPs that might be displayed on the touch screen. If an FSC continues, report it to IBM technical support.

Table 7. Fault symptom codes

Message	FSC	ERP
OS Catastrophic Error	0901	G
OS Task Exit Error	0902	G
SCSI Firmware Error	1001	D,G
SCSI FIFO Empty	1002	D,G
SCSI FIFO Error	1003	D,G
SCSI Gross Error	1004	C,D,G
Illegal SCSI Cnt Cmd	1005	C,D,G
SCSI Message Error	1006	D,G
SCSI Invalid Element	1007	D,G
SCSI No Pending Int.	1008	D,G
SCSI Invalid Int.	1009	D,G
Illegal Move	2008	C,G
Door Open (status only)	2009	F
Menu Mode (status only)	200A	F
Cart Unaccessible	200C	F
Drive In Error	200D	C,G
No Magazine	200E	F
Removal Prevented	200F	F
Ctl. Firmware Error	2010	C,G
Drive Code Update Command Error	2080	C,G
Move Command Failure	2081	C,G
Open Mail Slot Fault	2090	C,G
Open Left Door Fault	2091	C,G
Open Right Door Fault	2092	C,G
Open Doors Fault	2093	C,G
Open DLT Handle Fault	2094	C,G
No IP Address Found	20a0	C,G
No IP Address Mode Fault	20a1	C,G
No Gateway Address Found	20a2	C,G
Unknown Exchange For The Async message	20b0	C,G
Drive In Error	20c0	C,G
Drive In Error	20c1	C,G
Motor Fault Condition	3000	C,G
Shuttle Tach Errors	3001	C,G
Picker Tach Errors	3002	C,G
Rotary Tach Errors	3003	C,G

Table 7. Fault symptom codes (continued)

Message	FSC	ERP
Vertical Tach Errors	3004	C,G
Passthru Tach Errors	3005	C,G
Excessive Picker Friction Error	3006	C,G
Bin Fetch Failure	3011	C,G
Bin Stow Failure	3012	C,G
Drive Fetch Failure	3013	C,G
Drive Stow Failure	3014	C,G
Drive Timeout Failure	3015	C,G
Drive Status Failure	3016	C,G
Drive In Flux Timeout	3017	C,G
Drive Load Retry Failed	3018	C,G
Drive Open Door Failed	3019	C,G
Drive Close Door Failed	301A	C,G
Drive Communication Error	301B	C,D,G
Drive Get General Status Fail	301C	C,D,G
Drive Get Status 3 Fail	301D	C,D,G
Undefined Config	3020	C,G
Orphan Cartridge not flowed	3030	C,G
Chassis S/N Mismatch. Previous S/N retained	3031	G
Chassis S/N Character count is not correct	3032	G
Chassis S/N did not scan	3033	G
Chassis S/N save operation failed	3034	G
Motor Firmware Error	3040	C,G
Loader Received Invalid Command	3041	C,G
Motor Firmware Error	3042	C,G
Missing Magazine	3050	F
No Cartridges In Library	3051	F
Too Many Cartridges	3052	F
Need 3 Cartridges Minimum	3053	F
Need 1 Drive Minimum	3054	F
Need 5 Cartridge Minimum	3056	F
Invalid Magazine Type	3057	F
Magazine Type Change Not Handled	3058	F
Zone Sequence Error	3060	C,G
Drive Eject Fail	3070	C,G
Drive Eject Fail	3071	C,G
Drive Eject Fail	3072	C,D,G
Drive Eject Fail	3073	C,D,G
Soft Fetch Retry	3080	C,D,G
Soft Fetch Retry	3081	C,D,G

Table 7. Fault symptom codes (continued)

Message	FSC	ERP
Drive Stow Failed, Media Returned to Source	3082	F
Drive Stow Failed, Media Remains in Drive	3083	F
Unsupported Drive For Requested Operation	3084	F
No Retry On Fetch/Stow	308F	F
Picker Jammed	3100	C,G
Picker Jammed 2	3102	C,G
Picker Jammed 3	3103	C,G
Picker Jammed 4	3104	C,G
Picker Jammed 5	3105	C,G
Picker Jammed 6	3106	C,G
Picker Jammed 7	3107	C,G
Picker Jammed 8	3108	C,G
Picker Jammed 9	3109	C,G
Picker Jammed 10	310A	C,G
Picker Jammed 11	310B	C,G
Picker Jammed on Stow	310F	C,G
Picker Retries Exceeded	3110	C,G
Picker Retries Exceeded 1	3111	C,G
Picker Retries Exceeded 2	3112	C,G
Picker Retries Exceeded 3	3113	C,G
Picker Retraction Error	3115	C,G
Shuttle Jammed	3200	C,G
Shuttle Jammed	3201	C,G
Shuttle Jammed	3202	C,G
Shuttle Jammed	3203	C,G
Shuttle Jammed	3204	C,G
Shuttle Jammed	3205	C,G
Rotary Jammed	3300	C,G
Shuttle on Wrong Side of the Rotary	3301	C,G
Rotary Cannot Find Zones	3302	C,G
Passthrough Elevator Jammed	3400	C,G
Vertical Elevator Jammed	3500	C,G
No DLTs Attached	5010	F
All Slots Empty	5011	F
DLT Already Loaded	5014	F
Expired Clean'g Cart	5015	F
Not a Clean'g Cart	5016	F
DLT Timeout Error	5035	C,D,G
Move Command Fail	503B	F
Clean Operation Timeout	503C	F

Table 7. Fault symptom codes (continued)

Message	FSC	ERP
Drive Status Fail	503D	F
Command response from unexpected source	7001	D,G
Control command execution failed	7002	D,G
Control response not matched to a known command	7003	D,G
Loader response not matched to a known command	7004	D,G
Drive response not matched to a known command	7005	D,G
Flash response not matched to a known command	7006	D,G
Drive index on Update Status message was invalid	7007	C,D,G
The Drive response was not expected	7008	C,D,G
The opcode for a WORD message was unknown	7009	C,D,G
The opcode for a DWORD message was unknown	700A	C,D,G
The button causing library to go offline was unknown	700B	C,D,G
Destination Xchg was Null	700C	C,G
Sending of a cmd failed	700D	C,G
Deactivating a drive that is not attached	700E	C,G
Deactivation of a drive failed	700F	C,G
Drive removal failed	7010	C,G
HotPlug statue update failed	7011	C,G
Drive is Active failed	7012	C,G
Control Com Unidentified	7013	C,G
Drive status update failed	7014	C,G
Loader command execution failed	7015	C,G
Sequential command execution failed	7016	C,G
Destination Xchg for msg. was Null	7017	C,G
Bad src mod in peg msg	7018	C,G
Peg message wrapping a Null msg. ptr.	7019	C,G
Xchg conversion failed	701A	C,G
Invalid L-drive number to convert	701B	C,G
Invalid P-drive number to convert	701C	C,G
Invalid mod number to convert	701D	C,G
Cartridge reject recovery failed	8001	C,D,G
Drive Fan stalled	8002	C,D,G
Drive load did not complete	8003	C,D,G
Invalid drive was installed	8004	F
Orphan cartridge recovery failed	9001	C,D,G
Move operation failed	9002	C,D,G
SMX send error	A001	C,G
SMX receive error	A002	C,G
Comm free list empty	A003	C,G
Invalid comm. put attempt	A004	C,G

Table 7. Fault symptom codes (continued)

Message	FSC	ERP
Invalid comm. get attempt	A005	C,G
Comm initialization error	A006	C,G
Put of a NULL comm	A007	C,G
Msg contains no comm	A008	C,G
Comm return address is unknown	A009	C,G

Note: If an error message is displayed that is not included in Table 7, write down the fault code number and follow the recovery procedure. If the same error occurs again, call IBM technical support.

Chapter 7. Using the NeoCenter utility

The NeoCenter utility enables you to configure the unit using the Windows[®] interface. The utility enables you to perform the following tasks:

- Establishing communication with your host
- Setting IP addresses
- Setting an access password
- Setting SNMP traps
- Setting e-mail addresses
- Setting remote FTP server parameters
- Setting SCSI parameters
- Setting the SCSI identification
- Setting library parameters
- Setting the drives
- Uploading data
- Downloading data
- Rebooting the library

Establishing communication with your host

To establish communication with your host, complete the following procedure:

1. Turn on the power.
2. Connect the RJ11-DB9 cable between the connector labeled RS232 on the library and a COM port on the host computer. Note the port you select.
3. Power up the host computer and boot into Windows. Windows 95, Windows 98, Windows 2000, or Windows NT[®] 4.0 are supported.
4. Install the configuration utility from the included 3.5" diskette (A:\SETUP).
5. Launch the configuration utility. The Main screen is displayed.
6. Click **Connect**.
The Serial Port Setting screen is displayed.
7. Verify settings of the COM port and click **OK**.

Note: If the connection is not successful, check all cable connections and repeat step 6 and step 7. If communication with the library fails again, contact IBM Technical Support.

Setting IP addresses

To set IP addresses, complete the following procedure:

Note: Configuration addresses are network specific. Contact your network system administrator for the appropriate values. These settings enable access to your library from your network and the World Wide Web.

1. Establish communications with the library, if not already established.
2. On the Main screen, select **Configure**.

An upload process screen is displayed for a moment and then the **Configure** dialog box appears:

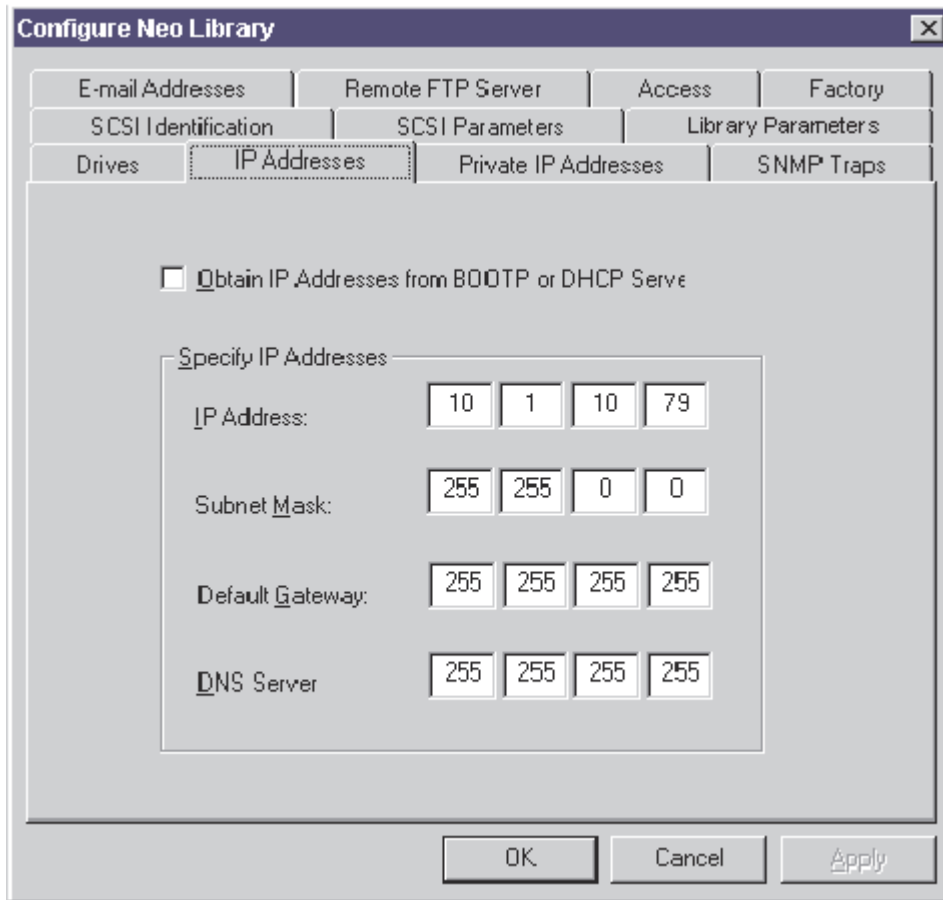


Figure 55. Configure dialog box - IP addresses

3. Select the **IP Addresses** tab.
4. Set the IP addresses by doing one of the following:
 - Select the check box if you want the addresses to be set by a Dynamic Host Configuration Protocol (DHCP) or BootP server.
 - Specify the addresses individually.
5. Click **OK** to save the settings.

Setting an access password

Web TLC limits access to the system by means of passwords set on the configuration screen. Web TLC passwords allow for two levels of system access:

- Level 1 access allows operator viewing of library status only.
- Level 2 access allows full control, permitting the user to move tapes and modify library configuration settings.

Note: Level 2 access can be disabled entirely.

To set an access password, complete the following procedure:

1. Establish communications with the library.

2. On the Configure screen, select the **Access** tab.
The **Access** tab panel is displayed.
3. Place the text cursor into a level field and type in the password.
4. Enable or disable Level 2 access.
5. Enter the library name.
6. Click **OK** to save the settings.

Note: The Access tab panel permits you to specify a familiar, mnemonic name for your library. This name will be displayed on many pages of your Web TLC site.

Setting SNMP traps

To set SNMP traps, complete the following procedure:

Note: Configuration addresses are network specific. Contact your network system administrator for the appropriate values. These settings enable the Web TLC to send system events asynchronously to the network.

1. Establish communications with the library.
2. On the **Configure** screen, select the **SNMP Traps** tab.
The SNMP tab panel displays fields that enable you to enter the IP addresses of up to four hosts that can receive SNMP traps.
3. Enter the appropriate values in the fields.
4. Click **OK** to save the settings.

Setting e-mail addresses

To set e-mail addresses, complete the following procedure:

1. Establish communications with the library.
2. On the Configure screen, click the **E-Mail Addresses** tab.
The E-Mail Addresses tab panel is displayed.
3. Enter the name or IP address of the SMTP mail server.
4. Enter up to four e-mail addresses.
These addresses will be e-mailed upon notification of specific system events.
5. Click **OK** to save the settings.

Setting remote FTP server parameters

These settings enable the user to download firmware to the Web TLC or to the library using a remote FTP site.

1. Establish communications with the library.
2. On the Configure screen, click the **Remote FTP Server** tab.
The Remote FTP Server tab panel is displayed.
3. Enter the necessary server information.
If the default name or address has been updated or is unavailable, contact IBM Technical Support.
4. Click **OK** to save the settings.

Setting SCSI parameters

1. Establish communications with the library.
2. On the Configure Library screen, click the **SCSI Parameters** tab.
The SCSI Parameters tab panel is displayed.
3. Click **OK** to save the settings.
For a complete description of the above selectable options, including default options, see Chapter 3, "Library configuration" on page 21.

Setting the SCSI identification

1. Establish communications with the library.
2. On the Configure Library screen, click the **SCSI Identification** tab.
The SCSI Identification tab panel is displayed.
3. Click **OK** to save the settings.
For a complete description of the above selectable options, including default options, see Chapter 3, "Library configuration" on page 21

Setting library parameters

1. Establish communications with the library.
2. On the Configure Library screen, click the **Library Parameters** tab.
The Library Parameters tab panel is displayed.
3. Click **OK** to save the settings.
For a complete description of the above selectable options, including default options, see Chapter 3, "Library configuration" on page 21.

Setting the drives

1. Establish communications with the library.
2. On the Configure Library screen, click the **Drives** tab.
The Drives tab panel is displayed.
3. Click **OK** to save the settings.

Uploading data

The configuration utility enables you to upload binary data files containing system trace information for diagnostic troubleshooting. Uploads enable you to view the current unit configuration.

The Upload function creates binary files that you can save. The utility includes a post-processor that converts files into readable form. You can view the files using the text editor of your choice.

To upload data, complete the following procedure:

1. Establish communications with the library.
2. On the main screen, select **Upload**.
The Upload Data From Library prompt is displayed:

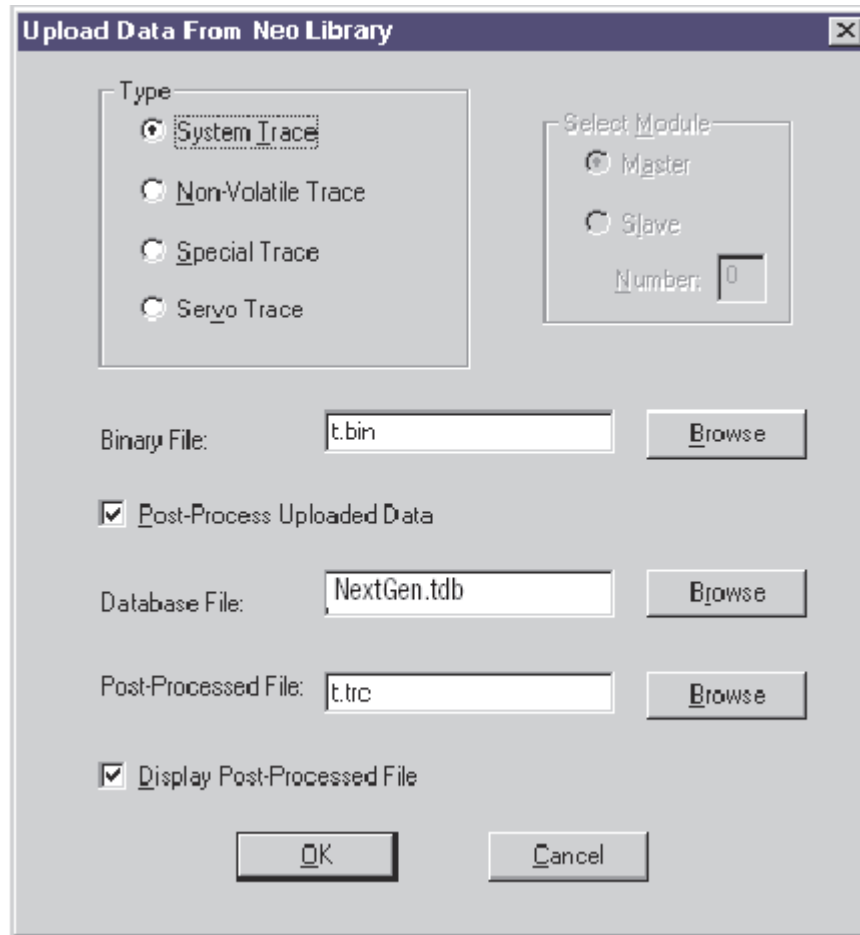


Figure 56. Upload Data From Library prompt

3. Click the radio button for System Trace or Non-Volatile Trace.
4. Use the **Browse** button to select a network destination for the uploaded binary file.
The default file name appears in the Binary File field at the end of the network path.
5. To create a text version of the file, select the **Post-Process Upload Data** check box.
6. Use the associated **Browse** button to select NexGen.tdb in the Database File field. This file is necessary to decode the uploaded file into text.
7. Use the associated **Browse** button to select a destination for the text file.
The default file name appears in the Post-Processed File field at the end of the specified network path.
8. Click **OK** to start the upload.
An Upload Progress screen momentarily displays a percent complete bar. When the upload is complete, your selected text editor application launches and displays the text version of the file.

Downloading data

The library firmware is resident in flash memory; however, IBM periodically updates this code. You can find the latest firmware files by searching on "4560SLX" on the <http://www.pc.ibm.com/support> IBM Web site. The configuration utility enables you to remotely download flash image files that contain the updated firmware.

The download process takes place in two stages. First, the data is downloaded into RAM and is verified; then, it is programmed into the flash memory.

To download new firmware, complete the following procedure:

1. Establish communications with the library.
2. On the Main screen, select **Download**.

The Download Data to Neo Library prompt is displayed:

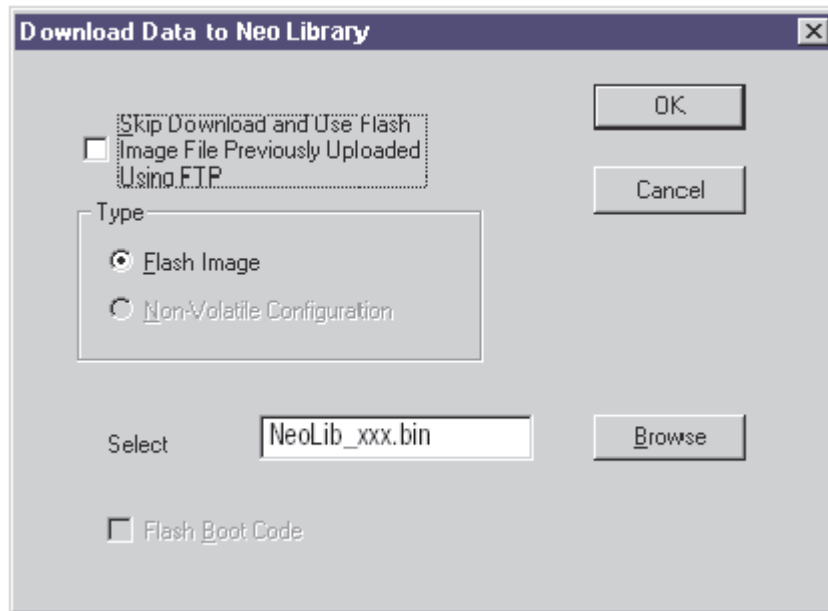


Figure 57. Download Data to Library prompt

3. Use the browse button to display the firmware binary image file you want to download in the **Select** field.
4. Click **OK**.

A Download Progress screen is displayed that tracks the progress of the download into RAM and its checksum is verified.

When the download completes, another progress screen is displayed that tracks valid flash programming. When the programming is complete and the NeoCenter is rebooting, a confirmation screen is displayed.

5. Click **OK** to return to the Main screen.

If flash programming does not complete, check all cable connections and repeat download step 1 through step 5. If the download fails again, contact IBM Technical Support.

Rebooting the library

To reboot the library, complete the following procedure:

1. Establish communications with the library.
2. From the Diag menu, select the **Reboot NeoCenter** option.
3. Click **Yes**.
4. Click **OK**.

Chapter 8. Web TLC

Web TLC (Total Library Control) is a remote interface device built into your 4560SLX Tape Library that enables you to monitor and control your automated tape library. Web TLC enables you to view overall status and provides a control panel for making adjustments and viewing details down to the cartridge level. Web TLC hosts a dedicated, protected Internet site that displays a graphical representation of your library.

You can access Web TLC from the World Wide Web or from your local area network.

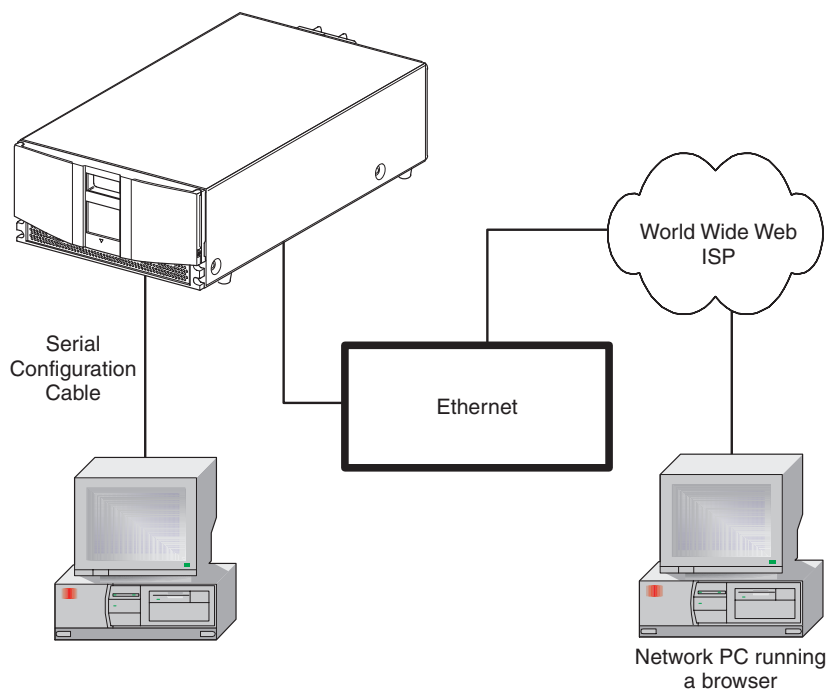


Figure 58. World Wide Web accessible

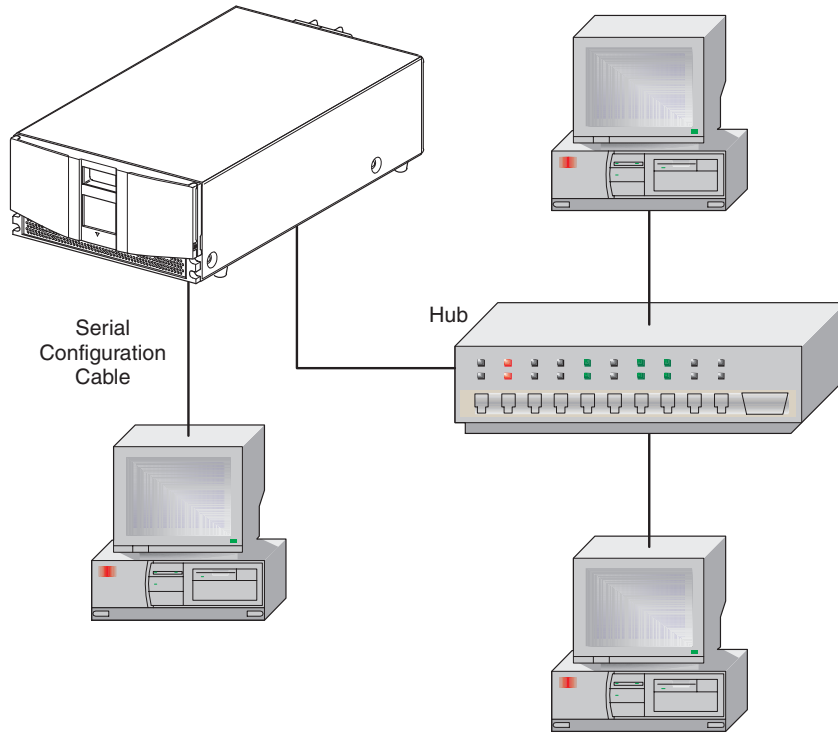


Figure 59. Local area network

In order to use Web TLC, you must have the following:

- A 10 BaseT Ethernet network
- A dedicated IP address (either Internet or local)
- A host computer with COM port (initial setup and alternative maintenance procedures only)
- Access to your network
- A web browser installed on your computer (either Microsoft Internet Explorer 3.0 or higher or Netscape 3.0 or higher)

Operation

This section explains the functionality that is available on Web TLC but not always found on deployed hardware systems. To configure Web TLC you must utilize Network Options on the touch screen or set the IP addresses. See “Setting IP addresses” on page 55.

Web TLC access

To access Web TLC:

Note: The library must be in ready mode to establish communications with Web TLC. If you are unable to access the unit with your browser, check whether the library is being operated locally.

1. Type the Web TLC IP address in the Location field of your Internet browser, and press Enter.

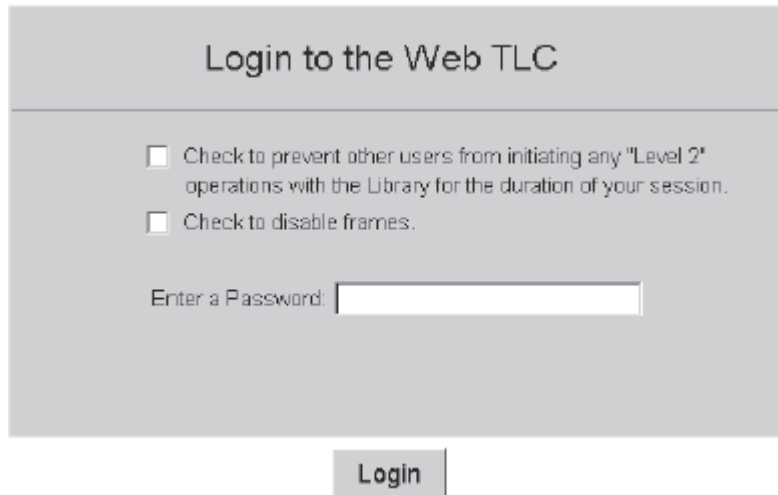


Figure 60. Web TLC login prompt

2. Enter your password in the appropriate field and click **Login**.
The Web TLC Control Panel page appears with the Status screen displayed.



Figure 61. Web TLC control panel

Status

Click the **Status** button to view itemized status information for the library and for each drive. You can configure two browser settings from this screen:

- **Auto refresh:** off / 1 min / 2 min / 5 min
Auto refresh setting ensures that the status of your library displayed on the browser remains valid.
- **Inventory Display:** Logical / Physical
The inventory display setting enables you to display your library logically with drives and slots grouped separately or physically with drives and slots grouped by library module.

Information available from the Status screen:

- Library status
- Drive status (summary)
- Full drive status is available through the **Full Drive Status** button.

Move media

The Move Media button enables you to move a selected cartridge to a target drive or cartridge slot.

Note: Do not move tape cartridges while the library applications software is running. If you do, unrecoverable software faults might occur!

To move a selected cartridge using Web TCL, complete the following procedure:

1. Specify the source slot and destination.
2. Click the **Execute the move** button.

A screen is displayed notifying the user that selecting confirm will cause the library to go offline during the move media operation.

3. Click **Confirm** to proceed with the move.

Setup

Click **Setup** to set various configuration options. Select one of the configuration options from the menu to view or change parameters. The settings correspond to those in the Configure Menu on the library touch screen.

Functions

Click **Functions** to execute a cleaning or a diagnostic.

The functions available from this screen include the following:

- Perform a drive cleaning operations
- Perform a free running library diagnostics
- Perform standard library diagnostics
- Drive flash operations
- Reset Web TLC
- Reset library

History

Click **History** to view a list of files that can be displayed or downloaded. When you select a file, a Save As window is displayed, which enables you to select a network destination for the download. When you click **Display Trace**, the trace log will be viewed through the browser.

Appendix A. Adding a tape drive

This appendix explains how to add a tape drive to the library. See Chapter 1, "Introduction" for a list of tape drives supported by the library.

To add a tape drive, complete the following procedure:

1. Unpack the tape drive and inspect it for any damage. If the tape drive has been damaged, return it to IBM for a replacement.

Note: With a blank panel or tape drive removed, there is access to moving parts. DO NOT reach into open cavities.

2. Remove the blank panel that covers the appropriate tape-drive mounting bay as shown in Figure 62. Save the blank panel for future use.

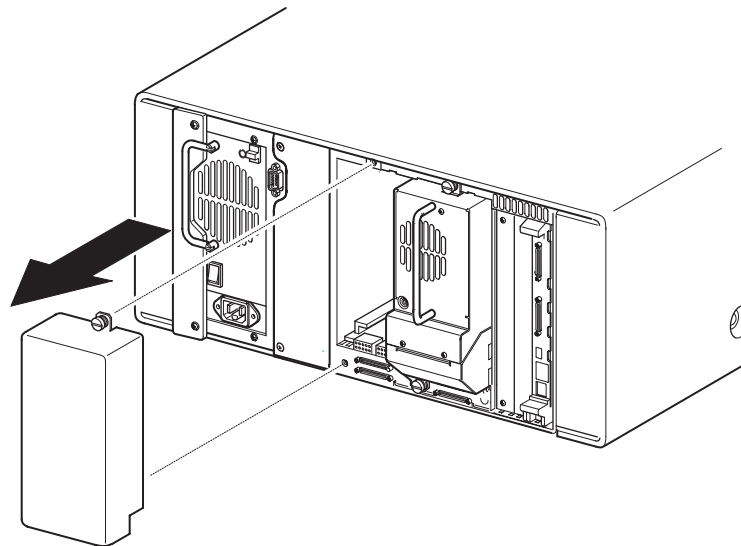


Figure 62. Removing tape-drive blank panel

3. Carefully insert the tape drive into the mounting bay. Make sure you push the drive in all the way so that it fully seats the mating connectors at the rear of the library.

Note: The tape drives are hot-plug capable so you do not have to turn the library off when removing or installing a tape drive.

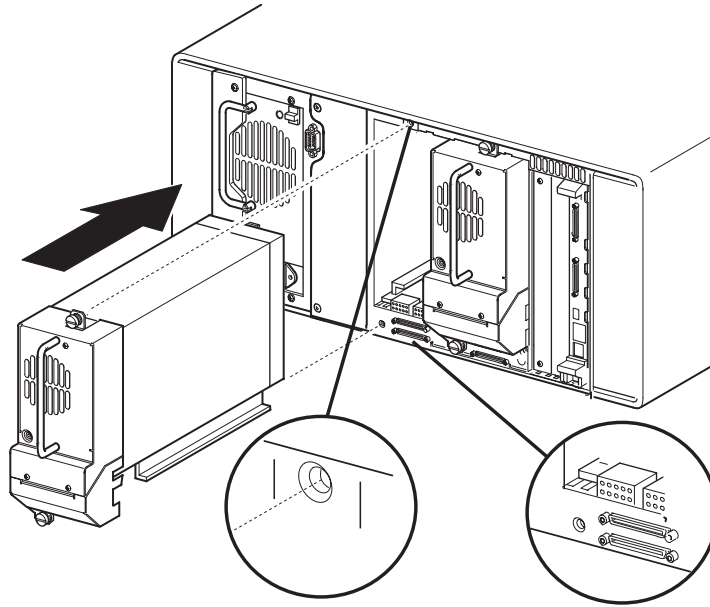


Figure 63. Installing a tape drive

4. Secure the tape drive to the library using the two thumbscrews.
5. Configure the tape drive using the touch screen.

Appendix B. Adding a library module

The 4560SLX architecture is uniquely suited to growing storage needs. It enables the robotics in the 4560SLX Tape Library to exchange cartridges by means of a pass-through cartridge elevator, integrating the robotics of each individual module into a single high-performance library robotics system. The 4560SLX Tape Library can be modified by adding modules and cartridge elevators. Add drives to speed performance or magazine space for greater capacity.

The major steps needed to install a cartridge elevator are as follows:

1. Rack preparation

Verify the correct installation and alignment of the rack-mounted modules as described in Chapter 2, "Installation" on page 11. This is crucial when installing a cartridge elevator. Re-alignment of modules might be required during installation of a cartridge elevator.

2. Verify minimum firmware

Check the firmware level of the module you select as the master control module. The top module in the rack is the master control module.

3. Mechanical installation

Substeps include:

- Installing a router
- Installing a module in the rack
- Assembling the cartridge elevator (the 10U is factory assembled)
Combinations of the base unit and available extensions can be added to accommodate virtually any configuration of SDLT modules up to a total of 40U.
- Installing a cartridge elevator in the rack-mounted modules

4. Configuration

Touch screen inputs to configure master and slave modules

5. Cabling

- Motor cable from the master module to the primary cartridge elevator
- 10BaseT cables from the router to master and slave modules

6. Secondary master

Substeps include:

- Configuring the secondary master
- Initiating fail-over
- Restoring the primary master

Planning your installation

The multiple module cartridge elevator is intended to be mounted in a standard 19-inch equipment rack with a depth of 24 to 30 inches. There are two cartridge elevator accessories:

- 10U base cartridge elevator (Part number: 59P6662)
- 5U cartridge elevator extension (Part number: 59P6663)

The cartridge elevator is composed of a 10U motor drive assembly with extensions equal to the combined heights of the number of modules installed in the rack. You will need to install an additional extension section and timing belt with each additional library you install.

Prepare each module in a multi-unit library system for cartridge elevator installation by removing the cartridge elevator cover blanks, drive shoe assemblies (drive 2), and the blank drive shoe covers while they are outside of the storage cabinet. Alignment of the modules might be necessary during the installation.

Positioning the modules

The cartridge elevator motor drive section must be mounted at the top of the module stack. The top module is designated as the master through the touch screen and it senses the position of each module during initialization at power-up. The other modules are designated as slaves.

For ease of installation, the router should be mounted at the top rear of the rack above the master module, allowing for easy expansion of your storage capability.

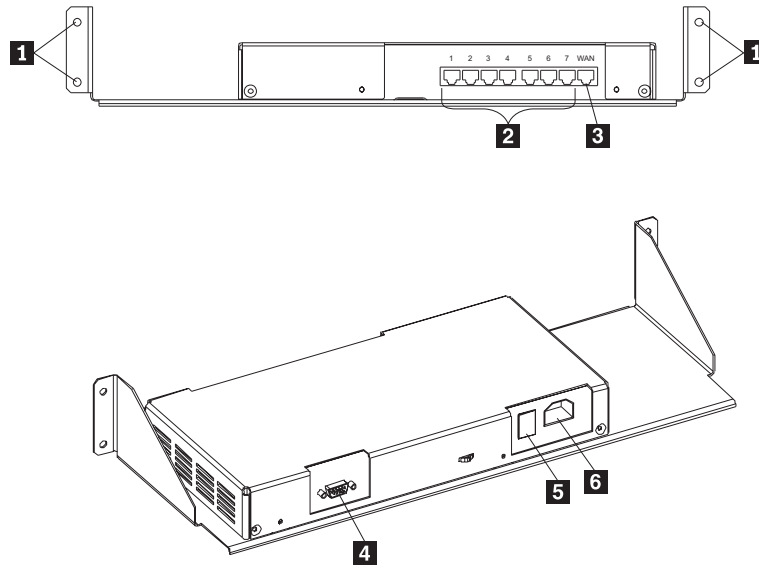
Cartridge elevator router

The cartridge elevator router is an 8-port configured device. It is a plug-and-play device when installed in a standard rack and connected by 10BaseT cables to individual modules. The router can support up to seven libraries. It is pre-configured specifically for use with a multi-module library. The router is physically encased in a rack-mountable shelf to be installed in the rack.

Router installation

To install the cartridge elevator router, complete the following procedure:

1. Verify that power is not applied to the router and that the power cord is not connected.



- 1** Mounting holes
- 2** 10BaseT connection ports
- 3** Host port
- 4** COM port (factory use only)
- 5** Power switch
- 6** ac power

Figure 64. Cartridge elevator router

2. Position the router at the top rear of the rack to locate the appropriate mounting holes in the rack rails.
3. Install the four captive fasteners into the rack rails.
4. Mount the router using the four screws (10-32x 1/2 P.H.). Do not apply power or connect any cables.
5. You have received a pre-assembled 10U cartridge elevator. If the length is correct for your system, proceed to "Installing the cartridge elevator" on page 72. If you need to add an extension to your system, proceed to "Cartridge elevator extension assembly" on page 75.

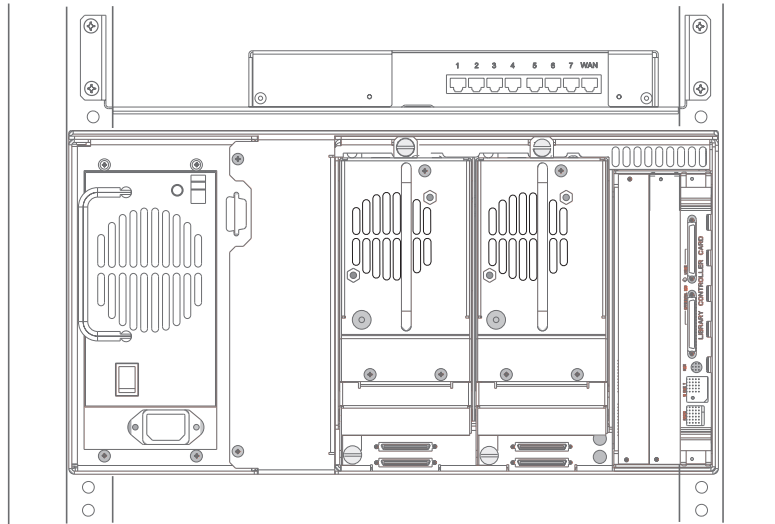


Figure 65. Cartridge elevator router installed

Installing the cartridge elevator

To install the cartridge elevator, complete the following procedure:

Note: The following procedure assumes that the modules have been prepared for rack-mount installation or are installed in a rack.

1. Ensure that the router is mounted at the top of the rack.
2. If modules are rack-mounted, verify that all units are powered down and the power cords are removed.

Note: Attempting to install the cartridge elevator to a fully powered 4560SLX Tape Library module might cause severe damage to unit circuitry.

3. Remove drive shoe 2 as shown in Figure 66 on page 73 or the blank cover for each module that will use the cartridge elevator.

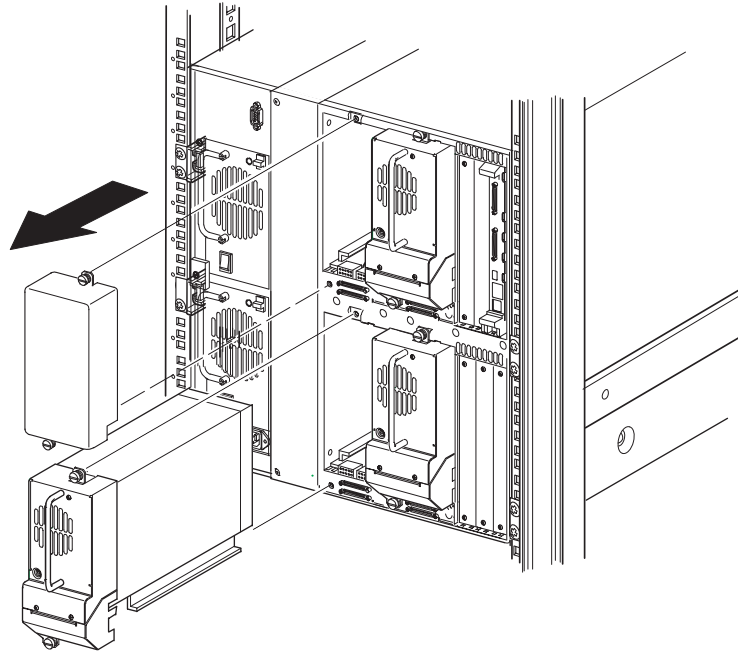


Figure 66. Drive shoe and blank panel removal

Note: With a blank panel or tape drive removed, there is access to moving parts. **DO NOT** reach into open cavities.

- a. Loosen the captive retainer screws at the top center and lower left of the drive module.
 - b. Pull straight back on the drive shoe handle to remove the drive. Some effort will be required to overcome the initial resistance of unplugging the module from the receiver.
 - c. Continue to slide the drive out while fully supporting the module until the drive load handle has cleared the back of the library.
4. Remove the cover plate adjacent to the power supply as shown in Figure 67 on page 74.
- a. Remove two screws from the back of the cover plate.
 - b. Remove two inner screws from inside the drive shoe slot.
 - c. Remove top screw. Rack-mounted modules must be slid forward to access the top cover screw.

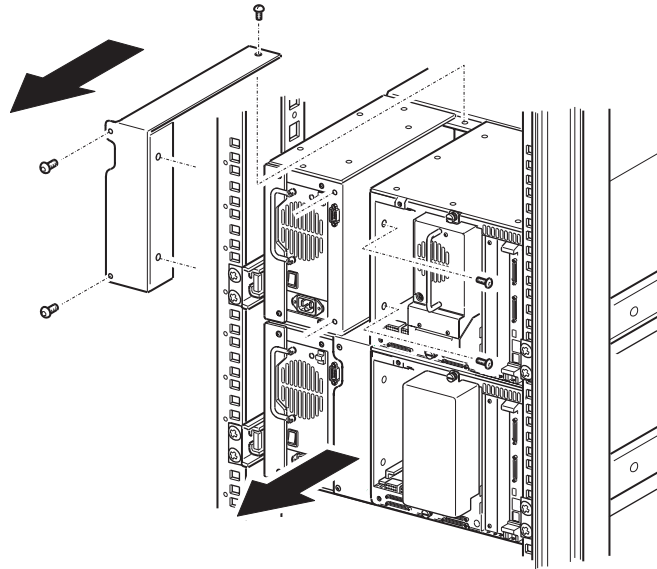


Figure 67. Cover plate removal

5. Install all of the modules in the equipment rack.
6. Slide each of the 4560SLX Tape Libraries a few inches forward, starting below the top (master) library module.
 When installing the cartridge elevator assembly, work from top to bottom of the library assembly. This eases alignment with less binding of the inner guide pins. As each module is physically connected by the retaining screws, slide the module back until seated and the inside guide pin and retainer holes are aligned. Then tighten the retainer screws.
7. Carefully insert the cartridge elevator base unit into the top library module making sure the top pins are fully engaged.
8. Secure the base unit to the top library, using the base unit top and top-middle thumbscrews.
9. Secure the base unit to the second library, using the base unit bottom-middle and bottom thumbscrews.
 If the pins are difficult to align to the bottom (slave) libraries, push them forward slightly and then engage each one by pulling them one at a time toward the cartridge elevator and then tighten the appropriate thumbscrews.
10. Using the extension thumbscrews, secure the cartridge elevator to the remaining libraries in the multi-unit library system.
 If you still cannot align the bottom (slave) libraries to the cartridge elevator base unit, slightly loosen the rear rail bracket screws for each library, reposition it, and then secure it to the cartridge elevator. Afterwards, re-tighten all rear rail bracket screws.

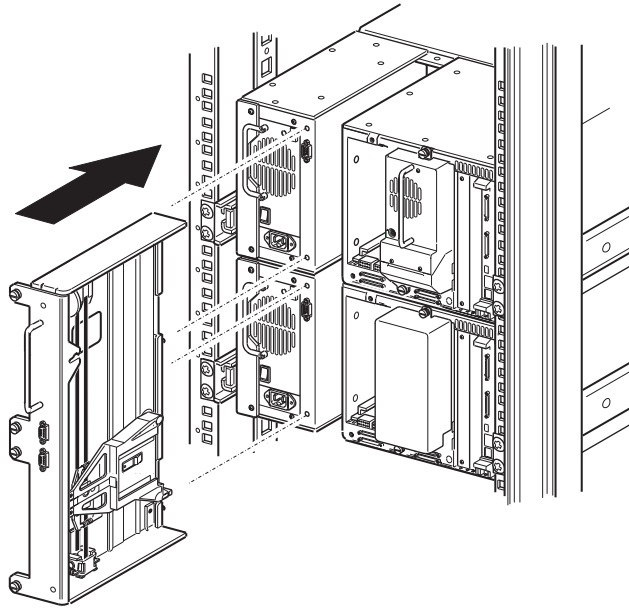


Figure 68. Cartridge elevator (two units) installed

11. Replace drive 2 or the blank cover to all modules. If replacing a drive, repeat the procedure below for each module.
 - a. Fully support the drive shoe assembly while starting it into the receiver, being careful not to damage the drive load handle.
 - b. Push the drive shoe assembly slowly into the receiver until it seats against the back of the library.
 - c. Tighten the two captive retainer screws to secure the module to the library.
 - d. Repeat for all modules. See “Module configuration” on page 82.

Cartridge elevator extension assembly

This section provides information on cartridge elevator extension components and assembly.

Components

The cartridge elevator is made up of the following components:

- Primary chassis (10U length)
- Media elevator car
- PCB
- Belt block and brackets
- Drive belt
- Drive motor
- Drive motor pulley
- Belt tensioner ramp and idler pulley
- Standoff
- Motor cable

The cartridge elevator extension contains the following components:

- 5U extension

- Tie bars (to connect extensions)
- Install hardware

The following are required tools for the cartridge elevator:

- #2 Phillips, stubby, or right-angle screwdriver
- Flat-blade screwdriver
- 0.05 in. allen wrench
- Scissors or knife (for sizing the belt)

Figure 69 shows a typical 10U cartridge elevator assembly. The motor drive section always goes on top, and the base section with the idler pulley always goes on the bottom. Extension sections are mounted between the motor drive section and the base section. All extensions are joined together with tie bars. The cartridge elevator moves tape cartridges vertically between the modules.

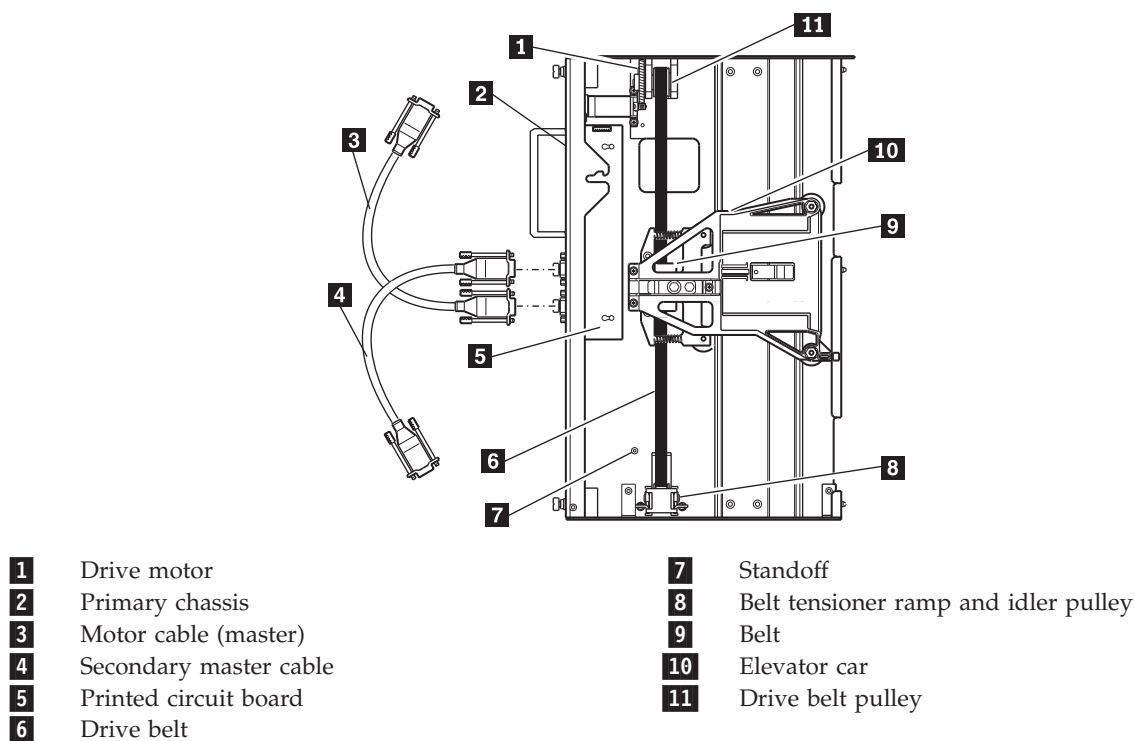


Figure 69. Factory assembled cartridge elevator

Assembly

You will need a clean, flat work area such as a table or work bench. The surface should be long enough to support the full height of the cartridge elevator. The height is equal to the height of the stack of modules in your system. Use the following procedure to assemble your cartridge elevator.

If you received a pre-assembled 10U cartridge elevator and the length is correct for your system, see "Installing the cartridge elevator" on page 72. If you need to add a cartridge elevator extension section, complete the following procedure:

1. Remove the retaining screws from the bottom plate of the cartridge elevator.

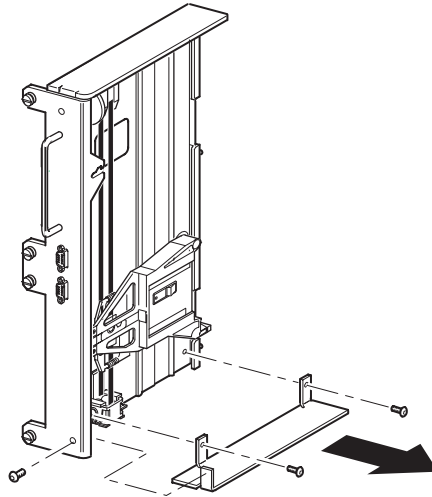


Figure 70. Cartridge elevator bottom plate

2. Slide the elevator car to the top of the primary chassis.
The elevator car is now positioned over the belt block bracket access cutout next to the PCB and drive motor.

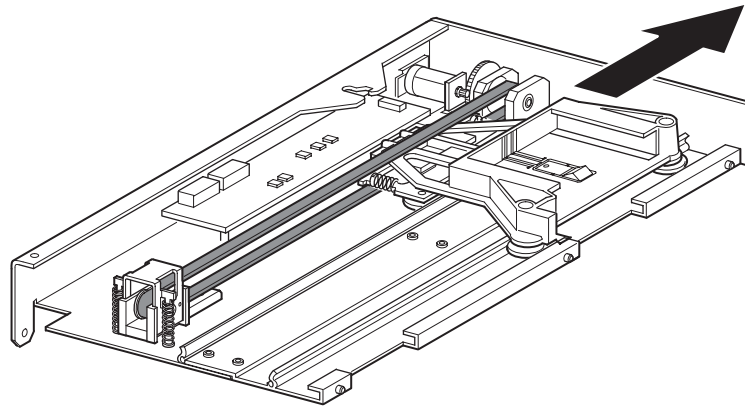


Figure 71. Cartridge elevator media elevator car

3. On the tensioner ramp/idler pulley base of the primary chassis, compress the springs until the holes in the tensioner ramp are aligned with the holes in the base of the tensioner, and insert a 0.05 in. allen wrench through the holes as shown in Figure 72 on page 78. This sets the idler pulley to the zero position.

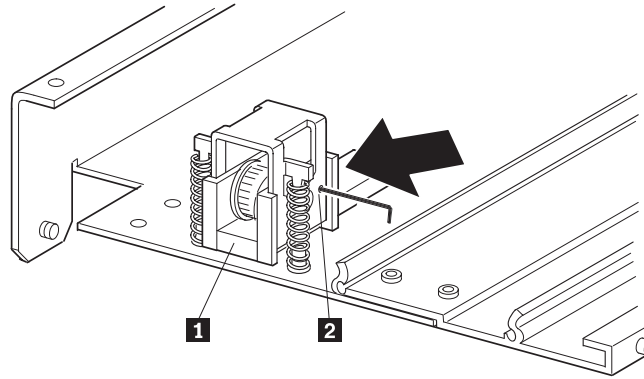


Figure 72. Tensioner ramp/idler pulley zero point

4. Turn the primary chassis face down.
The belt block brackets and fasteners are now visible through the access cutout.
5. Remove the four mounting screws from the two belt block brackets as shown in Figure 73.

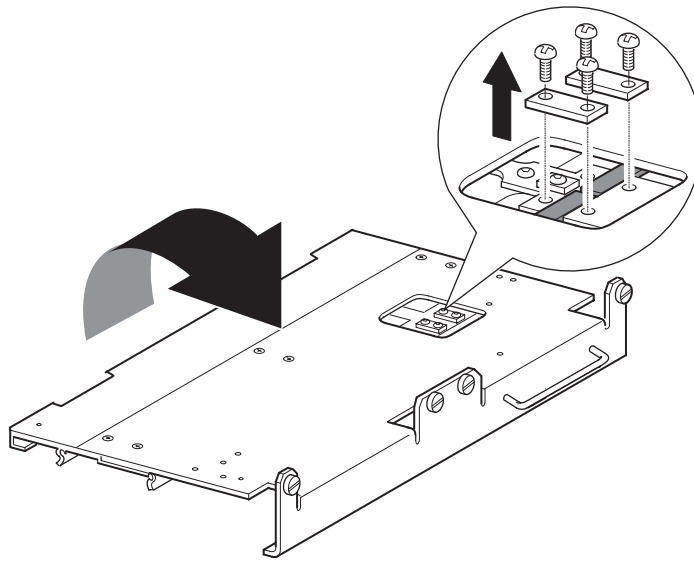


Figure 73. Cartridge elevator belt block and brackets

6. Turn the primary chassis face up and remove the belt from the media elevator car and the tensioner ramp/idler pulley.
7. Remove the belt tensioner components as shown in Figure 74 on page 79.
 - a. Remove the two screws and springs from tensioner ramp/idler pulley.
 - b. Remove the other two screws from the tensioner ramp/idler pulley.
 - c. Remove the tensioner ramp/idler pulley.

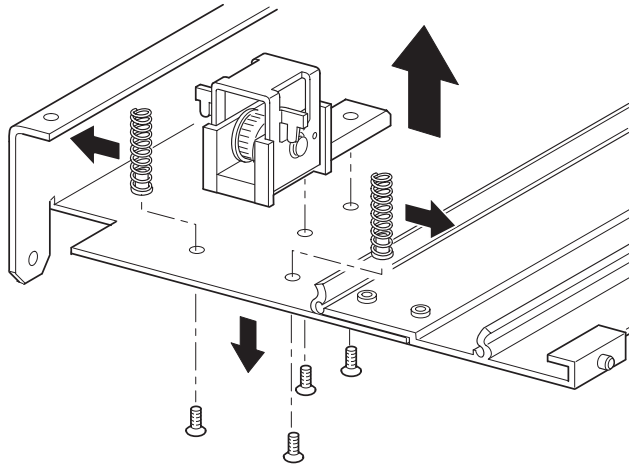


Figure 74. Tensioner ramp/idler pulley

8. Mount the cartridge elevator extension:
 - a. Insert alignment pins of the extension to the slot at the bottom of the primary chassis as shown in Figure 75.

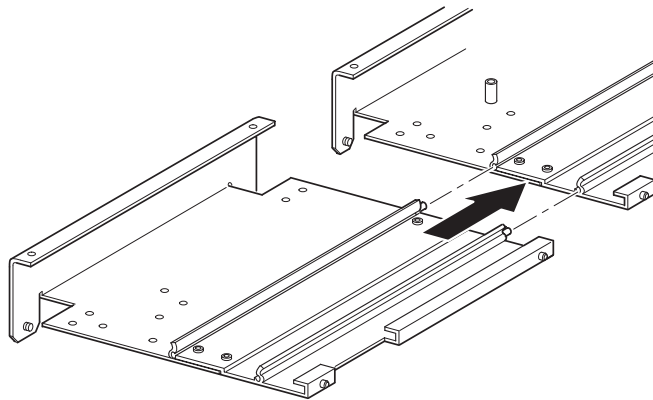


Figure 75. Cartridge elevator extension alignment

- b. Align the tie bar pins of the two narrow tie bars to the holes in the extension and primary chassis and attach with the four mounting screws (two each) as shown in Figure 76 on page 80.

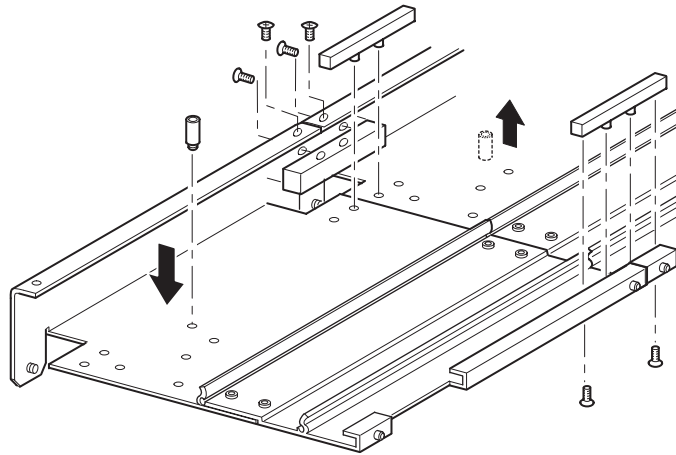


Figure 76. Tie bar installation

- c. Attach the large tie bars with the four mounting screws so that the beveled edge is facing the inside corner of the chassis and extension.
- 9. Remove the bottom stop standoff from the primary chassis and attach it to the cartridge elevator extension in the corresponding mounting hole as shown in Figure 76.
- 10. Attach the tensioner springs mounting hardware and springs.
- 11. Attach the tensioner ramp/idler pulley components to the cartridge elevator extension in the same manner as shown in Figure 74 on page 79.
- 12. On the tensioner ramp/idler pulley base of the base expansion section, compress the springs until the holes in the tensioner ramp are aligned with the holes in the base of the tensioner, and insert a 0.05 in. allen wrench through the holes. This sets the idler pulley to the zero position.
- 13. Cut the new timing belt supplied with the expansion kit (between the teeth) to the appropriate size for the total number of modules used as shown in Table 8.

The timing belt supplied with the expansion kits is marked and numbered at the appropriate cut points.

Table 8. Timing belt lengths

Number of modules	Number of teeth	Length of belt (Centimeters)	Length of belt (Inches)
2	169	85.8	33 13/16
3	257	130.6	51 3/8
4	344	174.8	68 13/16
5	432	219.5	86 3/8
6	519	263.6	103 13/16
7	607	308.4	121 3/8
8	694	352.6	138 13/16

- 14. Thread the timing belt counter-clockwise through the top of the tensioner ramp/idler pulley and clockwise through the motor drive pulley as shown in Figure 77 on page 81 and Figure 78 on page 81.

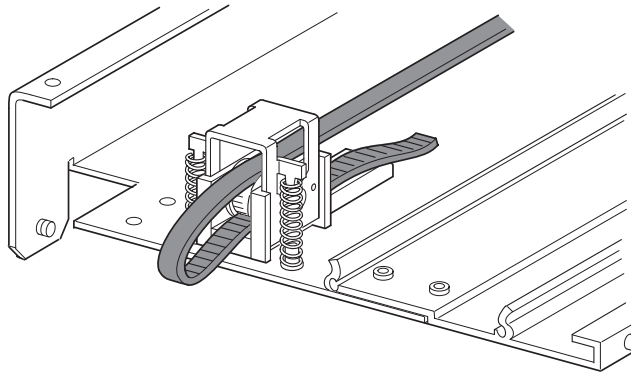


Figure 77. Timing belt installation base section

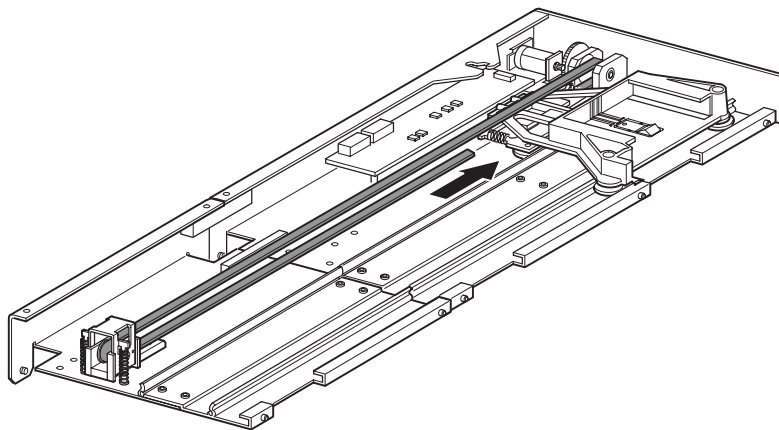


Figure 78. Timing belt installation

15. Position the media elevator car over the belt block access cutout.
16. Position the ends of the timing belt under the elevator car at the midpoint of the belt block access cutout.
17. Turn the cartridge elevator face down.
18. Place the timing belt ends on the belt block as shown in Figure 79 on page 82.

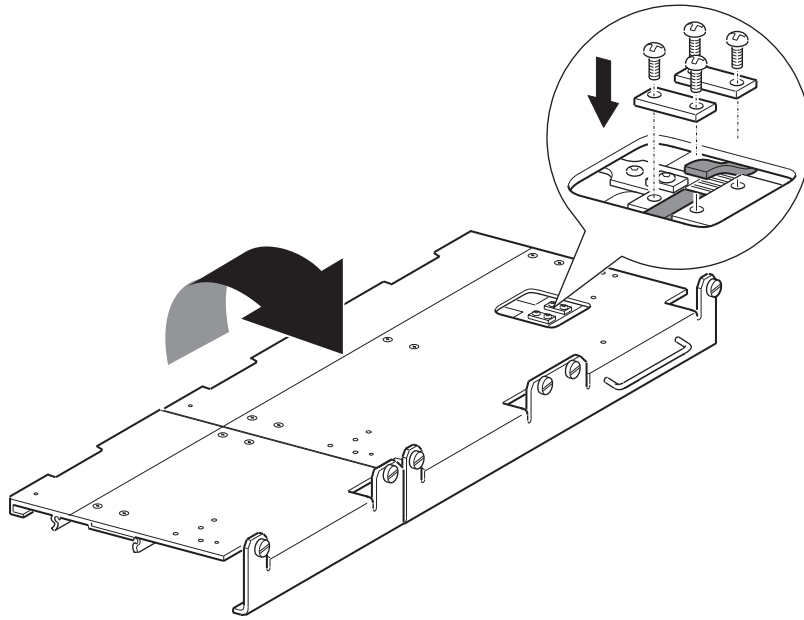


Figure 79. Timing belt to belt block

19. Secure the timing belt with the two belt brackets and four retaining screws. If the belt was sized properly a small space between the belt ends is visible as shown in Figure 79.
20. Remove the 0.05 in. allen wrench from the tensioner ramp.
21. Attach the bottom plate removed from the cartridge elevator in step 1 with the retaining screws as shown in Figure 80.

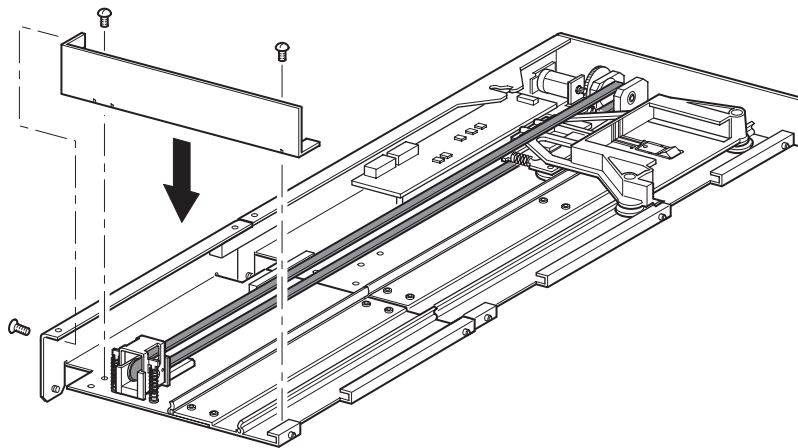


Figure 80. Assembled cartridge elevator and extension

22. Go to “Installing the cartridge elevator” on page 72.

Module configuration

Configuring the multi-module library includes identifying which library module is the master and which are the slaves. The module designated as the primary master will monitor and modify the parameters and settings of the entire multi-module cartridge elevator. The primary master can be used to perform many of the

common functions in a slave module. The following procedure prepares your multi-module library for cartridge elevator use.

The following procedure assumes that the modules are configured for standalone operation, that they have been rack mounted, that the system router is installed at the top of the rack above the primary master with power off, and that the 10BaseT cabling is not connected to any of the modules.

If the modules are not powered up, apply power to all library modules as shown in Figure 81.

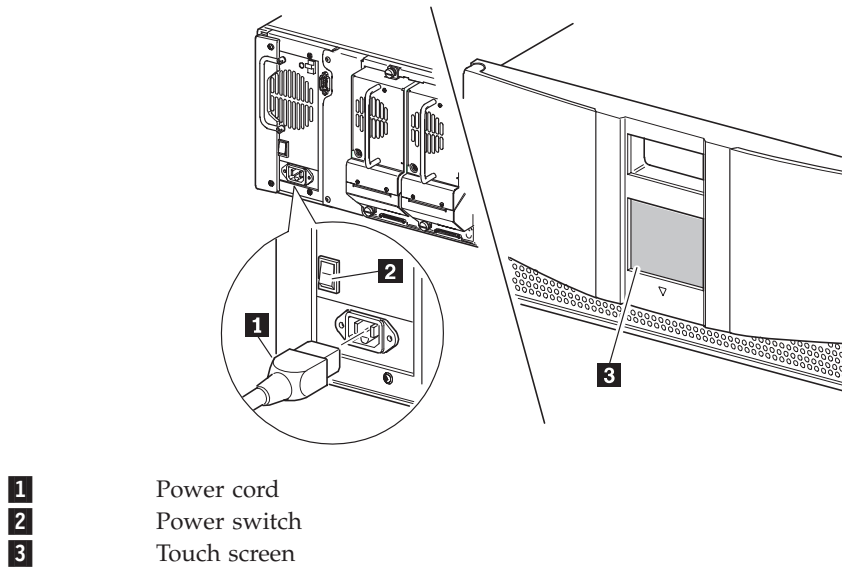


Figure 81. Powering up the library

1. Connect the power cord to the power supply receptacle.
2. Toggle the power switch located on the power supply to ON.
3. Press the touch screen to apply power to the module.

Configuring the primary master module

To configure the primary master module, complete the following procedure:

1. Press **Menu** on the primary master library touch screen.
2. Under Edit Options press **Library**.
3. Press the scroll down arrow until Module Configuration is visible.
4. Press the button adjacent to Module Configuration.

The Module Configuration screen is displayed.

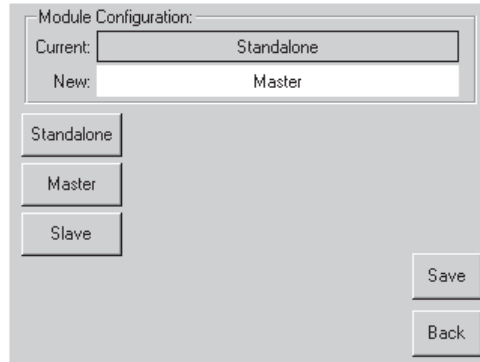


Figure 82. Module Configuration screen

5. Press **Master**, then press **Save**.
The Module Configuration Confirmation pop-up window is displayed.
6. Press **OK**. The module reboots.
The touch screen will display the module as “Primary Master (Active)” when all cabling has been performed.

Configuring slave modules

To configure the slave modules, complete the following procedure:

1. Press **Menu** on the touch screen of the library you want to configure as a slave.
2. Under Edit Options press **Library**.
3. Press the scroll down arrow until Module Configuration is visible.
4. Press the button adjacent to Module Configuration.
The Module Configuration screen is displayed.

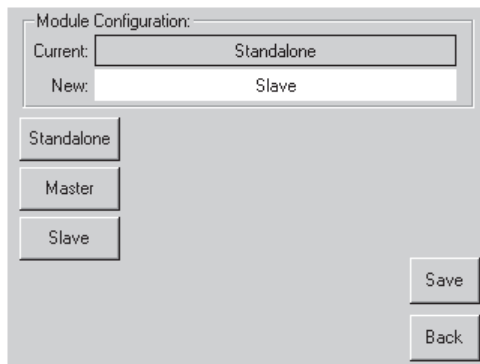


Figure 83. Module Configuration screen

5. Press **Slave**.
6. Press **Save**.
Module Configuration Confirmation pop-up window is displayed.
7. Press **OK**. The module reboots.
Several screen functions are not available to slave modules. Those functions including Online, Magazine Access, Mail Slot Access, and Move Media are

now controlled through the master. The missing options identify the module as a slave as shown in Figure 84.



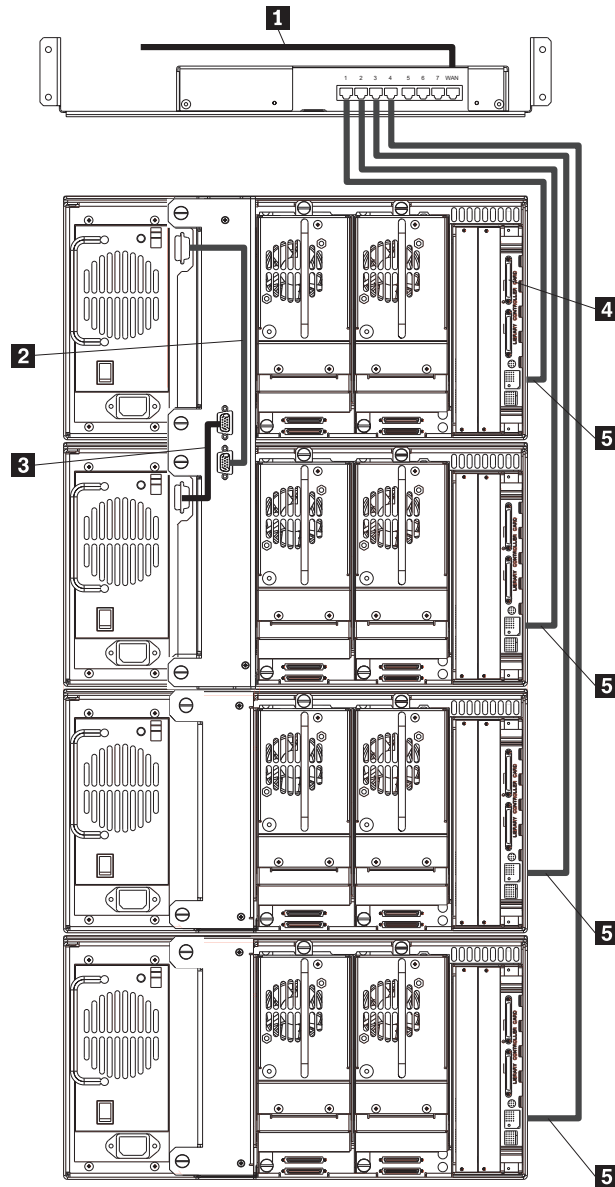
Figure 84. Module configured as a slave

8. Repeat step 1 through step 6 for all slave modules.
9. Using the touch screen, power off all modules, both master and slaves, after configuration and then switch the master power switch at the rear of each module to the off (0) position.
10. Verify that all modules are powered down.
11. Proceed to “Cabling and interface connections”.

Cabling and interface connections

Before the cartridge elevator combination can communicate with the host device or user applications, the connections shown in Figure 85 on page 86 must be made. A four module library is used for illustration purposes. The second module (slave 0) has been selected as the secondary master.

1. Verify that the modules and router have been properly installed in the rack.
Power down all the modules and the router.

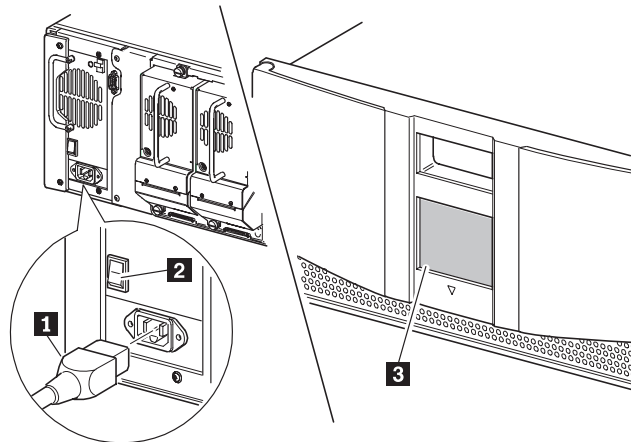


- | | |
|---|---|
| <p>1 To host</p> <p>2 Master to cartridge elevator</p> <p>3 Cartridge elevator to secondary master</p> | <p>4 Library controller card terminator connection</p> <p>5 10BaseT connections</p> |
|---|---|

Figure 85. Four module library cabling

2. Install a terminator on the master library controller adapter connection.
3. Optional: Connect the WAN point to the host with a 10BaseT cable as shown in Figure 64 on page 71 and Figure 85. This step is applicable to systems that utilize a host. (For WEB TLC operations.)
4. Using 10BaseT cable, connect a cable from router port 1 to the primary master SDLT module. See Figure 64 on page 71 and Figure 85.
5. Connect a cable from router port 2 to the secondary master.
6. Continue connecting cables, router port 3 to the third module, port 4 to the fourth module and so on until all modules are connected to the router. Ensure the power is off before proceeding with steps 7 and 8.

7. Connect the male to male 9-pin cartridge elevator cable from the primary master to the lower serial port connection on the cartridge elevator.
8. Connect the other 9-pin cartridge elevator cable from the secondary master (module 2 in this example) to the upper serial port connection on the cartridge elevator.
The 9-pin cartridge elevator cable to the secondary master module enables the firmware (by operator initialization) to initiate a fail-over from the primary master to the secondary master and designate it as the secondary master.
9. Connect the power cord to the router.
10. Supply power to the router. Power up the router before the modules.
11. Turn on the library modules as shown in Figure 86.



- | | |
|----------|--------------|
| 1 | Power cord |
| 2 | Power switch |
| 3 | Touch screen |

Figure 86. Powering up the library

- a. Connect the power cord to the power supply's receptacle.
- b. Toggle the power switch located on the power supply to ON.
- c. Repeat steps a and b for all modules connected to the cartridge elevator.
- d. Press the slave module touch screens to apply power to the libraries.
- e. Press the master touch screen to apply power to all of the libraries.

Verifying firmware level of the slave modules

To ensure reliable multi-module operation, the slave modules must be using the same firmware level as the master module. The firmware of the slave modules can be updated using the firmware image of the master.

Verify the firmware level of the slave modules as follows:

1. After the POST completes, press **Menu** on the first slave module.
2. Press **Library Info** in the View System Data area.
3. The firmware revision is displayed on the Miscellaneous Library Info screen.
4. Repeat step 1 through step 3 for the other slave modules.

After the flash operation completes, the slave modules will reboot.

If any of the slave modules are at a different firmware level than the master, update the multi-module system using the master module touch screen (if firmware version 2.33 or higher is installed). Web TLC or the configuration utility connected to the master module can also be used to update the modules.

For additional assistance on using the configuration utility or the Web TLC to upgrade the firmware, contact IBM Technical Support.

Fail-over operation

The 4560SLX Tape Library in a multi-module configuration enables one of the slave modules to take over control of the library as a temporary master if the primary master module is not operational. This is referred to as fail-over. The fail-over is a manual procedure that needs to be initiated by an operator, either locally through the touch screen or remotely using Web TLC. A fail-over operation can be initiated at any time. This section describes the terminology and methodology used to initiate a fail-over operation, and to restore the library to its normal operating condition.

Cartridge elevator terms

The following list describes the cartridge elevator terms:

- **Primary master (active):** An active primary master is a library that is configured as a master, connected to the primary cartridge elevator port, and is operating normally.
- **Secondary master (standby):** A standby secondary master is a library that is configured as a slave, connected to the standby cartridge elevator port, and is operating normally.
- **Secondary master (active):** An active secondary master is a library that is configured as slave, connected to the standby cartridge elevator port, and is in a failed-over condition.
- **Primary master (inactive):** An inactive primary master is a library that is configured as master, connected to the primary cartridge elevator port, and is in a failed-over condition.
- **Failed-over:** Failed-over is the condition of a multi-module library, where a designated slave module will temporarily act as a master module in the event of a failure of the primary master module.

Cabling considerations for fail-over operation

To enable proper fail-over operation, the SCSI connection to the primary and secondary master should be daisy-chained. This enables the secondary master to assume control of the SCSI bus when the primary master fails.

Fail-over initiation

In order for a fail-over operation to take effect, the library modules must be correctly cabled to the cartridge elevator hardware, as described in “Cabling and interface connections” on page 85:

- The master module must be connected as the primary master as shown in Figure 85 on page 86.
- One of the slave modules must be connected as the secondary master as shown in Figure 85 on page 86.

Local fail-over to secondary master initiation

The fail-over operation should be initiated when it is determined that the primary master module is in a hard fault condition.

1. From the secondary master touch screen, select **Menu**.
2. Select **Maintenance**. The Secondary Master Maintenance screen will appear.

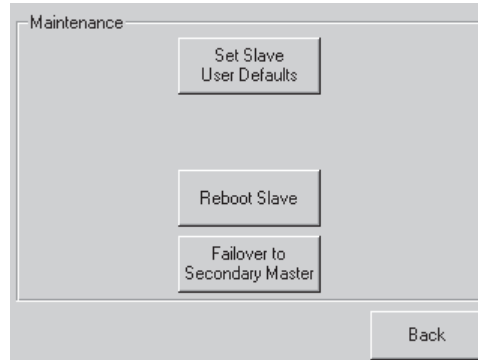


Figure 87. Secondary Master Maintenance screen

3. Select **Fail-Over to Secondary Master**.

The library will transfer control of the cartridge elevator to itself, power down the primary master, then reboot.

Remote fail-over to secondary master initiation

To configure the secondary master for remote fail-over, complete the following procedure:

1. If the library is connected to a network, use a Web browser to connect to the library's fail-over URL, which uses the same IP address of the library's Web TLC, but uses port 8008. For example, if the Web TLC address is 10.1.15.77, the fail-over URL will be <http://10.1.15.77:8008>.
2. Log in.
3. Select **Fail-over to Standby Module**.
4. Confirm that you want to fail-over to the standby module.

The secondary master will transfer control of the cartridge elevator to itself, power down the primary master, and then reboot.

Restoring normal operation

After the failed module is replaced, a procedure similar to the one described in the previous section can be invoked to restore the original operation. In order for the restore operation to take effect, the future master module must be connected as the inactive primary master.

Local fail-over to primary master

To configure the primary master for local fail-over, complete the following procedure:

1. From the secondary master touch screen, select **Menu**.
2. Select **Maintenance**.
3. Select **Fail-over to Primary Master**.

The secondary master will transfer control of the cartridge elevator back to the primary master and then reboot.

After rebooting, the modules will revert back to their default configurations and the library will be fully operational.

Remote fail-over to primary master

To configure the primary master for remote fail-over, complete the following procedure:

1. If the library is connected to a network, use a Web browser to connect to the library's Web TLC URL using the default HTTP port, log in, and select **Functions**.
2. Confirm that you want to fail over to the primary module.

The secondary master will then transfer control of the cartridge elevator back to the primary master, then reboot. After rebooting, the modules will revert back to their default configurations and the library will be fully operational.

Appendix C. Specifications

This appendix provides hardware, environmental, primary power, and cooling specifications and installation considerations for the 4560SLX Tape Library.

Hardware

The following tables provide the operational specifications, reliability, and physical characteristics of the 4560SLX Tape Library.

Table 9. Operational specifications

Operational specifications	4560SLX Tape Library
Host SCSI interface	LVD/SE
Drive configuration	0, 1, 2
Drive compatibility	Quantum SDLT 320, LTO Ultrium 200
Number of cartridges	26 removable (SDLT) or 30 removable (LTO)
Maximum data capacity (native)	>4.16 TB (SDLT), 3.00TB (LTO)
Maximum transfer rate (native)	>57.6 GB/hr. (SDLT), 54 GB/hr. (LTO)
Mount time into drive	<10 seconds, excluding cartridge elevator access
Dismount time from drive	<10 seconds, excluding cartridge elevator access

Table 10. Reliability

Reliability	4560SLX Tape Library
Mean Time Between Failure (MTBF)	>250,000 hours (excluding power supply, tape drives, and cooling fans)
Mean Swaps Before Failure (MSBF)	2,000,000 cartridge cycles
Design Life	7 yrs. @ 30% duty cycle
Mean Time to Repair (MTTR)	<10 min (most FRUs)

Table 11. Physical characteristics (tabletop version)

Physical characteristics	4560SLX Tape Library
Height	8.75 in. (22.25 cm) nominal (5U) Note: The rear rack enclosure door (if any) must provide minimum of 3.0" additional clearance from the rear of the chassis for SCSI cables and fan housings.
Width	16.75 in. (22.23 cm)
Depth (including drive handles)	31 in. (78.74 cm)
Weight	<ul style="list-style-type: none">Unpacked 67.0 lbs (30.40 kg) estimated (with 2 drives installed)Packaged 99.0 lbs (44.91 kg) estimated

Environmental

This section provides safety, electromagnetic emissions, electrostatic discharge, and vibration information for the 4560SLX Tape Library.

Safety

The 4560SLX Tape Library complies with the following regulatory agency product safety specifications:

Table 12. Safety specifications

Agency	Standard
UL Listed Mark	UL 1950, Standard for Safety of Information Technology Equipment
CUL Mark (Canadian UL)	CAN/CSA-C22.2 No. 950, Standard for Safety of Information Technology Equipment
CE Marking (European Union)	Low Voltage Directive, 72/23/EEC, European Union
TÜV GS Mark (Germany)	EN60950, (IEC950) Standard for Safety of Information Technology Equipment, Third Edition

Electromagnetic emissions

The 4560SLX Tape Library complies with the following EMC compliance specifications:

Table 13. Electromagnetic emissions specifications

Agency	Standard
FCC	US Std. 47 CFR, Part 15 Rules, Class A. Notation on product
Industry Canada	Industry Canada Rules, ICES-003, Class A. Notation on product
CE Marking (European Union)	EMC Directive, 89/336/EEC Laws, relating to electromagnetic compatibility, European Union EN55022, Standard, RFI limits, Information Technology Equipment, Class A EN55024, Information Technology Equipment, Immunity.
VCCI	Class 1 per CISPR 22, Japan. VCCI statement on product
BSMI (BCIQ)	CNS: 13438, Taiwan. EMC warning and certificate number on product
CTICK	Class A

Electrostatic discharge

The test shall be run using an ESD test probe to directly contact operator-accessible surfaces, plus 4560SLX Tape Library enclosure surfaces.

Table 14. Electrostatic discharge specification

Amplitude	Allowable errors
0 - 8 kV	None

Temperature, humidity, and altitude

The following table provides temperature, humidity, and altitude specifications for the 4560SLX Tape Library.

Table 15. Temperature, humidity, and altitude specifications (non-operating - long term)

Non-operating - long term (unpacked or packed)	
Dry Bulb Temperature	-40°C to 60°C
Temp Gradient	20°C/hr. (across the range)
Temperature Shock	15°C (over 2 min.)
Wet Bulb Temperature	30°C
Relative Humidity	5% to 95% (non-condensing)
Humidity Gradient	10%/hr
Altitude (sea level)	-1000 ft. to +10,000 ft.

Table 16. Temperature, humidity, and altitude specifications (transit - short term)

Transit - short term (packed 7 days)	
Dry Bulb Temperature	-40°C to 60°C
Temp Gradient	25°C/hr. (across the range)
Temperature Shock	15°C (over 2 min.)
Wet Bulb Temperature	30°C
Relative Humidity	5% to 95% (non-condensing)
Altitude (sea level)	-1000 ft. to +10,000 ft.

Shock

The following tables provide operating, non-operating, transit/storage, and physical drop test shock specifications for the 4560SLX Tape Library.

Table 17. Shock specifications (operating)

Operating (within spec - no damage)	
Peak Acceleration	1.5 G's
Duration	11 ms
Waveshape	1/2 sine pulses
Application	X,Y,Z axes, repeat 3 times

Table 18. Shock specifications (non-operating)

Non-operating (unpacked - no damage)	
Peak Acceleration	25 G's
Duration	11 ms
Waveshape	1/2 sine pulses
Application	X,Y,Z axes, repeat 3 times

Table 19. Shock specifications (transit/storage)

Transit/storage (packed - no damage)	
Peak Acceleration	30 G's
Duration	30 ms
Waveshape	1/2 sine pulses
Application	X,Y,Z axes, repeat 3 times

Table 20. Shock specifications (physical drop test)

Physical drop test (packaged - no damage)	
Drop Test Distance	12 in. (30.5 cm)
Application	Per ISTA (1 time)

Vibration

The following tables provide operating, non-operating, and transit/storage vibration specifications for the 4560SLX Tape Library.

Table 21. Vibration specifications (operating)

Operating (within spec - no damage)	
Frequency Range	5-1000-5 Hz
Peak Acceleration	.25 G's
Waveshape	Sinusoidal, 1 octave/min
Application	X,Y, Z axes, 2 sweeps pers

Table 22. Vibration specifications (non-operating)

Non-operating (unpacked - no damage)	
Frequency Range	5-1000-5 Hz
Peak Acceleration	1.0 G's
Waveshape	Sinusoidal, 1 octave/min
Application	X,Y, Z axes, 2 sweeps pers

Table 23. Vibration specifications (transit/storage)

Transit/storage (packed - no damage)	
Frequency Range	5-1000-5 Hz
Peak Acceleration	2.0 G's
Waveshape	Sinusoidal, 1 octave/min
Application	X,Y, Z axes, 2 sweeps pers

Primary power

This section provides information on voltage and frequency limits, power requirements, sag/surge protection, and power line disturbance for the 4560SLX Tape Library.

Voltage limits

The 4560SLX Tape Library is capable of using any nominal ac voltage between 100 and 240 V ac power, at 50 or 60 Hz. It is capable of powering up and operating without error from any voltage within the ranges specified:

Frequency limits

The 4560SLX Tape Library is capable of operation at either 50 Hz or 60 Hz. It will automatically adjust for 50-60 Hz primary power operation, without requiring user intervention or modification.

Power requirements

The 4560SLX Tape Library (with two tape drives installed) exhibits a nominal steady state ac power consumption of 192 watts, and a maximum peak power consumption of 240 watts.

Table 24. Current

Current	
4560SLX Tape Library	1.6 - 1.0 A (120 V ac - 240 V ac)

Sag/Surge protection

Once powered on, the 4560SLX Tape Library will continue to operate without error under the following conditions:

Table 25. Sag/Surge protection

Condition	Period
100 V -20%	2 seconds
120 V +15%	1 second
200 V -20%	2 seconds
240 V -20%	2 seconds

Power line disturbance

Once powered on, the 4560SLX Tape Library will continue to operate without error under the following conditions of power line disturbances:

Table 26. Power line disturbance

Disturbance	Period	Limit
PULSE: 1.2 ms rise - 50 ms decay 8.0 ms rise - 20 s decay	High Low	1.0 KV, Max 300 A, Max
RING: 0.5 ms @ 100 KHz	High Low	1.0 KV, Max 200 A, Max

Cooling

Forced-air cooling is used to keep the tapes drives, logic devices, motor amplifiers, motors, and power supplies below their maximum allowable temperatures at ambient extremes.

Installation considerations

This section contains installation considerations on rack mounting, input supply, and grounding for the 4560SLX Tape Library.

Rack mounting

When rack-mounted units are installed in a closed or multi-unit rack assembly, they might require further evaluation by certification agencies. The following information must be considered:

- The ambient temperature within the rack might be greater than the room ambient temperature. Install the library so that the amount of air flow required for safe operation is not compromised. The maximum equipment environment temperature is 50°C.
- Library installation should be conducted such that no hazardous stability condition is achieved due to uneven loading.

Input supply

Check power supply nameplate ratings to ensure that no overloading of supply circuits will occur.

Grounding

Check that reliable grounding of this equipment is maintained. Particular attention should be given to supply connections when connecting power strips.

Appendix D. Field replaceable units (FRUs)

Table 27 lists all of the parts that can be replaced by the user or trained service personnel.

Table 27. Field Replaceable Units (FRUs)

Description	Part number
SDLT sled drive	59P6699
LTO sled drive	59P6698
Robot assembly	59P6707
LCD display assembly	59P6713
Fibre channel interface card	59P6715
Library controller interface card	59P6708
Power supply assembly	59P6709
Left LTO magazine assembly	59P6703
Right LTO magazine assembly	59P6704
Left SDLT magazine assembly	59P6705
Right SDLT magazine assembly	59P6706
2M SCSI (drive to drive) cable	09N7276
4M SCSI (host to library) cable	09N7278

Appendix E. Warranty information

This section contains the warranty period for your product, information about obtaining warranty service and support, and the IBM Statement of Limited Warranty.

Warranty period

Contact your place of purchase for warranty service information. Some IBM Machines are eligible for on-site warranty service depending on the country or region where service is performed.

Machine - 4560SLX Tape Library

Warranty period - Three years

Service and support

The following information describes the technical support that is available for your product, during the warranty period or throughout the life of the product. Refer to your IBM Statement of Limited Warranty for a full explanation of IBM warranty terms.

Warranty information on the World Wide Web

The IBM Machine Warranties Web site at http://www.ibm.com/servers/support/machine_warranties/ contains a worldwide overview of the IBM Limited Warranty for IBM Machines, a glossary of terms used in the Statement of Limited Warranty, Frequently Asked Questions (FAQ), and links to Product Support Web pages. The IBM Statement of Limited Warranty is available from this Web site in 29 languages in Portable Document Format (PDF).

Online technical support

Online technical support is available during the life of your product through the Personal Computing Support Web site at <http://www.ibm.com/pc/support/>.

During the warranty period, assistance for replacement or exchange of defective components is available. In addition, if your IBM option is installed in an IBM computer, you might be entitled to service at your location. Your technical support representative can help you determine the best alternative.

Telephone technical support

Installation and configuration support through the IBM HelpCenter[®] will be withdrawn or made available for a fee, at IBM's discretion, 90 days after the option has been withdrawn from marketing. Additional support offerings, including step-by-step installation assistance, are available for a nominal fee.

To assist the technical support representative, have available as much of the following information as possible:

- Option name

- Option number
- Proof of purchase
- Computer manufacturer, model, serial number (if IBM), and manual
- Exact wording of the error message (if any)
- Description of the problem
- Hardware and software configuration information for your system

If possible, be at your computer. Your technical support representative might want to walk you through the problem during the call.

For the support telephone number and support hours by country, refer to the following table. If the number for your country or region is not listed, contact your IBM reseller or IBM marketing representative. Response time may vary depending on the number and nature of the calls received.

Support 24 hours a day, 7 days a week	
Canada (Toronto only)	416-383-3344
Canada (all other)	1-800-565-3344
U.S.A. and Puerto Rico	1-800-772-2227
All other countries and regions	Go to http://www.ibm.com/pc/support/ , and click Support Phone List .

IBM Statement of Limited Warranty Z125-4753-06 8/2000

Part 1 - General Terms

This Statement of Limited Warranty includes Part 1 - General Terms and Part 2 - Country-unique Terms. The terms of Part 2 replace or modify those of Part 1. The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you purchase for your use, and not for resale, from IBM or your reseller. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. The term "Machine" does not include any software programs, whether pre-loaded with the Machine, installed subsequently or otherwise. Unless IBM specifies otherwise, the following warranties apply only in the country where you acquire the Machine. Nothing in this Statement of Limited Warranty affects any statutory rights of consumers that cannot be waived or limited by contract. If you have any questions, contact IBM or your reseller.

The IBM Warranty for Machines: IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications ("Specifications"). The warranty period for a Machine is a specified, fixed period commencing on its Date of Installation. The date on your sales receipt is the Date of Installation unless IBM or your reseller informs you otherwise.

If a Machine does not function as warranted during the warranty period, and IBM or your reseller are unable to either 1) make it do so or 2) replace it with one that is at least functionally equivalent, you may return it to your place of purchase and your money will be refunded.

Extent of Warranty: The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible. The warranty is voided by removal or alteration of Machine or parts identification labels.

THESE WARRANTIES ARE YOUR EXCLUSIVE WARRANTIES AND REPLACE ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD.

Items Not Covered by Warranty: IBM does not warrant uninterrupted or error-free operation of a Machine. Any technical or other support provided for a Machine under warranty, such as assistance via telephone with "how-to" questions and those regarding Machine set-up and installation, will be provided **WITHOUT WARRANTIES OF ANY KIND.**

Warranty Service: To obtain warranty service for a Machine, contact IBM or your reseller. If you do not register your Machine with IBM, you may be required to present proof of purchase.

During the warranty period, IBM or your reseller, if approved by IBM to provide warranty service, provides without charge certain types of repair and exchange service to keep Machines in, or restore them to, conformance with their Specifications. IBM or your reseller will inform you of the available types of service for a Machine based on its country of installation. At its discretion, IBM or your reseller will 1) either repair or exchange the failing Machine and 2) provide the service either at your location or a service center. IBM or your reseller will also manage and install selected engineering changes that apply to the Machine.

Some parts of IBM Machines are designated as Customer Replaceable Units (called "CRUs"), e.g., keyboards, memory, or hard disk drives. IBM ships CRUs to you for replacement by you. You must return all defective CRUs to IBM within 30 days of your receipt of the replacement CRU. You are responsible for downloading designated Machine Code and Licensed Internal Code updates from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides.

When warranty service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. You represent that all removed items are genuine and unaltered. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced. The replacement assumes the warranty service status of the replaced item. Many features, conversions, or upgrades involve the removal of parts and their return to IBM. A part that replaces a removed part will assume the warranty service status of the removed part.

Before IBM or your reseller exchanges a Machine or part, you agree to remove all features, parts, options, alterations, and attachments not under warranty service.

You also agree to

1. ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange;
2. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
3. where applicable, before service is provided:
 - a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provides;
 - b. secure all programs, data, and funds contained in a Machine;
 - c. provide IBM or your reseller with sufficient, free, and safe access to your facilities to permit them to fulfill their obligations; and
 - d. inform IBM or your reseller of changes in a Machine's location.

IBM is responsible for loss of, or damage to, your Machine while it is 1) in IBM's possession or 2) in transit in those cases where IBM is responsible for the transportation charges.

Neither IBM nor your reseller is responsible for any of your confidential, proprietary or personal information contained in a Machine which you return to IBM or your reseller for any reason. You should remove all such information from the Machine prior to its return.

Limitation of Liability: Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other

contract or tort claim), except for any liability that cannot be waived or limited by applicable laws, IBM is liable for no more than

1. damages for bodily injury (including death) and damage to real property and tangible personal property; and
2. the amount of any other actual direct damages, up to the charges (if recurring, 12 months' charges apply) for the Machine that is subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code.

This limit also applies to IBM's suppliers and your reseller. It is the maximum for which IBM, its suppliers, and your reseller are collectively responsible.

UNDER NO CIRCUMSTANCES IS IBM LIABLE FOR ANY OF THE FOLLOWING: 1) THIRD-PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, YOUR RECORDS OR DATA; OR 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES, LOST PROFITS OR LOST SAVINGS, EVEN IF IBM, ITS SUPPLIERS OR YOUR RESELLER IS INFORMED OF THEIR POSSIBILITY. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

Governing Law

Governing Law: Both you and IBM consent to the application of the laws of the country in which you acquired the Machine to govern, interpret, and enforce all of your and IBM's rights, duties, and obligations arising from, or relating in any manner to, the subject matter of this Agreement, without regard to conflict of law principles.

Part 2 - Country-unique Terms

AMERICAS

BRAZIL

Governing Law: *The following is added after the first sentence:*

Any litigation arising from this Agreement will be settled exclusively by the court of Rio de Janeiro.

NORTH AMERICA

Warranty Service: *The following is added to this Section:*

To obtain warranty service from IBM in Canada or the United States, call 1-800-IBM-SERV (426-7378).

CANADA

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*

laws in the Province of Ontario.

UNITED STATES

Governing Law: *The following replaces “laws of the country in which you acquired the Machine” in the first sentence:*
laws of the State of New York.

ASIA PACIFIC

AUSTRALIA

The IBM Warranty for Machines: *The following paragraph is added to this Section:*
The warranties specified in this Section are in addition to any rights you may have under the Trade Practices Act 1974 or other similar legislation and are only limited to the extent permitted by the applicable legislation.

Limitation of Liability: *The following is added to this Section:*
Where IBM is in breach of a condition or warranty implied by the Trade Practices Act 1974 or other similar legislation, IBM’s liability is limited to the repair or replacement of the goods or the supply of equivalent goods. Where that condition or warranty relates to right to sell, quiet possession or clear title, or the goods are of a kind ordinarily acquired for personal, domestic or household use or consumption, then none of the limitations in this paragraph apply.

Governing Law: *The following replaces “laws of the country in which you acquired the Machine” in the first sentence:*
laws of the State or Territory.

CAMBODIA, LAOS, AND VIETNAM

Governing Law: *The following replaces “laws of the country in which you acquired the Machine” in the first sentence:*
laws of the State of New York.

The following is added to this Section:
Disputes and differences arising out of or in connection with this Agreement shall be finally settled by arbitration which shall be held in Singapore in accordance with the rules of the International Chamber of Commerce (ICC). The arbitrator or arbitrators designated in conformity with those rules shall have the power to rule on their own competence and on the validity of the Agreement to submit to arbitration. The arbitration award shall be final and binding for the parties without appeal and the arbitral award shall be in writing and set forth the findings of fact and the conclusions of law.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator.

The two arbitrators appointed by the parties shall appoint a third arbitrator before proceeding upon the reference. The third arbitrator shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the ICC. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

The English language version of this Agreement prevails over any other language version.

HONG KONG AND MACAU

Governing Law: *The following replaces “laws of the country in which you acquired the Machine” in the first sentence:*

laws of Hong Kong Special Administrative Region.

INDIA

Limitation of Liability: *The following replaces items 1 and 2 of this Section:*

1. liability for bodily injury (including death) or damage to real property and tangible personal property will be limited to that caused by IBM’s negligence;
2. as to any other actual damage arising in any situation involving nonperformance by IBM pursuant to, or in any way related to the subject of this Statement of Limited Warranty, IBM’s liability will be limited to the charge paid by you for the individual Machine that is the subject of the claim.

JAPAN

Governing Law: *The following sentence is added to this Section:*

Any doubts concerning this Agreement will be initially resolved between us in good faith and in accordance with the principle of mutual trust.

NEW ZEALAND

The IBM Warranty for Machines: *The following paragraph is added to this Section:*

The warranties specified in this Section are in addition to any rights you may have under the Consumer Guarantees Act 1993 or other legislation which cannot be excluded or limited. The Consumer Guarantees Act 1993 will not apply in respect of any goods which IBM provides, if you require the goods for the purposes of a business as defined in that Act.

Limitation of Liability: *The following is added to this Section:*

Where Machines are not acquired for the purposes of a business as defined in the Consumer Guarantees Act 1993, the limitations in this Section are subject to the limitations in that Act.

PEOPLE’S REPUBLIC OF CHINA (PRC)

Governing Law: *The following replaces this Section:*

Both you and IBM consent to the application of the laws of the State of New York (except when local law requires otherwise) to govern, interpret, and enforce all your and IBM’s rights, duties, and obligations arising from, or relating in any manner to, the subject matter of this Agreement, without regard to conflict of law principles.

Any disputes arising from or in connection with this Agreement will first be resolved by friendly negotiations, failing which either of us has the right to submit the dispute to the China International Economic and Trade Arbitration Commission in Beijing, the PRC, for arbitration in accordance with its arbitration rules in force at the time. The arbitration tribunal will consist of three arbitrators. The language to be used therein will be English and Chinese. An arbitral award will be final and binding on all the parties, and will be enforceable under the Convention on the Recognition and Enforcement of Foreign Arbitral Awards (1958).

The arbitration fee will be borne by the losing party unless otherwise determined by the arbitral award.

During the course of arbitration, this Agreement will continue to be performed except for the part which the parties are disputing and which is undergoing arbitration.

EUROPE, MIDDLE EAST, AFRICA (EMEA)

THE FOLLOWING TERMS APPLY TO ALL EMEA COUNTRIES:

The terms of this Statement of Limited Warranty apply to Machines purchased from IBM or an IBM reseller.

Warranty Service: If you purchase an IBM Machine in Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland or United Kingdom, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM. If you purchase an IBM Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kirghizia, Federal Republic of Yugoslavia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, or Ukraine, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

If you purchase an IBM Machine in a Middle Eastern or African country, you may obtain warranty service for that Machine from the IBM entity within the country of purchase, if that IBM entity provides warranty service in that country, or from an IBM reseller, approved by IBM to perform warranty service on that Machine in that country. Warranty service in Africa is available within 50 kilometers of an IBM authorized service provider. You are responsible for transportation costs for Machines located outside 50 kilometers of an IBM authorized service provider.

Governing Law: The applicable laws that govern, interpret and enforce rights, duties, and obligations of each of us arising from, or relating in any manner to, the subject matter of this Statement, without regard to conflict of laws principles, as well as Country-unique terms and competent court for this Statement are those of the country in which the warranty service is being provided, except that in 1) Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Hungary, Former Yugoslav Republic of Macedonia, Romania, Slovakia, Slovenia, Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan, the laws of Austria apply; 2) Estonia, Latvia, and Lithuania, the laws of Finland apply; 3) Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Congo, Djibouti, Democratic Republic of Congo, Equatorial Guinea, France, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Mali, Mauritania, Morocco, Niger, Senegal, Togo, and Tunisia, this Agreement will be construed and the legal relations between the parties will be determined in accordance with the French laws and all disputes arising out of this Agreement or related to its violation or execution, including summary proceedings, will be settled exclusively by the Commercial Court of Paris; 4) Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique, Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, United Kingdom, West Bank/Gaza, Yemen, Zambia, and Zimbabwe, this Agreement will be governed by English Law and

disputes relating to it will be submitted to the exclusive jurisdiction of the English courts; and 5) in Greece, Israel, Italy, Portugal, and Spain any legal claim arising out of this Statement will be brought before, and finally settled by, the competent court of Athens, Tel Aviv, Milan, Lisbon, and Madrid, respectively.

THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:

AUSTRIA AND GERMANY

The IBM Warranty for Machines: *The following replaces the first sentence of the first paragraph of this Section:*

The warranty for an IBM Machine covers the functionality of the Machine for its normal use and the Machine's conformity to its Specifications.

The following paragraphs are added to this Section:

The minimum warranty period for Machines is six months. In case IBM or your reseller is unable to repair an IBM Machine, you can alternatively ask for a partial refund as far as justified by the reduced value of the unrepaired Machine or ask for a cancellation of the respective agreement for such Machine and get your money refunded.

Extent of Warranty: *The second paragraph does not apply.*

Warranty Service: *The following is added to this Section:*

During the warranty period, transportation for delivery of the failing Machine to IBM will be at IBM's expense.

Limitation of Liability: *The following paragraph is added to this Section:*

The limitations and exclusions specified in the Statement of Limited Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

The following sentence is added to the end of item 2:

IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

EGYPT

Limitation of Liability: *The following replaces item 2 in this Section:*

as to any other actual direct damages, IBM's liability will be limited to the total amount you paid for the Machine that is the subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code.

Applicability of suppliers and resellers (unchanged).

FRANCE

Limitation of Liability: *The following replaces the second sentence of the first paragraph of this Section:*

In such instances, regardless of the basis on which you are entitled to claim damages from IBM, IBM is liable for no more than: *(items 1 and 2 unchanged).*

IRELAND

Extent of Warranty: *The following is added to this Section:*

Except as expressly provided in these terms and conditions, all statutory conditions, including all warranties implied, but without prejudice to the generality of the foregoing all warranties implied by the Sale of Goods Act 1893 or the Sale of Goods and Supply of Services Act 1980 are hereby excluded.

Limitation of Liability: *The following replaces items one and two of the first paragraph of this Section:*

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence; and
2. the amount of any other actual direct damages, up to 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim.

Applicability of suppliers and resellers (unchanged).

The following paragraph is added at the end of this Section:

IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default shall be limited to damages.

ITALY

Limitation of Liability: *The following replaces the second sentence in the first paragraph:* In each such instance unless otherwise provided by mandatory law, IBM is liable for no more than:

1. *(unchanged)*
2. as to any other actual damage arising in all situations involving nonperformance by IBM pursuant to, or in any way related to the subject matter of this Statement of Warranty, IBM's liability, will be limited to the total amount you paid for the Machine that is the subject of the claim.

Applicability of suppliers and resellers (unchanged).

The following replaces the third paragraph of this Section:

Unless otherwise provided by mandatory law, IBM and your reseller are not liable for any of the following: *(items 1 and 2 unchanged)* 3) indirect damages, even if IBM or your reseller is informed of their possibility.

SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND

Limitation of Liability: *The following is added to this Section:*

IBM's entire liability to you for actual damages arising in all situations involving nonperformance by IBM in respect of the subject matter of this Statement of Warranty will be limited to the charge paid by you for the individual Machine that is the subject of your claim from IBM.

UNITED KINGDOM

Limitation of Liability: *The following replaces items 1 and 2 of the first paragraph of this Section:*

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence;
2. the amount of any other actual direct damages or loss, up to 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim;

The following item is added to this paragraph:

3. breach of IBM's obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982.

Applicability of suppliers and resellers (unchanged).

The following is added to the end of this Section:

IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default shall be limited to damages.

Appendix F. Notices

IBM may not offer the products, services, or features discussed in this document in all countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

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Electronic emission notices

Federal Communications Commission (FCC) statement

Note: 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.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité a la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Deutsche EMV-Direktive (electromagnetische Verträglichkeit)

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen EMVG vom 9.Nov.92 das EG-Konformitätszeichen zu führen.

Der Aussteller der Konformitätserklärung ist die IBM UK, Greenock.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse A. Für diese Klasse von Geräten gilt folgende Bestimmung nach dem EMVG:

Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind.

(Auszug aus dem EMVG vom 9.Nov.92, Para.3. Abs.4)

Hinweis: Dieses Genehmigungsverfahren ist von der Deutschen Bundespost noch nicht veröffentlicht worden.

European Union - EMC directive

This product is in conformity with the protection requirements of EU Council Directive 89/336/ECC on the approximation of the laws of the Member States relating to electromagnetic compatibility.

IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

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

Union Européenne - Directive Conformité électromagnétique

Ce produit est conforme aux exigences de protection de la Directive 89/336/EEC du Conseil de l'UE sur le rapprochement des lois des États membres en matière de compatibilité électromagnétique.

IBM ne peut accepter aucune responsabilité pour le manquement aux exigences de protection résultant d'une modification non recommandée du produit, y compris l'installation de cartes autres que les cartes IBM.

Ce produit a été testé et il satisfait les conditions de l'équipement informatique de Classe A en vertu de CISPR22/Standard européen EN 55022. Les conditions pour l'équipement de Classe A ont été définies en fonction d'un contexte d'utilisation commercial et industriel afin de fournir une protection raisonnable contre l'interférence d'appareils de communication autorisés.

Avertissement : Ceci est un produit de Classe A. Dans un contexte résidentiel, ce produit peut causer une interférence radio exigeant que l'utilisateur prenne des mesures adéquates.

Union Europea - Normativa EMC

Questo prodotto è conforme alle normative di protezione ai sensi della Direttiva del Consiglio dell'Unione Europea 89/336/CEE sull'armonizzazione legislativa degli stati membri in materia di compatibilità elettromagnetica.

IBM non accetta responsabilità alcuna per la mancata conformità alle normative di protezione dovuta a modifiche non consigliate al prodotto, compresa l'installazione di schede e componenti di marca diversa da IBM.

Le prove effettuate sul presente prodotto hanno accertato che esso rientra nei limiti stabiliti per le apparecchiature di informatica Classe A ai sensi del CISPR 22/Norma Europea EN 55022. I limiti delle apparecchiature della Classe A sono stati stabiliti al fine di fornire ragionevole protezione da interferenze mediante dispositivi di comunicazione in concessione in ambienti commerciali ed industriali.

Avvertimento: Questo è un prodotto appartenente alla Classe A. In ambiente domestico, tale prodotto può essere causa di interferenze radio, nel qual caso l'utente deve prendere misure adeguate.

Unione Europea - Directiva EMC (Conformidad electromagnética)

Este producto satisface los requisitos de protección del Consejo de la UE, Directiva 89/336/CEE en lo que a la legislatura de los Estados Miembros sobre compatibilidad electromagnética se refiere.

IBM no puede aceptar responsabilidad alguna si este producto deja de satisfacer dichos requisitos de protección como resultado de una modificación no recomendada del producto, incluyendo el ajuste de tarjetas de opción que no sean IBM.

Este producto ha sido probado y satisface los límites para Equipos Informáticos Clase A de conformidad con el Estándar CISPR22 y el Estándar Europeo EN 55022. Los límites para los equipos de Clase A se han establecido para entornos comerciales e industriales a fin de proporcionar una protección razonable contra las interferencias con dispositivos de comunicación licenciados.

Advertencia: Este es un producto de Clase A. En un entorno doméstico este producto podría causar radiointerferencias en cuyo caso el usuario deberá tomar las medidas adecuadas.

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