

Compaq StorageWorks

Compaq TL881/TL891 Family MiniLibrary System

Reference Guide

Second Edition (November 1999)
Part Number ER-TL891-UA. B01 / 127510-002
Compaq Computer Corporation

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About This Guide

This guide is designed to be used as step-by-step instructions for installation and as a reference for operation, troubleshooting, and future upgrades.

Text Conventions

This document uses the following conventions to distinguish elements of text:

Keys	Keys appear in boldface. A plus sign (+) between two keys indicates that they should be pressed simultaneously.
USER INPUT	User input appears in a different typeface and in uppercase.
<i>FILENAMES</i>	File names appear in uppercase italics.
Menu Options, Command Names, Dialog Box Names	These elements appear in initial capital letters.
COMMANDS, DIRECTORY NAMES, and DRIVE NAMES	These elements appear in uppercase.
Type	When you are instructed to <i>type</i> information, type the information without pressing the Enter key.
Enter	When you are instructed to <i>enter</i> information, type the information and then press the Enter key.

Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.



WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.



CAUTION: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

IMPORTANT: Text set off in this manner presents clarifying information or specific instructions.

NOTE: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Symbols on Equipment

These icons may be located on equipment in areas where hazardous conditions may exist.



Any surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

WARNING: To reduce the risk of injury from electrical shock hazards, do not open this enclosure.



Any RJ-45 receptacle marked with these symbols indicates a Network Interface Connection.

WARNING: To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.



Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching.



Power Supplies or Systems marked with these symbols indicate the equipment is supplied by multiple sources of power.

WARNING: To reduce the risk of injury from electrical shock, remove all power cords to completely disconnect power from the system.

Rack Stability



WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
 - The full weight of the rack rests on the leveling jacks.
 - The stabilizing feet are attached to the rack if it is a single rack installations.
 - The racks are coupled together in multiple rack installations.
 - A rack may become unstable if more than one component is extended for any reason. Extend only one component at a time.
-

Getting Help

If you have a problem and have exhausted the information in this guide, you can get further information and other help in the following locations.

Compaq Technical Support

You are entitled to free hardware technical telephone support for your product for as long you own the product. A technical support specialist will help you diagnose the problem or guide you to the next step in the warranty process.

In North America, call the Compaq Technical Phone Support Center at 1-800-OK-COMPAQ¹. This service is available 24 hours a day, 7 days a week.

Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for world wide Technical Support Centers are listed on the Compaq website. Access the Compaq website at <http://www.compaq.com>.

Be sure to have the following information available before you call Compaq:

- Technical support registration number (if applicable)
- Product serial number (s)
- Product model name(s) and numbers(s)
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level
- Detailed, specific questions

¹ For continuous quality improvement, calls may be recorded or monitored.

Compaq Website

The Compaq website has information on this product as well as the latest drivers and Flash ROM images. You can access the Compaq website at <http://www.compaq.com>.

Compaq Authorized Reseller

For the name of your nearest Compaq Authorized Reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, see the Compaq website for locations and telephone numbers.

Chapter 1

System Description

Introduction

This chapter describes the features of the Expansion Unit, the Base Module, and the Data Unit of the MiniLibrary system, including storage architecture, SCSI interface, bus performance, and physical configuration/expansion options.

The MiniLibrary system is an expandable, modular tape library system that combines DLT technology drives with advanced robotics. The MiniLibrary system is designed for high duty-cycle on-line and near-on-line applications, such as Hierarchical Storage Management (HSM). It is a superior performer in high-volume backup and archival service.

Modules

The MiniLibrary system is based on three types of modules:

- Expansion Unit (master)
- MiniLibrary Base Module
- Data Unit

The MiniLibrary system consists of one Expansion Unit and up to five MiniLibrary Base Modules and Data Units in combination stacked in a rack. The Expansion Unit can move media freely between itself, the MiniLibrary Base Module, and the Data Unit by way of the system's robotically controlled Pass-Through Mechanism.

In a MiniLibrary system, you can combine modules to provide the right combination of capacity and performance to meet your present storage requirements. Compaq's MiniLibrary storage architecture lets you add modules to optimize throughput and capacity as your needs change.

NOTE: There is a specific Low Voltage Differential (LVD) version of the Expansion Unit for the TL891DLX. Also, the Data Unit can be used in conjunction with all MiniLibrary systems (TL881, TL891, TL891DLX, and TL891DX) because there is no SCSI bus connection to the unit.

MiniLibrary Storage Architecture

When connected as a system, the robotics in the Expansion Unit act as commanded by the host computer(s). The host(s) need no knowledge of the internal geometry of the system, or of the actions or capabilities of the MiniLibrary Base Modules or Data Units.

The Expansion Unit presents to the host(s) a single SCSI medium changer device with a single SCSI medium transport element, several SCSI storage elements equal to the total number of cartridge magazine slots, a number of SCSI import/export elements as specified by the user during configuration of the Expansion Unit, and a number of SCSI data transfer elements equal to the total number of drives in the system.

Flexibility

The Compaq MiniLibrary storage architecture is uniquely suited to growing storage needs. Its flexible library robotics system lets you start with a system configured to your present requirements, confident that as your storage needs evolve, you can easily modify the MiniLibrary by adding modules and extending the Pass-Through Mechanism. Add drives for faster performance or magazine space for greater capacity, as needed. Then just turn on the power, and immediately the system updates the system map so the host is informed of the expanded capability.

The Expansion Unit

The Expansion Unit (Figure 1-1) integrates the robotics in the individual modules into a single, coordinated library robotics system. The Expansion Unit performs and maintains an inventory of all media present in the system, including bar code data. All necessary system control operations can be performed from the control panel of the Expansion Unit, as well as from the host via software. The SCSI interface for the library robotics is designed for high-speed communication with the host and for Fast Wide SCSI configurations.

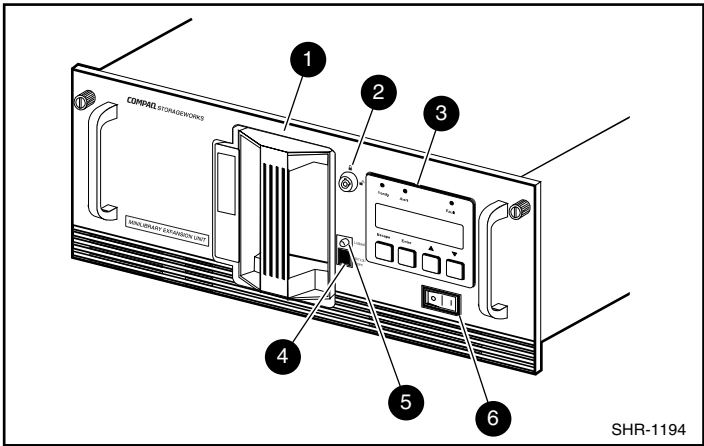


Figure 1-1. Expansion unit front view

Table 1-1
Expansion Unit Front View

Figure Legend	Description
①	16-cartridge magazine
②	Magazine security lock
③	Control panel
④	Unlock/Open button
⑤	Locked indicator
⑥	Power switch

In addition to its system control functions, the Expansion Unit has a 16-cartridge magazine with a random access robotic mechanism. The module robotics moves cartridges between the Pass-Through Mechanism and any of the 16 cartridge storage locations.

You can designate a magazine in one of the MiniLibrary Base Modules as a mail slot for inserting or removing one or more single cartridges, which implements the SCSI IMPORT/EXPORT commands.

NOTE: A magazine that has been reserved for import/export service can not be used for data storage.

The MiniLibrary Base Module

The MiniLibrary Base Module (Figure 1-2) has one or two DLT tape drives and a 10-cartridge magazine with a rugged random access robotic mechanism. The drives use the DLT tape IV cartridges, which provide a native capacity of 20 GB, 35 GB, or 40 GB per cartridge depending on the drive type. All models can also read and write DLTtape III and DLT tape IIIxt cartridges. Both read and write densities are selectable from the front panel, and under SCSI control from the host. These units are available as differential rack-mount or table-top versions, as well as a single-ended table-top-only version.

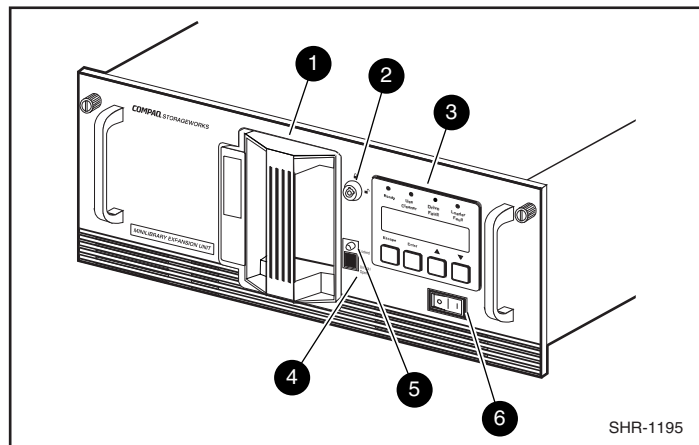


Figure 1-2. MiniLibrary base module front view

Table 1-2
MiniLibrary Base Module Front View

Figure Legend	Description
❶	10-cartridge magazine
❷	Magazine security lock
❸	Control panel
❹	Unlock/Open button
❺	Locked indicator
❻	Power switch

The Data Unit

The Data Unit (Figure 1-3) has a 16-cartridge magazine and a random access robotic mechanism, but no tape drives. The module robotics, under control of the Expansion Unit, moves cartridges between the Pass-Through Mechanism and any of the 16 cartridge storage locations.

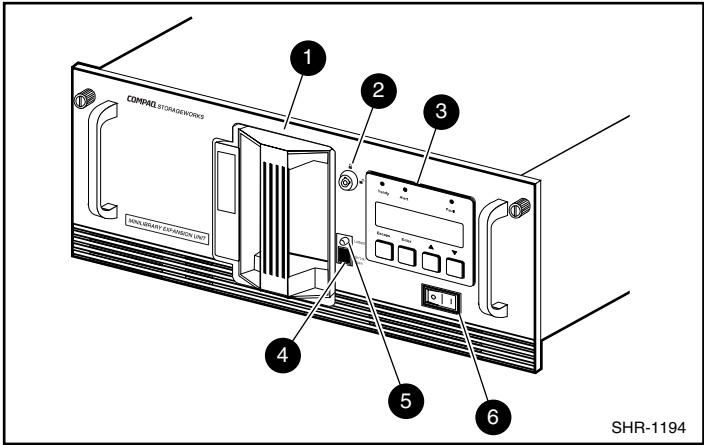


Figure 1-3. Data unit front view

Table 1-3
Data Unit Front View

Figure Legend	Description
①	16-cartridge magazine
②	Magazine security lock
③	Control panel
④	Unlock/Open button
⑤	Locked indicator
⑥	Power switch

SCSI Interface Configurations

Systems equipped with TL881 and TL891 drives use a Fast Wide SCSI interface. TL891DLX drives use LVD/SE and High Voltage Differential (HVD) SCSI-2 interfaces. The section on SCSI interfaces in Chapter 3, “Installation,” describes the available interface options.

SCSI Bus Performance Considerations

Data Transfer Rate

The data transfer rate of the MiniLibrary is dependent on the type and number of drives and on the SCSI bus configuration. The bandwidth of the SCSI bus is limited. As a result, the transfer rate of DLT drives can be limited by sharing a SCSI bus with another disc drive on tape. It is recommended that the MiniLibrary be installed on its own controller for optimum performance.

Drives

With a standard SCSI interface, modules equipped with DLT 20/40 drives have a native data transfer rate of 1.5 MB/s; 3.0 MB/s for two drives. Modules equipped with DLT 35/70 drives have a native data transfer rate of 5 MB/s; 10 MB/s for two drives. Modules equipped with DLT 40/80 drives have a native data transfer rate of 6 MB/s; 12 MB/s for two drives. The rates for compressed data are dependent on compression ratio, record size, data type, and other system parameters, but averages approximately 1:7.

Internal Cabling Configuration

The differential version of the MiniLibrary Base Module is wired in an independent-bus SCSI configuration. That is, the robotics and each of the drives has its own SCSI bus. SCSI jumpers are available for those applications requiring that some combination of drives and robotics can be daisy-chained to a single SCSI bus. The single-ended table-top version, however, has the first drive daisy-chained internally to the robotics in order to reduce cable length. These configurations are described in more detail in Chapter 3, "Installation."

Physical Configuration

The Expansion Unit must be mounted at the top of the stack, which places its control panel at a convenient height. The control panels of the MiniLibrary Base Modules and Data Units are of secondary importance, as they serve mainly to help localize system failures. When installed, the motor drive assembly of the Pass-Through Mechanism is directly behind the Expansion Unit.

MiniLibrary Base Modules can be installed anywhere below the Expansion Unit, in any order. There can be a slight performance advantage in making the MiniLibrary Base Modules contiguous, but gaps are permitted. The size of a gap is limited by the fact that each gap must be bridged by some number of 7 inches of Pass-Through Mechanism track sections. For safety, available cover plates should be installed on all Pass-Through Mechanism sections that are not connected to MiniLibrary modules.

The Expansion Unit senses the position of each module during initialization at power-up. Even if there are gaps between modules, the system will operate correctly. If you plan to leave gaps between modules, be sure to order additional Pass-Through Mechanism track segments and cover plates equal to the length of the gap.

System Expansion

A MiniLibrary system can be expanded in capacity and performance by adding or removing TL881/TL891/TL891DLX modules. Associated with the Expansion Unit and each MiniLibrary Base Module is a section of the Pass-Through Mechanism. System firmware integrates all of the robotics of these system modules with that of the Pass-Through Mechanism into a single high-performance library robotics system.

Features

There are a number of important external features to note about the Expansion Unit, the MiniLibrary Base Module and the Data Unit. See Figures 1-4 through 1-7 to locate the features described in the following sections.

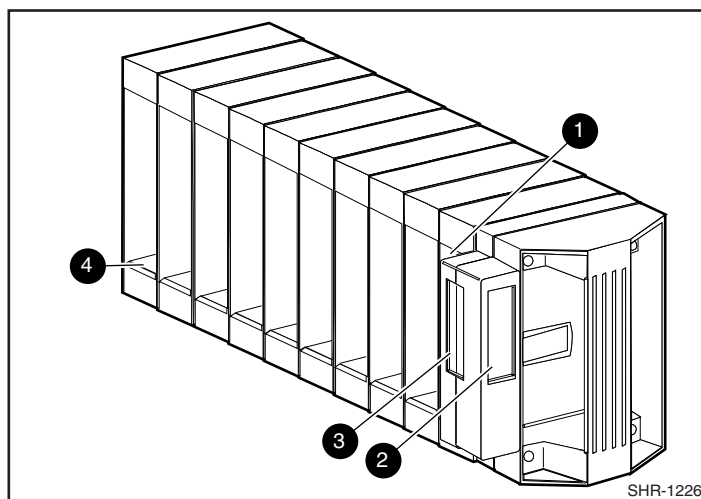


Figure 1-4. MiniLibrary base module 10-cartridge magazine

Table 1-4
MiniLibrary Base Module 10-Cartridge Magazine

Figure Legend	Description
❶	Slot 0
❷	Front label slide slot
❸	Bar code label slide slot (not used)
❹	Slot 9

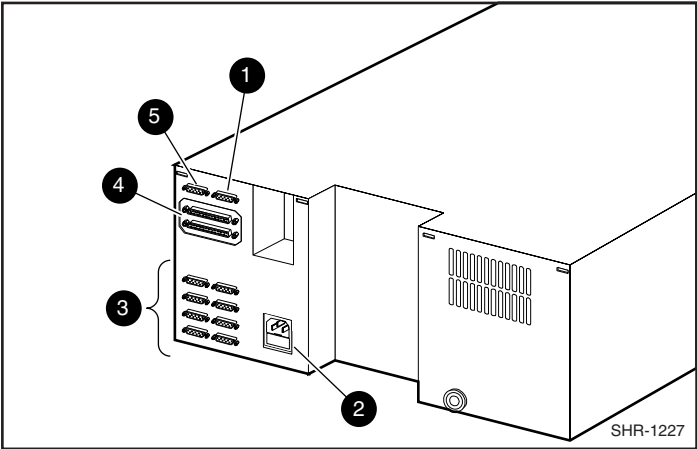


Figure 1-5. Expansion unit rear view

Table 1-5
Expansion Unit Rear View

Figure Legend	Description
❶	Pass-Through Mechanism motor drive connector
❷	Power connector
❸	Base Module robotics interface connectors
❹	Library robotics SCSI interface connector
❺	Diagnostics connector

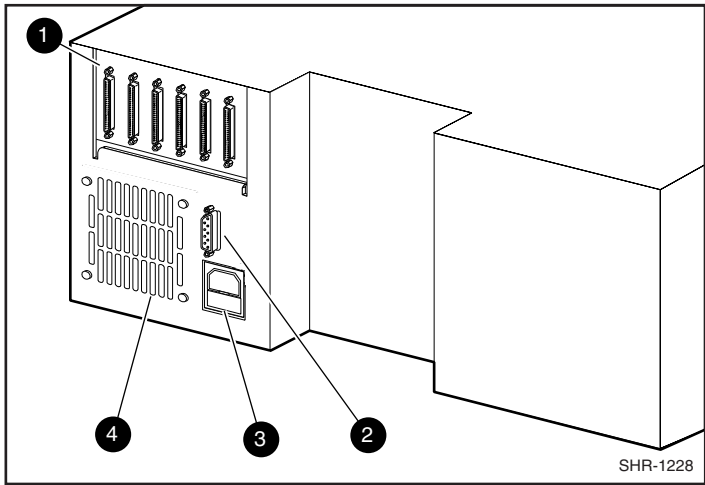


Figure 1-6. MiniLibrary base module rear view

Table 1-6
MiniLibrary Base Module Rear View

Figure Legend	Description
❶	SCSI bus interface: MiniLibrary (left two connectors) Drive 0 (middle two connectors) Drive 1 (right two connectors)
❷	Expansion Unit serial interface connector
❸	Power connector
❹	Fan

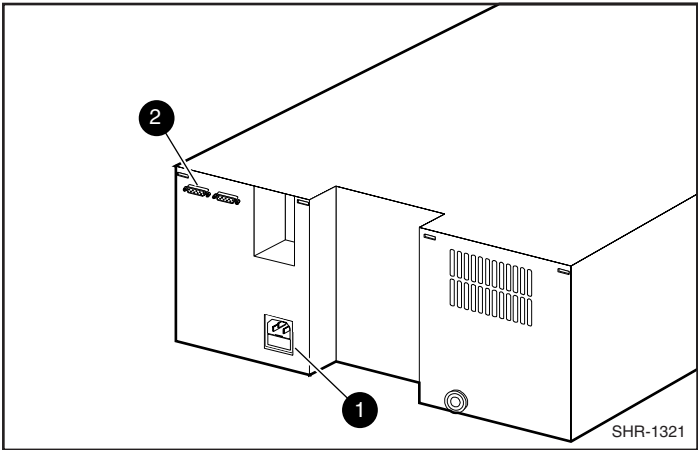


Figure 1-7. Data unit rear view

Table 1-7
Data Unit Rear View

Figure Legend	Description
❶	Power connector
❷	Diagnostics connector

Control Panel

The control panels for all modules are the same, except for the number of LED indicators. The control panel features a 4-line by 20-character backlit LCD display, three or four LED indicators, and four buttons. The buttons let you navigate through the menu structure to select and display operating modes, device status, diagnostic and maintenance functions, device history and error statistics, and system configuration. The functions of the control panel are described in detail in Chapter 2, "Operation."

Display

The backlit 4-line by 20-character control panel display provides a highly intelligible presentation of drive and loader status, menu choices, and error messages. The scrolling feature greatly expands the amount of information available to you. In the Expansion Unit, status information is available for the entire system. The MiniLibrary Base Modules display other information as needed for localizing malfunctions.

Magazine Security Lock

The magazine security lock is a key-operated switch on the front panel of each module. It can be used to prevent inadvertent removal of the cartridge magazine.

Power Supply

The AC power switch is located on the front panel of the module. The autoranging power supply adjusts automatically to either of two operating voltage ranges. The ranges are 100-120 VAC and 200-240 VAC. The power supply is capable of operating at 50 or 60 Hz without any adjustment or modification. AC power is supplied to the power supply by a single IEC-compatible socket that can be connected to any properly grounded outlet.

Tape Cartridge Magazines

The 10-cartridge and 16-cartridge magazines are removable from the front panel, but can be protected from tampering by any of three means:

1. A key-operated magazine security lock that must be unlocked before the magazine can be removed.
2. An electronic combination lock operated by using buttons on the Expansion Unit control panel.
3. Issuance by the host of a SCSI PREVENT MEDIUM REMOVAL command.

The rugged carbon-fiber-reinforced polymer magazine fits into an extruded track, which assures precise positioning with respect to the library robotics. A 10-cartridge tape magazine is shown in Figure 1-4. Insertion and removal of the magazine is described in Chapter 2, "Operation."

Integral Fan Cooling

A single forced-air fan is mounted inside each module to provide optimum cooling for critical parts, and to prevent the drive and robotics electronics, motors and power supply from overheating.

Library Robotics

The MiniLibrary system features library robotics that can load any of the cartridges stored in any magazine in the system into any of the tape drives, moving cartridges among as many as six modules within the MiniLibrary system.

Bar Code Reader

The bar code reader is mounted on the cartridge shuttle in each module. It reads bar code labels attached to each cartridge, and maintains the bar code data in memory as part of the library system map.

Advanced Design Features

The MiniLibrary system incorporates many significant improvements in tape drive and library design. One of the most important is the use of highly reliable DLT technology, with media rated by the media manufacturer at better than 1,000,000 head passes.

Embedded Diagnostics

The MiniLibrary system and each of its modules provide three levels of embedded diagnostics. The Power-On Self Test (POST) performs various verification tests on the system's configuration and host interface and device control functions, as well as memory tests, at power-up. The second level of diagnostics is the user diagnostics, which is provided for displaying and changing configuration options. The third level, Customer Engineer (CE) diagnostics, include advanced diagnostics to be used by CEs for servicing the MiniLibrary system. Both the User diagnostics and the CE diagnostics can be selected from the front panel.

User diagnostics are described in greater detail in Chapter 3, "Installation."

Error Checking

Drives used in the MiniLibrary system apply a 16-bit parity check to each record, a 64-bit CRC to each 4 KB of data, and Reed-Solomon error correction code overall. There is also an internal parity check on the data buffer.

Compression

MiniLibrary system drives use the standard Digital Lempel-Ziv (DLZ) data compression algorithm.

Capacity

A MiniLibrary Base Module with its 10-cartridge magazine and a single Expansion Unit with its 16-cartridge magazine offers the formatted capacities listed in Table 1-8.

Table 1-8 MiniLibrary System Tape Capacity				
Model	Cartridge	Magazine Capacity	Full Magazine Uncompressed	Full Magazine Compressed @ 2:1
TL881	DLTtape IV	10	200 GB	400 GB
TL891	DLTtape IV	10	350 GB	700 GB
TL891DLX	DLTtape IV	10	400 GB	800 GB
Expansion unit	DLTtape IV	16	320 GB*	640 GB*
Data unit	DLTtape IV	16	320 GB	640 GB

* This Expansion Unit can be used with the TL881, TL891DLX, or TL891. Note that the total tape capacities are different.

Media Life

The media used in the MiniLibrary is rated by the media manufacturer at over 1,000,000 head passes, and a shelf life of at least 30 years.

Chapter **2**

Operation

Introduction

This chapter describes manual operation of the MiniLibrary system. The system is operated manually through the MiniLibrary Expansion Unit control panel. Online and offline operations can be done through the control panels of the MiniLibrary Base Module and the MiniLibrary Data Unit.

Expansion Unit

Figure 2-1 shows the front panel of the Expansion Unit (Table 2-1). The panel includes a power switch and the control panel, which has pushbuttons, LED indicators, and a display.

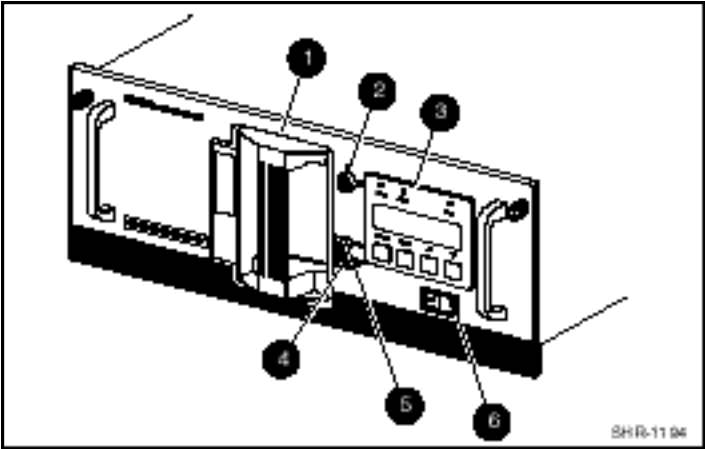


Figure 2-1. Expansion unit front panel

Table 2-1
Expansion Unit Front Panel

Figure Legend	Description
①	16-cartridge magazine
②	Magazine security lock
③	Control panel
④	Unlock/Open button
⑤	Locked indicator
⑥	Power switch

Power Switch

The power switch controls the supply of AC power to the unit. The switch is recessed into the front panel to prevent accidental power-up or power-down. Press 1 to turn the unit on and press 0 to turn the unit off.

NOTE: The Expansion Unit must be turned on after or simultaneously with the other modules. If this is not done, the Expansion Unit can not be notified of the presence of one or more of the other modules.

Control Panels

The Expansion Unit control panel (Figure 2-2) contains three LED indicators, a four-line by 20-character backlit LCD display, and four pushbuttons. The pushbuttons let you navigate through the menu structure to select and display operating modes, device status, diagnostic and maintenance functions, device history and error statistics, and system configuration.

LED Indicators

The three LED indicators on the control panel are labeled Ready (green), Alert (yellow), and Fault (red).

- Ready (green) - lights when the system is ready to accept commands, either from the control panel or from the host computer. The Ready indicator goes out when you enter the Menu Mode.
- Alert (yellow) - indicates that a fault or some other matter that requires attention has occurred in one of the modules in the system. Line 2 of the display blinks the number of the module where the fault has occurred. The control panel of the indicated module might give a further indication of the cause of the alert. Often, when the Alert LED is lit, a Fault LED is lighted on one or more of the MiniLibrary Base Modules as well.

- Fault (red) - indicates that a fault has occurred in the Expansion Unit, or that the magazine door is unable to close. When the Fault LED lights, a Fault screen appears on the LCD display. The Fault screen is described later in this chapter. A list of Fault Symptom Codes (FSC) and Error Recovery Procedures (ERP) shown in Chapter 6, "Diagnostics and Troubleshooting."

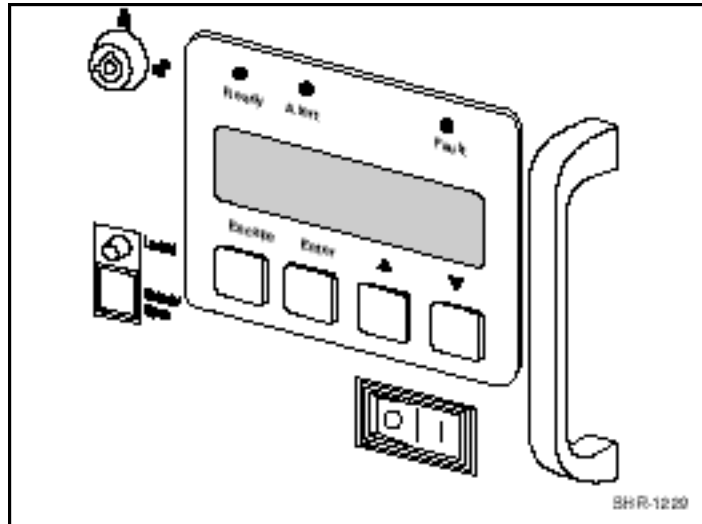


Figure 2-2. Expansion unit control panel

Pushbuttons

There are four buttons on the control panel, labeled **Escape**, **Enter**, ▲, and ▼. The buttons do not directly control specific functions or options. Instead, you use the buttons to navigate from the Default screen through a multi-level menu structure, then select the desired option from the appropriate menu by pressing the **Enter** button. Table 2-1 lists the effect of each of the four buttons under various conditions.

The three most important things you need to know about the buttons are:

1. To enter the Menu Mode and display the Main menu from the Default screen, press the **Enter** button.
2. To return to the Main menu from a submenu, press the **Escape** button repeatedly until the Main menu appears. Pressing the **Escape** button while the Main menu is displayed exits the Menu Mode and returns you to the Default screen. The Default screen and the Main menu are shown later in this chapter.

3. To display the Show Status menu only without entering Menu Mode, press the **Escape** button at the Default screen. The system remains online.

NOTE: When you enter Menu Mode at the Expansion Unit, the Ready light on that module goes out. This means that the MiniLibrary system is off-line, and the system responds to all commands from the host with a SCSI Not Ready until you exit Menu Mode and the Ready light goes on. When you enter Menu Mode at any of the MiniLibrary Base Modules, the Ready light on that module goes out. This means that the individual module is off-line, and the system responds to all commands from the host pertaining to that module with a SCSI Not Ready until you exit Menu Mode and the Ready light goes on.

Table 2-2
Control Panel Button Functions

	Escape	Enter	▲	▼
At POST screen	Not applicable (Note 2)	Not applicable	Not applicable (Note 3)	Not applicable (Note 3)
At Default screen	Displays Show Status menu	Enters Menu Mode	Not applicable	Not applicable
At Status submenu (while on-line)	Returns to Default screen	Same as in Menu Mode	Same as in Menu Mode	Same as in Menu Mode
In Menu Mode	Rejects currently displayed choice, or Aborts control panel operation in progress or	Accepts currently displayed choice	Moves ▲ 1 line upward through list of options, or Scrolls part of display 1 line toward top of list of options	Moves ▼ 1 line downward through list of options, or Scrolls part of display 1 line toward bottom of list of options

continued

Table 2-2
Control Panel Button Functions *continued*

	Escape	Enter	▲	▼
In Menu Mode	Exits to next higher menu level or Exits Menu mode to default screen			
At Fault screen	Not applicable	Clears soft errors	Not applicable	Not applicable

NOTE 1: There is an auto-repeat feature for the ▲ and ▼ buttons. When you press either button for more than one-half second, the control panel behaves as if you were pressing and releasing the button about four times per second. This effect stops when you release the button.

NOTE 2: This button is sampled during power-up while all control panel LEDs are on. If it is pressed during that time, the system updates its geometry; that is, it checks for the presence and location of all modules and remaps all media. Use this method when removing or installing a module permanently.

NOTE 3: These buttons are sampled during power-up. If both buttons are pressed during that time, the system clears low-power memory. Use this procedure only when low-power data is corrupted. Clearing low-power memory erases all log information, such as configuration history, error history, and statistics. In addition, the system time, date and password information is erased and must be re-entered.

MiniLibrary Base Module

Figure 2-3 shows the front panel of the MiniLibrary Base Module (Table 2-3). The panel includes a power switch and the control panel, which has pushbuttons, LED indicators, and a display.

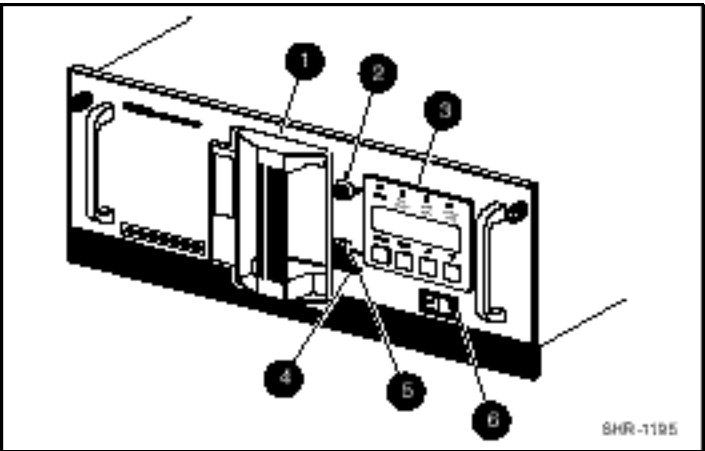


Figure 2-3. MiniLibrary base module front panel

Table 2-3
MiniLibrary Base Module Front View

Figure Legend	Description
①	10-cartridge magazine
②	Magazine security lock
③	Control panel
④	Unlock/Open button
⑤	Locked indicator
⑥	Power switch

Power Switch

The power switch controls the supply of AC power to the module. The switch is recessed into the front panel to prevent accidental power-up or power-down. Press 1 to turn the module ON and press 0 to turn the module OFF.

Control Panel

The Base Module control panel (Figure 2-4) contains four LED indicators, a four-line by 20-character backlit LCD display, and four pushbuttons.

LED Indicators

The four LED indicators on the control panel are labeled Ready (green), Use Cleaner (yellow), Drive Fault (red), and Loader Fault (red).

- Ready (green) – lights when the Base Module is ready to accept commands, either from the control panel or from the host computer via the Expansion Unit. The Ready indicator goes out when you enter Menu Mode.
- Use Cleaner (yellow) – indicates that either or both drives require cleaning. A cleaning operation should be done as described in Chapter 5, “Regular Maintenance.” When the Use Cleaner LED lights, you can find out which drive needs cleaning by selecting Cleaning Needed on the drive status submenu.

- Drive Fault or Loader Fault (red) – lights when a Fault screen appears on the LCD display. The fault screen is described later in this chapter. A list of Fault Symptom Codes (FSC) and Error Recovery Procedures (ERP) are shown in Chapter 5, “Regular Maintenance.”

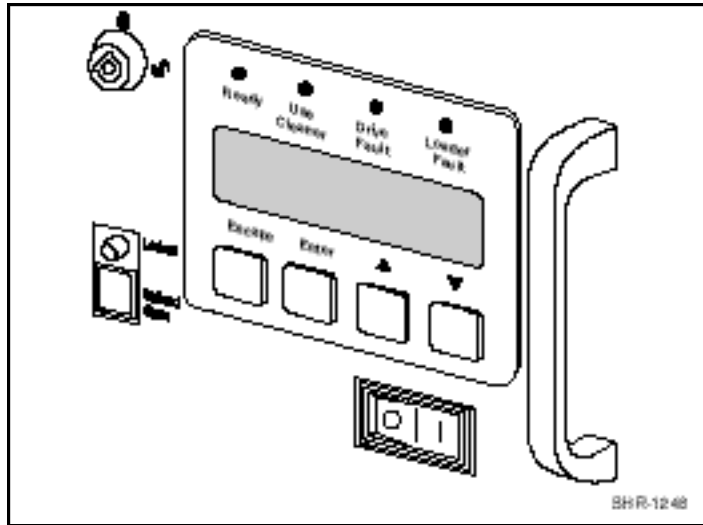


Figure 2-4. MiniLibrary base module control panel

Pushbuttons

The pushbuttons on the Base Module control panel operate the same way as the pushbuttons on the Expansion Unit control panel. See the description of the Expansion Unit pushbuttons described earlier in this chapter.

Data Unit

Figure 2-5 shows the front panel of the Data Unit (Table 2-4). The panel includes a power switch and the control panel, which has pushbuttons, LED indicators, and a display.

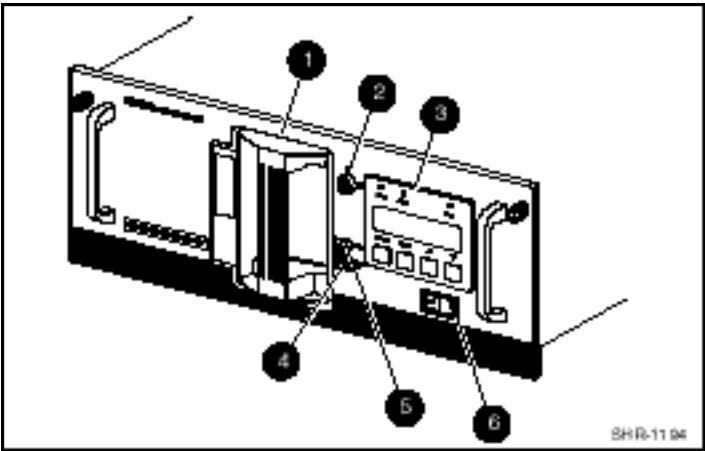


Figure 2-5. Data unit front panel

Table 2-4
Data Unit Front Panel

Figure Legend	Description
①	16-cartridge magazine
②	Magazine security lock
③	Control panel
④	Unlock/Open button
⑤	Locked indicator
⑥	Power switch

Power Switch

The power switch controls the supply of AC power to the unit. The switch is recessed into the front panel to prevent accidental power-up or power-down. Press 1 to turn the unit ON, and press 0 to turn the unit OFF.

Control Panel

The Data Unit control panel (Figure 2-6) contains three LED indicators, a four-line by 20-character backlit LCD display, and four pushbuttons.

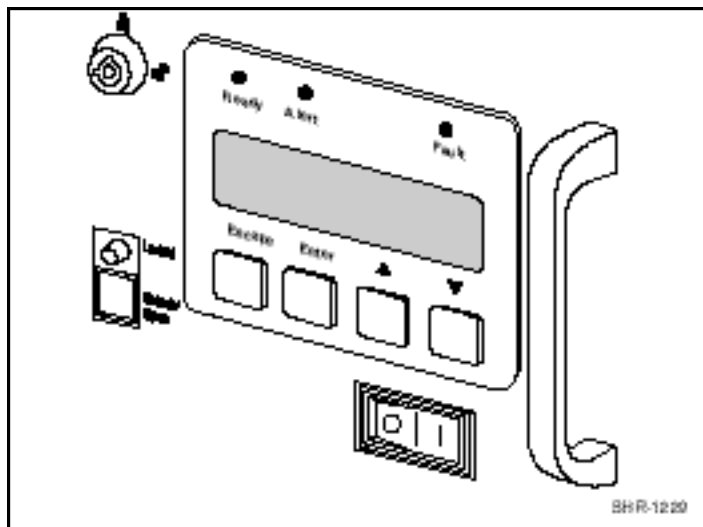


Figure 2-6. Data unit control panel

LED Indicators

The three LED indicators on the control panel are labeled Ready (green), Alert (yellow), and Fault (red).

- Ready (green) - lights when the system is ready to accept commands, either from the control panel or from the host computer via the Expansion Unit. The Ready indicator goes out when you enter Menu Mode.
- Alert (yellow) - this LED has no function in the Data Unit.
- Fault (red) – when this LED lights, a Fault screen appears on the display. The Fault screen is described later in this chapter. A list of Fault Symptom Codes (FSC) and Error Recovery Procedures (ERP) are shown in Chapter 5, “Troubleshooting.”

Pushbuttons

The pushbuttons on the Data Unit control panel operate the same way as the pushbuttons on the Expansion Unit control panel. See the description of the Expansion Unit pushbuttons described earlier in this chapter.

Front Panel and Media Locks

To avoid accidental interruption of system operation by entering Menu Mode or removing cartridges while the host is accessing the system, the front panel and the media for each module can be electronically locked. When the front panel of the Expansion Unit is locked, you can only enter Menu Mode after entering a 4-digit code. That is, when the Default screen appears, pressing the **Enter** button does not invoke Menu Mode until you enter the code. The front panel of a Base Module cannot be unlocked without using the Security submenu on the Expansion Unit to unlock it.

All MiniLibrary Base Module and Data Unit front panels are locked by default when connected to a Expansion Unit.

Media located in any or all modules can be locked and unlocked using the Security submenu on the Expansion Unit. When media is locked, you can only remove media after unlocking the module from the Expansion Unit using the Security submenu.

Procedures for locking and unlocking front panels and media are described later in this chapter.

Starting the System



CAUTION: When powering up the MiniLibrary, power must be applied to the Expansion Unit either simultaneously with or after the other modules. If the Expansion Unit is powered on first, its inventory of modules might be incorrect, and the contents of some or all of the modules will be inaccessible to the system and to the host.

Display Messages

The display on the control panel is capable of displaying four lines of 20 characters each, to allow the use of easy-to-understand messages. Many of these messages and their functions are described in this chapter. Those displays that are described in other chapters are cross-referenced here as well.

Power-On Self Test Screen

When power is first applied to the module, a series of POST diagnostics are performed. During POST execution, the model number of the module, the firmware revision, the status or result of the test in progress and the current date and time are displayed on the control panel as shown:

COMPAQ TL89x*
Firmware Level 0X.xx
Checking Hardware
26-Feb-19xx 15:35:59

* Note that this can be either one or two drives.

Model Numbers		
TL891	HVD	1 drive
TL892	HVD	2 drive
TL881	HVD/SE	1 drive
TL882	HVD/SE	2 drive
TL891DLX	LVD	1 drive
TL892DLX	LVD	2 drive
TL891DX	LVD	1 drive
TL891DX	LVD	2 drive

Initialization Screens

After POST completes, the library robotics system is initialized. A series of screens similar to the following appears during this process:

```
COMPAQ TL89x
Firmware Level 0X.xx
Initializing Loader
26-Feb-19xx 15:35:59
```

Default Screen

After the POST diagnostics have concluded successfully and initialization is complete, the system Default screen appears:

```
READY
Modules:0_-----
0 ▶-----◀ 9
10 ▶-----◀ 15
```

The numbers on the second line correspond to the Base Modules that are connected to the system. Up to five Base Modules can be connected. The third and fourth lines represent the cartridge magazine in the Expansion Unit. A rectangle appears in each position that contains a cartridge. An underline represents an empty slot.

A rectangle appears in each position that contains a cartridge. An underline represents an empty slot.

Fault Screen

When a fault is detected within the Expansion Unit or the Pass-Through Mechanism, a screen similar to the following appears:

```
Fault Code: XXXX
Error Description
ERP line 1
ERP line 2
```

When a fault is detected in one of the Base Modules, the Alert LED on the Expansion Unit control panel lights and the Fault screen appears on the malfunctioning Base Module. At the same time, either the Drive Fault or the Loader Fault LED lights on that module.

The first line shows a numerical FSC. The second line shows a brief description of the error, in place of the words, "Error Description." The third and fourth lines contain a one- or two-line message describing the initial ERP in place of the words shown in the Fault screen.

A list of FSC and ERP appears in Chapter 6, "Diagnostics and Troubleshooting."

MiniLibrary Base Module Default Screen

The MiniLibrary Base Modules display a different Default screen, as shown:

```
DLT0 Seeking
DLT1 Idle
Loader Idle
16  ►-----◄ 25
```

The example shown is a Base Module in the module 1 position. The first and second lines of the Default screen show the status of the two drives within the Base Module. On line 4, a rectangle appears in each position that contains a cartridge. An underline appears at each empty slot. The numbers at the beginning and end of line 4 represent the numbers the system has assigned to the first and last slots of that module.

The possible status conditions of the drives are:

- No tape
- Idle
- Rewinding
- Seeking
- Reading
- Writing
- Erasing
- Cleaning
- Unloaded
- Loading
- Unloading

- Hard error
- In flux
- Fault

The third line in a MiniLibrary Base Module tells the status of the library robotics (loader) within the MiniLibrary Base Module. The possible conditions of the library robotics are:

- Idle
- Fetch/stow
- Taking inventory
- Checking drives
- Scanning labels
- Orphaned cartridge
- Trapped cartridge
- Elevator home

The fourth line in a Base Module is the magazine map. Numbers 16-25 represent the map numbers of the cartridge slots. In this case, a 10-slot magazine is in the first position below the 16-slot Expansion Unit. These numbers vary with the position of the module within the system and magazine size. If no magazine is installed, line 4 indicates “No Magazine.” The boxes present on this line indicate that a cartridge is present in the corresponding slot of the magazine. An underline means that there is no cartridge present in that slot.

Selecting Control Panel Display Modes

As previously described, the POST, Initialization and Default screens appear without operator or host intervention. The Fault screens appear whenever a fault occurs. The screens that follow appear in response to operator actions.

The MiniLibrary System Menu Structure

Figure 2-7 shows the structure of the MiniLibrary System menus.

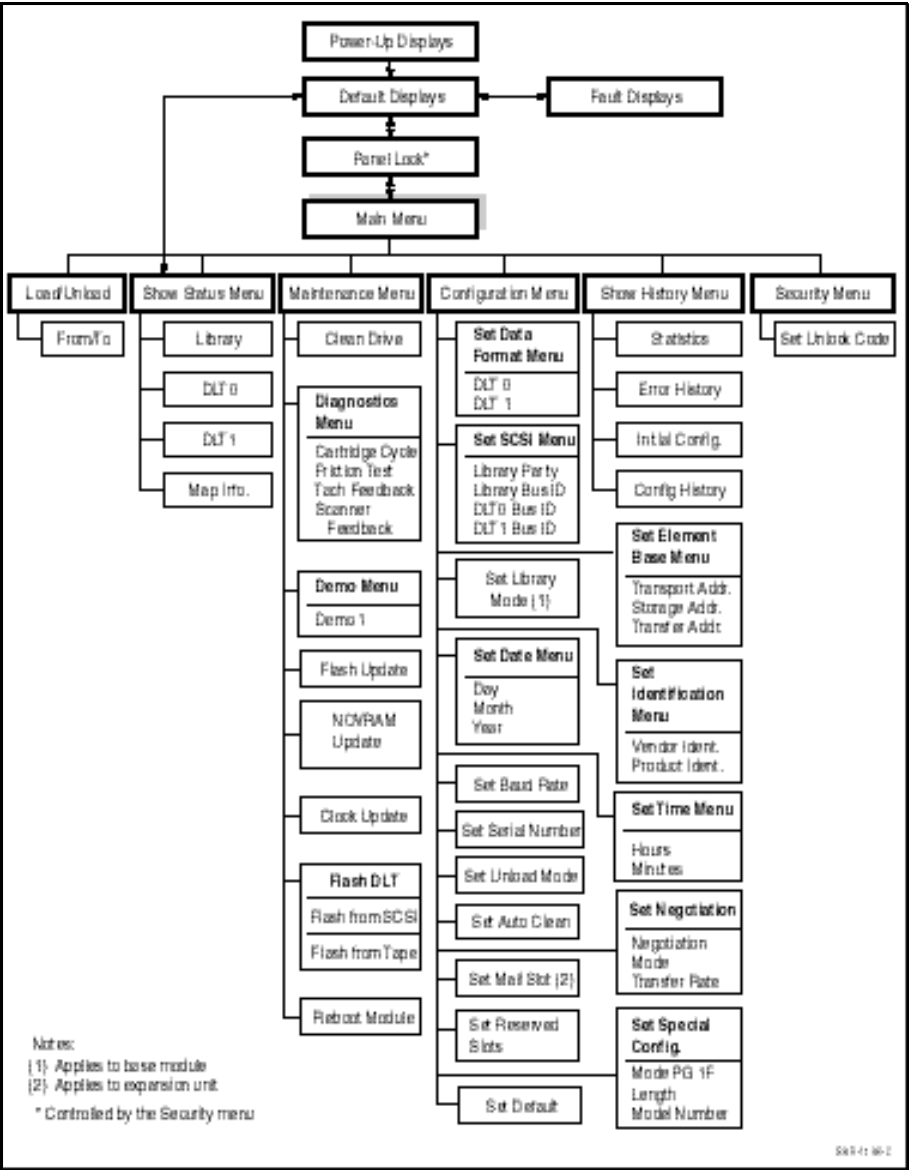


Figure 2-7. MiniLibrary menu structure

Entering the Menu Mode

IMPORTANT: When the Expansion Unit enters Menu Mode, the Ready light goes out. This means that the module is off-line, and responds to all commands from the host with a SCSI Not Ready until you exit Menu Mode and the Ready light comes on.

To prevent inadvertent interruption of host operations, you can lock out the Menu Mode using the Security menu. See the section “Security Menu,” later in this chapter. When all control panels are locked, you must enter your unlock code in order to display the Main menu. Note that the Show Status menu of each module remains accessible. It can be displayed from the module’s Default screen at any time by pressing the **Escape** button.

When the Default screen appears, you can enter Menu Mode by pressing the **Enter** button. Afterwards the Main menu appears:

```

▶ Load/Unload
  Show Status Menu
  Maintenance Menu
  Configure Menu  ↓
    
```

NOTE: If the control panel has been locked, the following screen appears instead of the Default screen shown above. You must know the unlock code for the system before you can proceed.

Front Panel Locked

ENTER to Unlock
ESCAPE to Exit

When you press the **Enter** button, the following screen appears:

```






Unlock Code  ↑
"           "
              ↓
    
```

Using the ▲ button and ▼ buttons, set the first digit of the unlock code. When you have set it, press the **Enter** button to move the cursor to the second digit and repeat the process. When you have finished, press the **Escape** button, then the **Enter** button to confirm your entry. If the code is correct, the Main menu appears. If the code is incorrect, an error screen appears.

Exiting the Menu Mode

To leave the menu mode and return to the Default screen, press the **Escape** button repeatedly. Each time you press the **Escape** button, the display moves to a higher menu level. When the Main menu appears, pressing the **Escape** button once returns you to the Default screen. At this point, the Ready LED lights.

Navigating Through the Menu Structure

To select a submenu, move the  on the display to the desired line using the  and  buttons. Then press the **Enter** button to confirm your choice and display the submenu. The  at the end of the fourth line of the Main menu indicates that there are one or more additional items that can be reached by scrolling, using the  button. The items available on the Main menu are:

- Load/unload
- Show status menu
- Maintenance menu
- Configuration men
- Show history menu
- Security menu

The following sections describe the submenus that correspond to each of the Main menu selections.

Load/Unload Menu

The Load/Unload menu is described later in this chapter, under the section “Loading and Unloading Tapes.”




Show Status Menu

When you select Show Status, the following menu appears:

```
Library
▶DLT0
DLT1      ↓
```

The items available on the Show Status menu are:

- Library
- DLT0
- DLT1
- . . .
- DLT n
- Map Info

Move the  up or down with the  and  buttons, then press the **Enter** button to select the item.

Library Status Submenu

When you select Library Status, the following scrollable menu appears:

Model Number:
COMPAQ TL89x
Firmware Revision
0X.xx



Table 2-5 lists the Library Status categories that are available.

Table 2-5 Library Status Categories	
Category	Category
Model number	Firmware revision
Date	Time
Loader status	Library configuration
Vendor identification	Product identification
Transport address	Storage address
Transfer address	Imp/exp address
Serial number	SCSI bus ID
SCSI bus parity	Negotiation mode
Transfer rate	Unload mode
Mail slot emulation	Mail slot count
Mode page 1F length	Initialize element status
Boot version	Flash type

Drive Status Menu

When you select either of the drives, the following scrollable menu appears:

Tape Motion:
Idle
Tape Format:
No Tape



Table 2-6 lists the Drive Status parameters that are available.

Table 2-6 Drive Status Parameters	
Parameter	Parameter
Compression	SCSI bus ID
Drive rev	Controller rev
Cartridge present	Hardware error
Cleaning needed	Write protected
Operate handle	Serial number
Read compression	Write compression
Tape remaining	Data cartridge count
Clean cartridge count	Last clean hours
Power on hours	Power on cycles
Speed setting	Media type
Temperature	

Map Information Screen

When you select Map Info, the following screen appears. The location being reported appears on Line 1. The content of the bar code on the label, up to 8 characters, appears on Line 4.

DLTO	↑
Occupied	
Label Valid	
XXXXXXXX	↓

The list of locations available for display on line 1 is as follows:

NOTE: If you do not designate any mail slots, those lines are omitted from the list.

Depending on the report for each location, Line 2 can display either Empty, or Occupied, or, if a magazine is absent, Not Installed.

Depending on the report for each location, Line 3 can display either Label Valid, or Label Not Present.

For each location reported, Line 4 displays the actual bar code on the label, up to 8 characters.

Maintenance Menu

The Maintenance menu and the options under it that are intended for operator use are described in Chapter 5, “Regular Maintenance.”

Configure Menu

The Configure menu, how to use it and the options available under it are described in Chapter 3, “Installation.”

Show History Menu

The Show History menu lets you review the history of the system. An example of the use of the Show History menu appears later in this chapter under the section “Displaying Error Logs.” You can retrieve the configuration history, the original configuration, as well as statistics on the number of operations the library robotics and the drives have performed.

Security Menu

The Security menu lets you lock the control panel, preventing inadvertent or unauthorized access to the Menu Mode, which takes the system offline. You can display the Show Status menu without unlocking the panel (and without taking the system offline) by pressing the **Escape** button at the Default screen.

When you select the Security menu, the following scrollable screen appears:

► Unlock All Panels
Unlock All Media
Lock All Panels
Lock All Media ▼

Table 2-7 lists the security functions that are available.

Table 2-7
Security Functions

Category	Category
Unlock all panels	Unlock all media
Lock all panels	Lock all media
Master locking	Module 1 locking
...	Module <i>n</i> locking
Set unlock code	

To change the unlock code, or to enable or disable the panel locking function, scroll down by pressing the ▼ button until the ► is next to Set Unlock Code. Press the **Enter** button. Afterwards, the following screen appears:

Unlock Code ▲
**"0000"

0000 Disables Lock ▼

An underline cursor appears underneath the first digit. To set the first digit, press the ▲ button or the ▼ button until the desired number appears. To move the cursor to the second digit, press the **Enter** button. Repeat the process for each of the four digits. Make sure you remember the 4-digit number, as you will need it in order to enter the Menu Mode. An unlock code of 0000 disables panel locking.

When you finish entering four digits, press the **Escape** button. Afterwards, the following screen appears:

Unlock Code
**"XXXX"
ENTER to Accept
ESCAPE to Exit

Your code is shown in place of XXXX.

Press the **Enter** button if you want to adopt the unlock code that appears. Press the **Escape** button if you do not want to accept it. Press the **Escape** button again to return to the Main menu, and again to return to the Default screen.

The next time you attempt to enter Menu Mode, the following screen appears. You can still display the Status menu without using the security code by pressing the **Escape** button at the Default screen.



Front Panel Locked

ENTER to Unlock
ESCAPE to Exit

When you press the **Enter** button, the following screen appears:

Unlock Code 
" "



Using the  and  buttons, set the first digit of the unlock code. Press the **Enter** button to move the cursor to the second digit and repeat the process. When you finish, press the **Escape** button. Afterwards, the following screen appears:

Unlock Code
""XXXX"
ENTER to Validate
ESCAPE to Exit

Press the **Enter** button to validate your choice. If the code is correct, the Main menu appears. If the code is incorrect, an error screen appears. If you have forgotten your unlock code, contact your technical support representative for assistance.

Displaying Firmware Revision

You can display the library robotics firmware revision at any time by pressing the **Escape** button at the Default screen to display the Show Status menu. It appears as one of the items on the Library Status submenu of the Show Status menu. Press the **Enter** button with the arrow next to Library and the revision is shown. Press the **Escape** button to bring back the Default screen. It is also displayed on line 2 of the POST screen and the Initialization screens.

Displaying Error Logs

To display the error history of the module, you need to use the Show History menu. Access this menu as follows:

```
Fault Code: XXXX      ↑
Error Description
DD/MMM/YYYY HH:MM:SS
Entry NNNN Of NNNN   ↓
```

Loading and Unloading Tapes

The Load/Unload menus let you specify a source and a destination for a cartridge movement. As a result, you use exactly the same procedure to load and unload. To load or unload a tape from the front panel of the module, use the Load/Unload menus.

The following Default screen appears. From this screen, enter Menu Mode by pressing the **Enter** button.

```
READY
Modules 012345_
0  ──────────▶ 9
10 ──────────▶ 16
```


Afterwards, the Main menu appears:

```
▶ Load/Unload
Show Status Menu
Maintenance Menu
Configure Menu  ↓
```

The ▶ is next to the line that reads Load/Unload. Press the **Enter** button to display the first Load/Unload submenu, which is shown below:

```
From:
▶ DLT1
To:
*Slot3  ↓
```



Notice that the ▶ is next to line 2 of the display. Line 2 shows the top item in a scrollable list of sources. Note that a ↓ has appeared on the right of the bottom line. This indicates that the ▼ button can now be used to scroll through the list, and that the top item on the list appears. As soon as you press the ▼ button, three things happen:

1. The list scrolls down one item (only line 2 scrolls).
2. An  appears on the right of line 1 of the display. This indicates that there is one or more items above the item displayed on line 2.
3. The * at the left of line 2 disappears. This is because the * indicates the current selection or the default selection, and that you have scrolled the default selection off of the screen, and haven't yet selected an item from the list.

NOTE: The contents of the lists on line 2 and line 4 will vary as follows:

Initial Screen (From Line)

The list on line 2 (From line) includes every drive and every magazine slot (including mail slots) that has a cartridge in it (you can't get a cartridge from a slot or drive that is empty).


From:
 DLT1
 To:
 *Slot3 




Initial Screen (To Line)

The list on line 4 (To line) includes all of the valid destination choices, that is, drives and slots that are empty (you can't put a cartridge into a slot or drive which already has one in it).


Scroll List (To Line)


There is another limitation on the To list. If you selected a drive on the From screen, the To list can include only slots. If you selected a slot on the From screen, the To list can contain only drives.



Assume that you want to load the cartridge that is in Slot 4 into any available drive. Use the  button to scroll line two to Slot 4. Afterwards, the following screen appears:

From: 
 Slot4
 To:
 *DLT0 

When you scrolled to your desired source, press the **Enter** button to select it. Notice the two changes that occurred in the display.

1. The * reappears at the beginning of line 2, indicating that you have made a selection.
2. The  now moves to line 4, indicating that you can now select a destination.

```
From:  
*Slot4  
To:  
*DLT0
```

You can now press the **Enter** button to select DLT0 as the destination. Note that there is no  at the end of line 4, nor  at the end of line 1. There are no additional choices because you have selected a slot as the source, so the destination must be a drive or the DLT1 already has a cartridge in it, so it cannot be a valid destination.

Press the **Enter** button to select DLT0. In response, the Confirmation screen appears:

```
From: Slot4 To:DLT0  
  
ENTER To Execute  
ESCAPE To Cancel
```

As the Confirmation screen indicates, to execute the load or unload, press the **Enter** button. If the Confirmation screen does not show your intended source and destination, press the **Escape** button to return to the From entry screen.

When you press the **Enter** button, the following screen appears. If the source is a drive, the word Unload appears in place of the word Load on line 4.

```
From: Slot4 To:DLT0  
  
Load In Progress
```

When the load or unload operation is finished, the Default screen reappears.

Inserting and Removing Cartridges

When inserting cartridges, make sure that the slot you intend to use is not already reserved in the system map for a cartridge in a drive. The best way to avoid conflicts is to unload all drives, either through your host computer software or by using the LOAD/UNLOAD command on the Main menu, described in the previous section.

The tape magazine must be removed from the module in order to insert or remove cartridges. To insert or remove the magazine, the following conditions must be met:

- The Magazine security lock must be unlocked, using the key supplied with the module (Figure 2-8 and Table 2-8). When the Magazine security lock is locked, the **Unlock/Open** button has no effect. If the module is installed in a reasonably secure environment, you can elect to leave the magazine security lock in the unlocked position.
- Media locking on the Security menu must be disabled.
- The host computer must allow medium removal. The host computer can enable or disable the **Unlock/Open** button using the SCSI PREVENT ALLOW MEDIUM REMOVAL command. When you press the **Unlock/Open** button, the message Magazine Locked appears.

The Expansion Unit must be ready, but not executing a command.

IMPORTANT: When you enter Menu Mode, the Ready light goes out. The magazine cannot be inserted or removed unless the Ready light is on. To remove the magazine when a failure prevents the Ready light from lighting, see the section “Emergency Magazine Removal.”

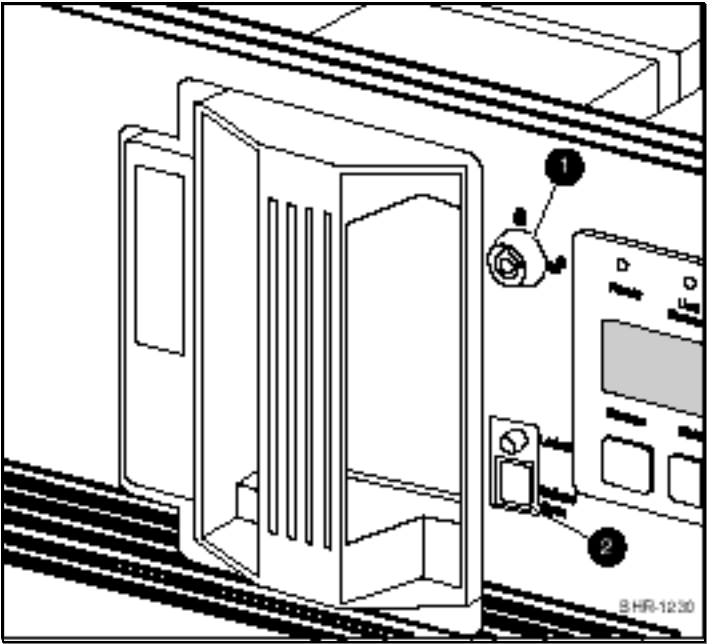


Figure 2-8. Magazine in place

Table 2-8
Magazine In Place

Figure Legend	Description
❶	Magazine security lock
❷	Unlock/Open button

Removing a Magazine

The following screens let you remove a magazine.

► Load/Unload
 Show Status Menu
 Maintenance Menu
 Configuration Menu ↓

Maintenance Menu ↑
 Configuration Menu
 Show History Menu
 ► Security Menu

► Unlock All Panels
 Unlock All Media
 Lock All Panels
 Lock All Media ↓

Unlock All Media

In Progress

Emergency Magazine Removal

If a fault occurs that prevents removal of a magazine, turn the power off for 30 seconds. Power up while continuously pressing the ▲ button. Continue to hold the button until all of the indicators on the control panel light, then go out. Release the button. The magazine can now be removed.

If you are unsuccessful in removing the magazine using this procedure, contract your technical support representative for further advice.

Inserting Cartridges into the Magazine

A full magazine is shown in Figure 2-9 (see Table 2-9). Insert cartridges so that the label end with the write protect switch is outward, with the write protect switch toward the bottom of the magazine. The lowest-numbered cartridge slot in the magazine is closest to the handle.

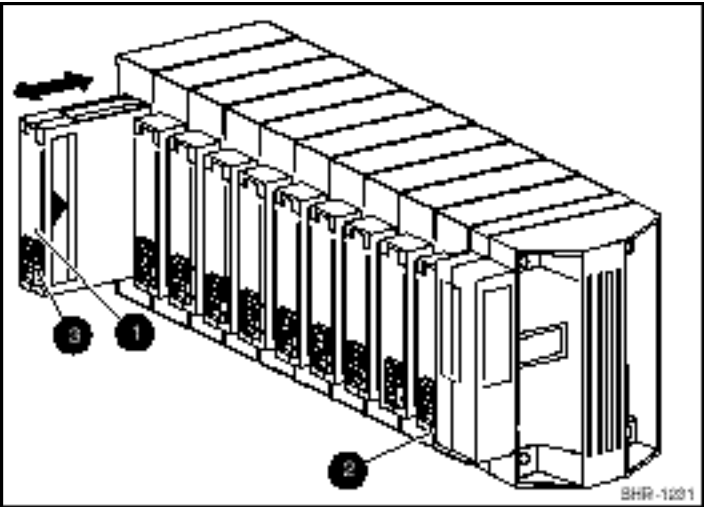


Figure 2-9. 10-slot tape magazine with cartridges installed

Table 2-9
10-Slot Tape Magazine (Cartridges Installed)

Figure Legend	Description
①	Label
②	Slot 0
③	Write protect switch

Inserting a Magazine

The following screens let you insert a magazine.

▶ Load/Unload
 Show Status Menu
 Maintenance Menu
 Configuration Menu ↓

Maintenance Menu ↑
 Configuration Menu
 Show History Menu
 ▶ Security Menu

▶ Unlock All Panels
 Unlock All Media
 Lock All Panels
 Lock All Media ↓

Unlock All Media

In Progress

Lock All Media

In Progress

MiniLibrary Base Module

The front panel of the Base Module is nearly identical to the Expansion Unit. It includes a power switch for the module, the magazine door, the magazine security lock, and the **Unlock/Open** button with its Locked indicator. The control panel, shown in Figure 2-2, has one more LED indicator than the Expansion Unit. Figure 2-10 shows the Base Module front panel (Table 2-10).

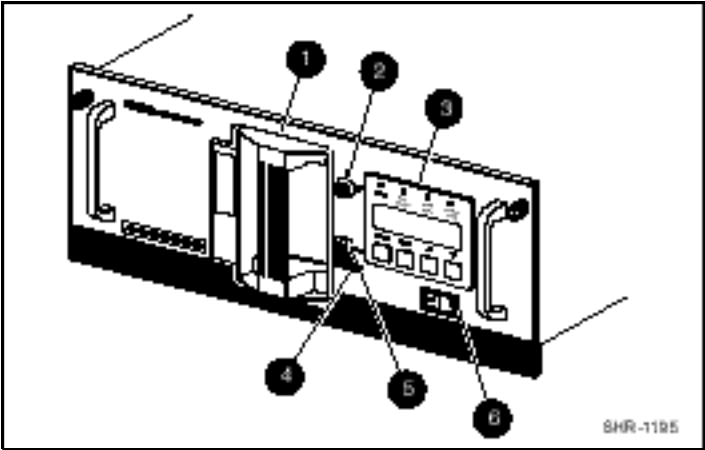


Figure 2-10. Base module front panel

Table 2-10
Base Module Front Panel

Figure Legend	Description
①	10-cartridge magazine
②	Magazine security lock
③	Control panel
④	Unlock/Open button
⑤	Locked indicator
⑥	Power switch

The Magazine Security Lock, the Unlock/Open Button, and the Locked Indicator LED

These features were previously described in the section “Inserting and Removing Cartridges.” So why make a whole section about it here? Put it in the index as a See reference.

Tape Requirements

The MiniLibrary System uses ECMA-approved and ANSI proposed-standards DLTtape cartridges. The DLTtape cartridge is a four-inch square plastic cartridge. According to the media manufacturer, the cartridge and the medium are designed to withstand 1,000,000 passes, and to have a shelf life of 30 years when properly stored.

Cartridge Handling and Storage

A DLTtape cartridge should be stored vertically until you want to use it. Do not expose a cartridge to moisture or direct sunlight. Maintain a clean, dust-free working and storage environment.

If a DLTtape cartridge is dropped:

- Inspect the cartridge carefully before you insert it into a MiniLibrary System magazine or any drive.
- Shake the cartridge while listening for the sound of a broken part. Any rattling sound makes a cartridge unfit for use.
- Inspect the case for distortion or cracks.
- Inspect the leader by opening the cartridge door as shown in Figure 2-11 (see Table 2-11). The leader should be positioned as shown in view ①, and should protrude at about a five-degree angle from the case. If the leader is out of position, do not use the cartridge; damage to the drive could result.

Under certain conditions, a DLTtape might stick to the drive read/write head during operation. Damage to media, failure of commands or batch jobs to execute, with resulting errors or hangs; failure to unload; apparent need to swap out the drive are a few such conditions.

When tapes are stored in an environment different from that of the drive, ensure that they are acclimatized, by moving them to a location in close proximity to the drive before attempting to use them. Ideally, tapes should be allowed to acclimate for a time equal to the duration of their storage away from the drive, or 24 hours, whichever is less.

Reports have verified that sticking occurs almost immediately with older, used tapes which have been stored at 68°F (20°C) and 75% humidity, when those tapes are used in a drive kept at a higher temperature and lower humidity. High tape humidity causes sticking from hydrolysis, a degradation of the tape which can be reversed by storing the tape for a while in a dry environment. Test conditions (cool, damp tapes and warm, dry drives) have produced stiction at will, but other conditions can also cause it. Remember to acclimatize tapes before use. Long-term storage specifications are more stringent than those for shorter periods. Cartridges intended for long-term archiving shall be stored in room conditions of 73°F +/-9 (23°C +/-5) at 50% +/-10% relative humidity.

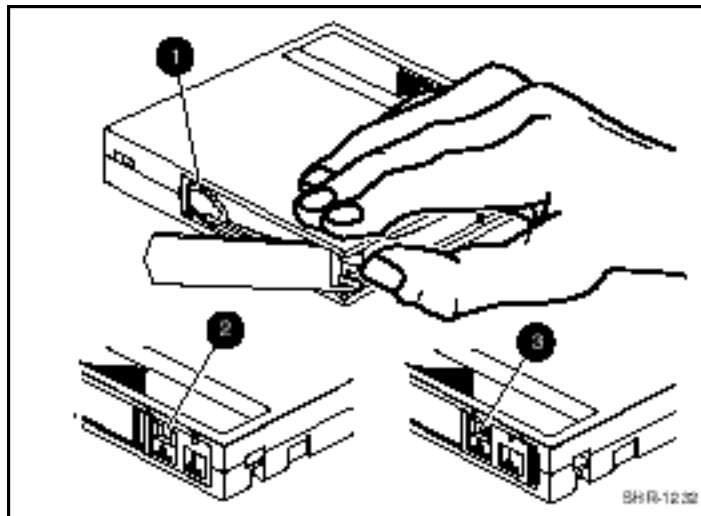


Figure 2-11. DLTtape cartridge

Table 2-11
DLT Tape Cartridge

Figure Legend	Description
❶	Leader
❷	Write protect OFF
❸	Write protect ON

Write Protection

The write protection switch of a DLTtape cartridge is also shown in Figure 2-11. To enable data recording, slide the write protect switch to the right so that no orange color is visible through the window in the write protect switch

❷. To write protect the DLTtape cartridge, slide the write protect switch to the left until the orange indicator shows through the window on the write protect switch ❸.

Barcode Labels

Barcode labels are included with the MiniLibrary and Expansion Unit. Additional labels can be ordered (see Appendix B). The label slips into the slot adjacent to the write-protect switch on each tape cartridge. The code used can be Code 39, Codebar, 2-of-9, standard 2-of-5, or interleaved 2-of-5, with a length of 8 digits. Minimum element width is 0.03 in (7.5 mm).

MiniLibrary System Components

There are four basic components in the MiniLibrary system:

- The MiniLibrary Base Module
- The MiniLibrary Expansion Unit (master)
- The MiniLibrary Data Unit
- The Pass-Through Mechanism

The Expansion Unit can move media freely within itself and between the MiniLibrary Base Modules and the Data Units via the Pass-Through Mechanism.

In the MiniLibrary system, you can combine modules to provide the right combination of capacity and performance for your requirements. The architecture lets you change or add to the mix of modules to optimize throughput, capacity, or both as your storage requirements change.

When connected as a system, the robotics in MiniLibrary Base Modules and Data Units operate from Expansion Unit commands. The host computer(s) are not dependent on the internal geometry of the system, or on the actions or capabilities of any of the slave modules. The Expansion Unit presents, to the host(s), a single SCSI medium changer device with a single SCSI Medium Transport element, several SCSI storage elements equal to the number of cartridge magazine slots, several SCSI import/export elements specified during configuration of the Expansion Unit, and a number of SCSI data transfer elements equal to the total number of drives in the system.

Storage Architecture

The MiniLibrary architecture is uniquely suited and designed for expanding storage needs. The MiniLibrary architecture enables the robotics in each of the MiniLibrary components to exchange cartridges with the Pass-Through Mechanism, and integrates the robotics in the individual components and the Pass-Through Mechanism into a single, high-performance library robotics system.

The MiniLibrary is easily modified, by adding modules and extending the Pass-Through Mechanism, to adapt to expanding storage needs. You can add drives for faster performance or magazine space for greater capacity, as needed. At power-up, the MiniLibrary updates the system map, signaling the host of the need for expansion.

The Expansion Unit

The master Expansion Unit integrates the robotics in the individual modules into a single coordinated library robotics system. The Expansion Unit performs and maintains an inventory of all media residing in the system, including bar code data, if the modules are equipped with bar code readers. All necessary system control operations can be performed from the control panel of the Expansion Unit, as well as from the host through software. The SCSI interface for the library robotics is designed for high-speed communication with the host, and is available in SCSI-2, Fast SCSI-2, Fast Wide SCSI, single-ended Low Voltage Differential (LVD) SCSI, and High Voltage Differential SCSI-2 configurations.

In addition to system control functions, the Expansion Unit has a 16-cartridge magazine with a random access robotic mechanism. The module robotics moves cartridges between the Pass-Through Mechanism and any of the 16 cartridge storage locations.

You can designate a magazine in one of the slave modules as a mail slot for inserting or removing one or more single cartridges, which implements the SCSI IMPORT/EXPORT commands.

NOTE: A magazine reserved for import/export service can not be used for data storage.

The MiniLibrary Base Module

The MiniLibrary Base Module has either one or two DLT drives and a 10-cartridge magazine with a random access robotic mechanism.

The Data Unit

The Data Unit has a 16-cartridge magazine, a random access robotic mechanism, and no tape drives. The module robotics, under control of the Expansion Unit, moves cartridges between the Pass-Through Mechanism and any of the 16 cartridge storage locations.

SCSI Interface Configurations

The MiniLibrary system standard SCSI interface is a Fast Wide SCSI interface using high-density 68-pin D-series connectors.

SCSI Bus Performance Considerations

The data transfer rate of the DLT MiniLibrary is dependent on the type of drives and on the SCSI bus configuration. The bandwidth of the SCSI bus is limited.

Drives

With a standard SCSI interface, modules equipped with:

- DLT20/40 drives can provide a maximum sustained native transfer rate of 1.5 MB/sec. With both drives operating, the DLT20/40 native transfer rate is 3.0 MB/sec.
- DLT35/70 drives can provide a maximum sustained native transfer rate of 5 MB/sec. With both drives operating, the DLT35/70 native transfer rate is 10 MB/sec.
- DLT40/80 drives can provide a maximum sustained native transfer rate of 6 MB/sec. With both drives operating, the DLT40/80 native transfer rate is 12 MB/sec.

The rates for compressed data are the native rates multiplied by the compression factor, which depends on file content, but averages approximately 1.7.

Internal Cabling Configuration

The differential MiniLibrary system is wired in an independent-bus SCSI configuration; the robotics and each of the drives has its own SCSI bus. SCSI jumpers are available for those applications requiring that some combination of drives and robotics are daisy-chained to a single SCSI bus.

The single-ended table-top unit has the robotics and first DLT drive daisy-chained internally to shorten the total internal cable length. The second drive is on an independent bus.

Bus Length Limitations

The single-ended SCSI-2 bus is limited to 19 ft (6 m) in length; single-ended fast SCSI-2 bus is limited to 10 ft (3 m) overall length. LVD SCSI bus length is 39 ft (12 m). In contrast, differential SCSI-2 and fast SCSI-2 buses can be up to 82 ft (25 m) long.

Physical Configuration

All modules in a MiniLibrary system must be mounted in a rack except for the table top module version. When a system is ordered, all the modules are supplied in a rack-mount configuration. Modules cannot be operated alone except for the MiniLibrary Base Module, which can be converted to operate as a free-standing 10-slot library.

System Expansion

A DLT MiniLibrary system can be expanded in capacity or performance or both by adding or removing components. Associated with each component is a section of the Pass-Through Mechanism. The MiniLibrary storage system firmware integrates the robotics in the individual modules and the Expansion Unit Pass-Through Mechanism into a single high-performance library robotics system.

Free-Standing MiniLibrary Base Modules Conversion

You can add existing MiniLibrary Base Modules to your system by changing firmware, resetting internal jumpers, removing the pass-through cover plate, and in some cases converting from desktop to rackmount. These tasks should be performed by qualified service personnel. Contact your technical support representative for instructions.

Features

Figures 2-12 through 2-16 show some of the external features of the Expansion Unit, the MiniLibrary Base Module, and the Data Unit (see Tables 2-12 through 2-16).

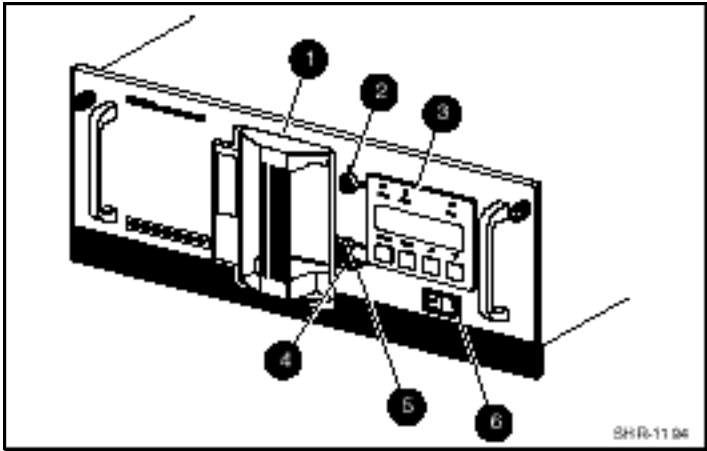


Figure 2-12. Expansion unit and data unit front view

Table 2-12
Expansion Unit and Data Unit Front View

Figure Legend	Description
①	16-cartridge magazine
②	Magazine security lock
③	Control panel
④	Unlock/Open button
⑤	Locked indicator
⑥	Power switch

Figure 2-13. MiniLibrary base module front view

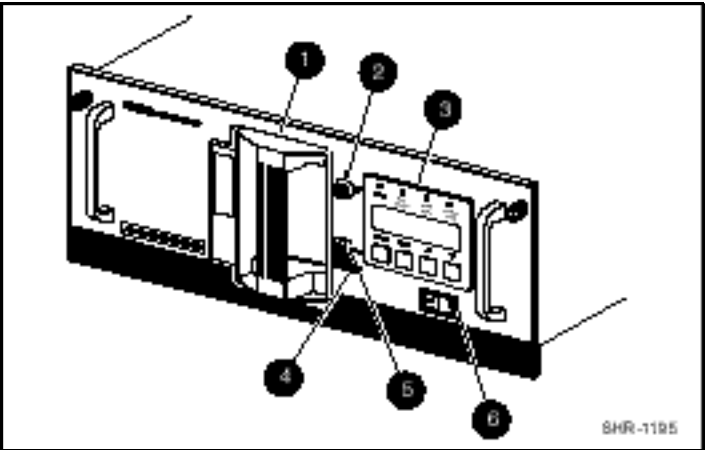


Table 2-13
MiniLibrary Base Module Front View

Figure Legend	Description
①	10-cartridge magazine
②	Magazine security lock
③	Control panel
④	Unlock/Open button
⑤	Locked indicator
⑥	Power switch

Figure 2-14. MiniLibrary base module 10-cartridge magazine

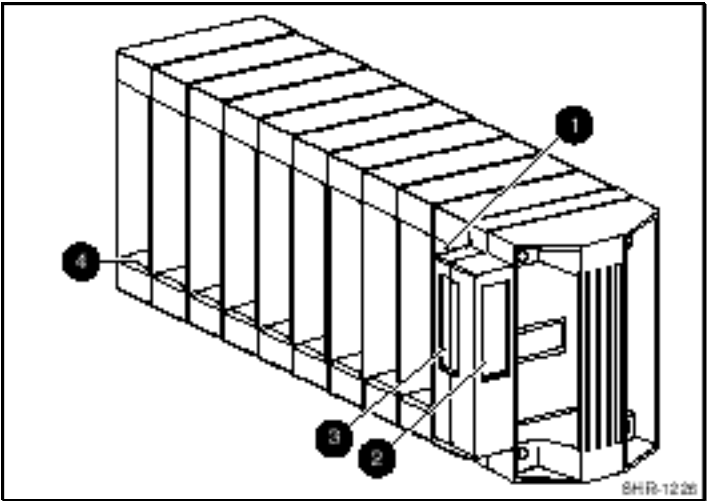


Table 2-14
MiniLibrary Base Module 10-Cartridge Magazine

Figure Legend	Description
①	Slot 0
②	Front label slide slot
③	Barcode label slide slot (not used)
④	Slot 9

Figure 2-15. Expansion unit rear view

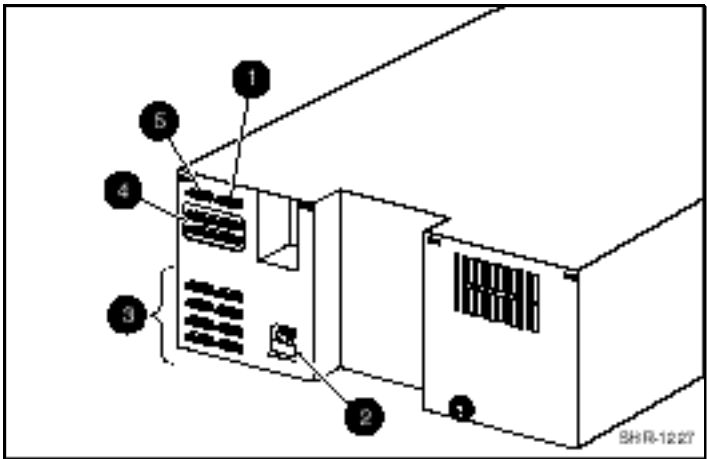


Table 2-15
Expansion Unit Rear View

Figure Legend	Description
①	Pass-Through Mechanism motor drive
②	Power connector
③	Slave module robotics interface connectors
④	Library robotics SCSI interface
⑤	Flash connector

Figure 2-16. MiniLibrary base module rear view

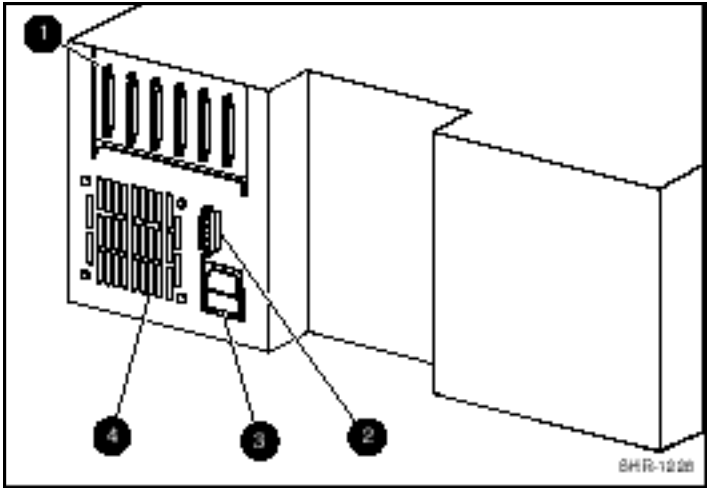


Table 2-16
MiniLibrary Base Module Rear View

Figure Legend	Description
1	SCSI bus interface: MiniLibrary (left two connectors) Drive 0 (middle two connectors) Drive 1 (right two connectors)
2	Expansion unit interface
3	Power connector
4	Fan

Control Panel

The control panels for all modules are the same, except for the number of LED indicators. The control panel features a 4-line by 20-character backlit LCD display, three or four LED indicators, and four buttons. The buttons let you navigate through the menu structure to select and display operating modes, device status, diagnostic and maintenance functions, device history and error statistics, and system configuration.

Display

The backlit 4-line by 20-character control panel display provides a highly intelligible presentation of drive and loader status, menu choices and error messages. The scrolling feature greatly expands the amount of information available to you. In the MiniLibrary Expansion Unit, status information is available for the entire system. The slave modules display other information as needed for localizing malfunctions.

Magazine Security Lock

The magazine security lock is a key-operated switch on the front panel of each module. It can be used to prevent inadvertent removal of the cartridge magazine.

Power Supply

The AC power switch is located on the front panel of the module. The autoranging power supply adjusts automatically to either of two operating voltage ranges. The ranges are 100-120 VAC and 200-240 VAC. The power supply is capable of operating at 50 or 60 Hz without any adjustment or modification. AC power is supplied to the power supply by a single IEC-compatible socket that can be connected to any properly grounded outlet.

Tape Cartridge Magazines

The 10-cartridge and 16-cartridge magazines are removable from the front panel, but can be protected from tampering by any of three means:

1. A key-operated magazine security lock must be unlocked before the magazine can be removed,
2. An electronic combination lock operated by using buttons on the Expansion Unit control panel.
3. Issuance by the host of a SCSI PREVENT MEDIUM REMOVAL command.

The rugged carbon-fiber-reinforced polymer magazine fits into an extruded track, which assures precise positioning with respect to the library robotics. A 10-cartridge tape magazine is shown in Figure 2-14.

The differential unit shown in Figure 2-17 has two ports (Table 2-17). A single-ended version has four ports.

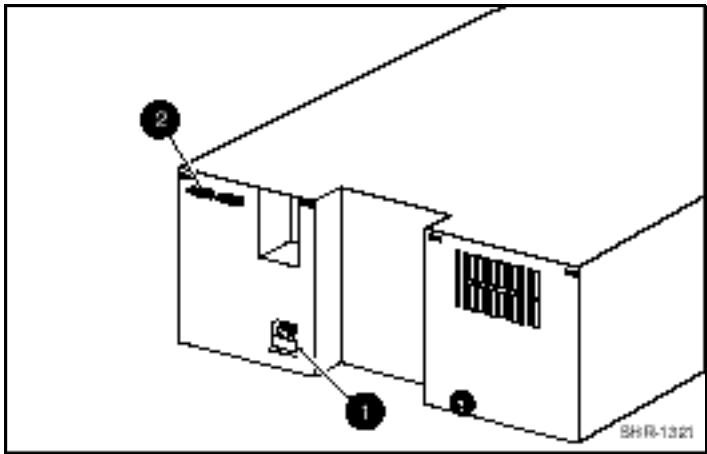


Figure 2-17. Data unit rear view

Table 2-17
Data Unit Rear View

Figure Legend	Description
①	Power connector
②	Expansion unit interface

Integral Fan Cooling

A single forced-air fan is mounted inside each module to provide optimum cooling for critical parts, and to prevent the drive and robotics electronics, motors and power supply from overheating.

Library Robotics

The DLT MiniLibrary system features library robotics that can load any of the cartridges stored in any magazine in the system into any of the DLT tape drives, moving cartridges among as many as six modules within the DLT MiniLibrary system. The robotics design utilizes the Compaq Library Robotics, which is known for ruggedness and its reliability.

Bar Code Reader

The optional bar code reader can be mounted on the cartridge shuttle in each module. It reads bar code labels attached to each cartridge, and maintains the bar code data in memory as part of the library system map. Upgrade kits to add the bar code reader are available for the MiniLibrary Expansion Unit, the MiniLibrary Base Module and the Data Unit.

Chapter **3**

Installation

Introduction

This chapter describes the complete MiniLibrary system installation process from planning and parts identification to mechanical installation, cabling, and configuration.

Installation Overview

There are three basic areas for installing a MiniLibrary System: mechanical installation, cabling, and configuration.

The mechanical installation consists of:

- Assembling the Pass-Through Mechanism. Note that the two-module version is factory assembled.
- Installing the Expansion Unit, the MiniLibrary Base Module(s) and the Data Units. Instructions are provided for all rack types: Compaq Cabinet, EIA/RETMA Standard 19-in (48 cm) cabinet, and StorageWorks SW500, SW600, or SW800 Metric cabinet.
- Installing the Pass-Through Mechanism in the rack.

Cabling consists of:

- Interconnecting the Data Units and MiniLibrary Base Modules with the Expansion Unit
- Connecting the Expansion Unit to the Pass-Through Mechanism motor
- Connecting the MiniLibrary Base Module drive SCSI buses to host SCSI interfaces
- Connecting the Expansion Unit to a host SCSI interface
- Terminating the buses properly

Configuration consists of using the Configure menu to customize the configuration options to your particular application

The remainder of this chapter describes each of these steps.

Planning Your Installation

The MiniLibrary System is designed for mounting in a Compaq Cabinet, StorageWorks SW500, SW600, SW800 or a standard 19-inch EIA/RETMA equipment rack with a depth of 24 to 30 in (61 to 76 cm). Each module is shipped with EIA/RETMA slides installed. Additional hardware for mounting in Compaq and SW500, SW600, and SW800 cabinets is included.

Every Compaq MiniLibrary System includes:

- One Expansion Unit
- One expandable Pass-Through Mechanism
- One to five MiniLibrary Base Modules or Data Units, each with one or two DLT drives

The Expansion Unit has 16 slots and no drives, and serves as controller of the MiniLibrary System. The MiniLibrary Base Modules each have 10 slots plus one or two drives. The Data Unit, which acts as a storage unit, contains 16 slots and no drives. The Expansion Unit, the Data Unit and the MiniLibrary Base Module(s) each occupy 7 in (18 cm) of rack space height.

The Pass-Through Mechanism is composed of a motor drive assembly plus sections of track whose combined length is equal to the combined heights of the Expansion Unit plus the MiniLibrary Base Modules. One extension section of track is needed for the installation of each additional MiniLibrary module.

Positioning the Modules

The Expansion Unit must be mounted at the top of the stack, which places its control panel at a convenient height. The control panels of the Data Unit MiniLibrary Base Modules are of secondary importance, as they serve mainly to help localize system failures. When installed, the motor drive assembly of the Pass-Through Mechanism is directly behind the Expansion Unit.

Data units and MiniLibrary Base Modules can be installed anywhere below the Expansion Unit, in any order. There might be a slight performance advantage in making the MiniLibrary Base Modules contiguous, but gaps are permitted. The size of a gap is limited by the fact that each gap must be bridged by some number of 7 in (18 cm) of Pass-Through Mechanism track sections. For safety, available cover plates should be installed on all Pass-Through Mechanism sections that are not connected to MiniLibrary System modules.

The Expansion Unit senses the position of each module during initialization at power-up. Even if there are gaps between modules, the system will operate correctly. If you plan to leave gaps between modules, be sure to order additional Pass-Through Mechanism track segments and cover plates equal to the length of the gap.

Mechanical Installation

Assembly of the Pass-Through Mechanism requires experience working with moderately complex mechanisms, and the ability to follow directions carefully.

Identifying the Parts of the Pass-Through Mechanism

Locate and identify the Pass-Through Mechanism internal and external parts. The Pass-Through Mechanism is made up of the following external parts, shown in Figure 3-1 (see Table 3-1):

Figure 3-1. Pass-through mechanism external parts

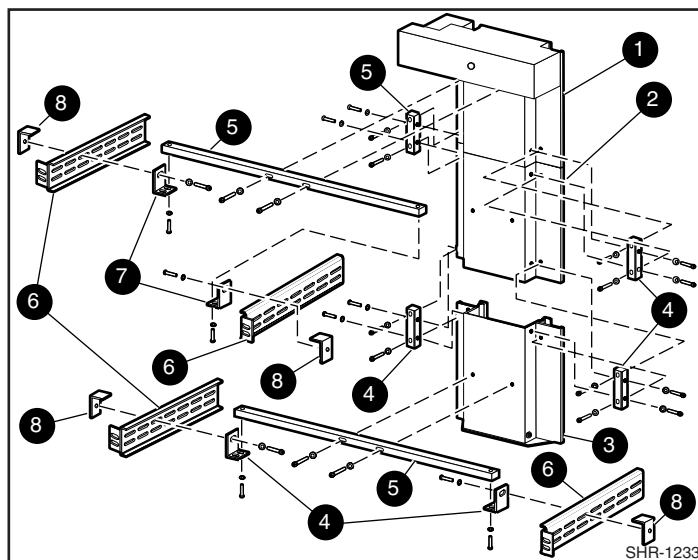


Table 3-1
Pass-Through Mechanism External Parts

Figure Legend	Description
①	Motor drive section
②	Extension sections
③	Pass-through base with idler pulley
④	Tie bars
⑤	Support brace
⑥	Left and right rack slide extensions
⑦	Angle brackets
⑧	L-shaped nut plates

NOTE: The slide extensions ⑥ are not enclosed with the Pass-Through Mechanism parts. They are supplied as part of the installation hardware for the slides that come with each of the modules.

Follow the instructions in the section “Mechanical Installation of the Expansion and Base Modules.” After the rack slides and the Base Modules are in place, and after the Pass-Through Mechanism is assembled, you will install the Pass-Through Mechanism in the rack by attaching the support braces **5** to the slide extensions **6** using the angle brackets **7** and L-shaped nut plates **8**.

The internal parts you will need to recognize during assembly are shown in Figures 3-2 and 3-3 (see Table 3-2).

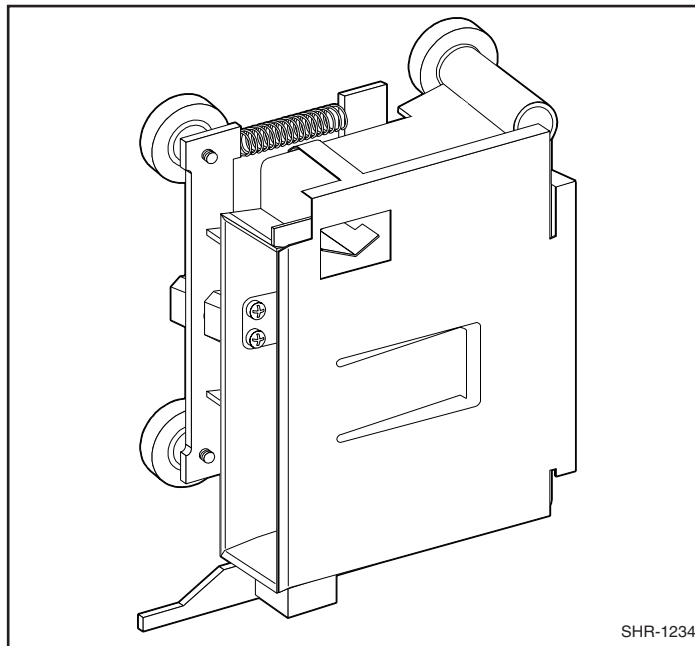


Figure 3-2. Pass-through mechanism car (front view)

Figure 3-3. Car rear view showing belt block

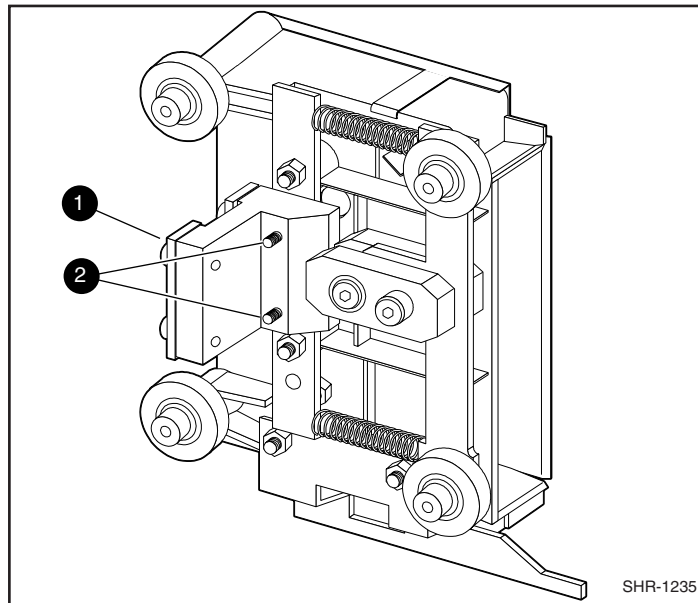


Table 3-2
Car Rear View Showing Belt Block

Figure Legends	Description
①	Belt block
②	Captive screws

The belt block comes fastened to the back of the car with two captive screws. Carefully note the orientation of the block with respect to the car, as shown in Figure 3-3.

Orientation of Parts During Assembly

To determine the orientation of an extension section, examine the flanges on the edges of the section, and note that they are dissimilar. Position the section so that its orientation matches that of the elevator base.

Figure 3-4 shows a typical Pass-Through Mechanism assembly (see Table 3-3). 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 sections are joined together with tie bars. For systems up to four modules, two support braces are needed: one attached to the motor drive and one to the base section. For larger systems, a third support brace should be mounted near the center of the Pass-Through Mechanism.

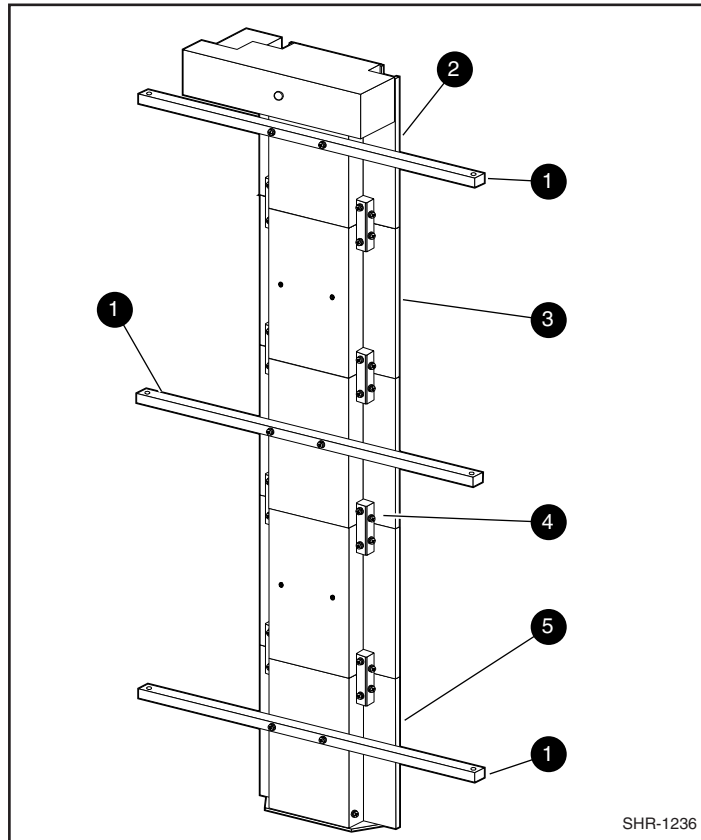


Figure 3-4. Pass-through mechanism assembled

Table 3-3
Pass-Through Mechanism Assembled

Figure Legend	Description
①	Support brace
②	Motor drive section
③	Extension section
④	Tie bar
⑤	Base section

Preparing to Assemble the Pass-Through Mechanism

You will need a clean, flat work area such as a table or workbench. The surface should be long enough to support the full height of the Pass-Through Mechanism. The height is equal to the height of the stack of modules in your system plus any gaps you intend to include in the stack. Use the following procedure to assemble your Pass-Through Mechanism.

Assembling the Pass-Through Mechanism

In most cases, you have received a pre-assembled Pass-Through Mechanism. If its length is correct for your system, proceed to the section “Mechanical Installation of the Expansion and MiniLibrary Base Modules” and continue on to the end of the chapter. If you need to add sections, please take a few minutes to read this section and the section “Installing the Belt,” before proceeding to “Adding to an Existing Pass-Through Mechanism.”

NOTE: References to left and right refer to the position of the part when the Pass-Through Mechanism is assembled and mounted in the rack, as viewed from the front of the rack.

1. Place the base section, with the inside facing down, overhanging the right end of the work area, with the bottom plate of the section toward the right (see Figures 3-1 and 3-4).

2. Place each of the extension sections, with the inside facing down, in a row aligned edge-to-edge beginning with the base section. The bottoms of the sections should be toward the right. Disregard the motor drive at this time.
3. Center one of the support braces across the rear of the base section over the holes on the rear surface of that section.
4. Insert two M4 x 20 mm Phillips sems screws through the holes in the support brace into the holes in the base section, and tighten.
5. Place pairs of tie bars so that they straddle all of the joints where sections come together. Be sure that the beveled edge is toward the inside corner of the sections.
6. Install two M3 x 20 mm Phillips sems screws through each tie bar into the threaded holes in the flanges of the extrusion sections. Only finger tighten the screws at this time. Insert two M3 x 20 mm sems screws through each tie bar into the side of the extrusion sections and then finger tighten.
7. Firmly press the neighboring sections together while tightening the two M3 x 20 mm screws through each tie bar into the flanges of the sections. Alternately tighten the screws into the flanges and those into the sides of the extrusions to ensure that each tie bar is drawn into the corner of the extrusion.

IMPORTANT: Be careful not to over-tighten these screws.

8. Inspect the joint to see that the sections are well aligned, with minimal irregularities and gaps.
9. Repeat steps 6, 7, and 8 for each pair of sections. It might be necessary to use suitable blocks to support the row of sections so that neither the motor housing nor the bottom flange of the base section touches the work surface while you are connecting the motor drive section.
10. Center one of the support bars across the rear of the motor drive section over the holes on the rear surface of that section.
11. Insert two M4 x 20 mm Phillips sems screws through the holes in the support brace into the holes in the motor drive section, and then tighten.
12. Go to the next section, "Installing the Belt."

Installing the Belt

1. Turn the assembled Pass-Through Mechanism over so that the motor points upward (see Figures 3-5 through 3-9).
2. Locate the tensioner ramp in the base section. Compress the spring until the hole in the tensioner ramp is aligned with a hole in the base section (Figure 3-5). Insert a 0.050 in Allen wrench or a paper clip through the holes. This sets the idler pulley for zero belt tension.

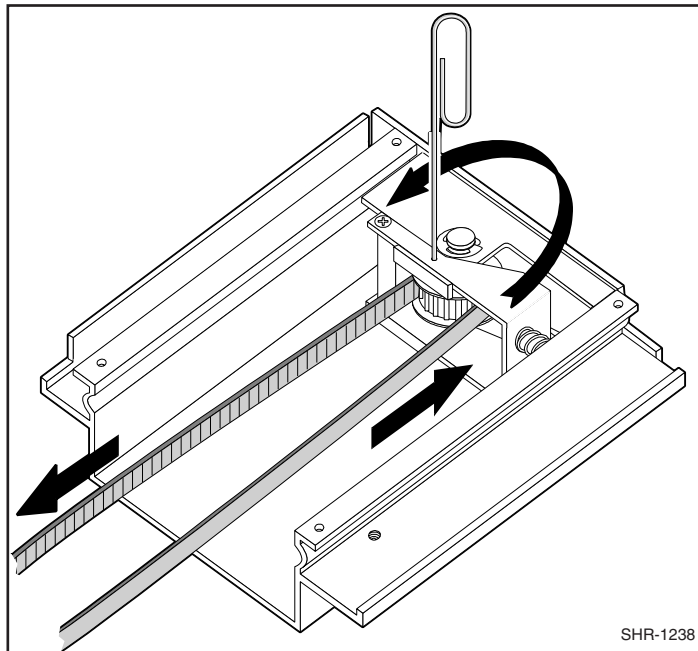


Figure 3-5. Threading the belt through the base section

3. Locate the length of toothed belt that was enclosed with the extension section (Table 3-4).

Table 3-4
Belt Length for Various System Sizes

Number of Modules	Length of Belt
2	27 in (68 cm)
3	41 in (104 cm)
4	55 in (140 cm)
5	69 in (175 cm)
6	83 in (211 cm)

4. See Table 3-4 for the required belt length for your system. After double-checking the length specified, cut the belt between teeth.
5. With the toothed side of the belt toward you, position the right end of the belt about halfway along the Pass-Through Mechanism.

6. Thread the left end of the belt counter-clockwise around the motor drive pulley (Figure 3-6).

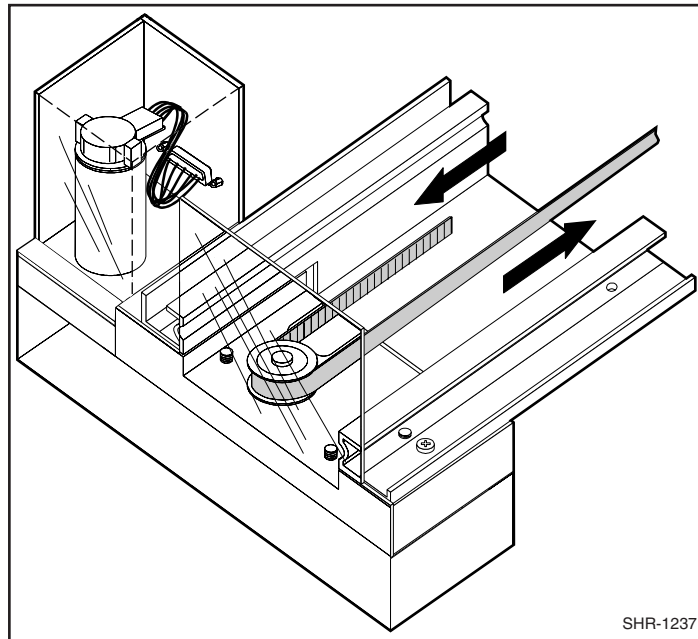
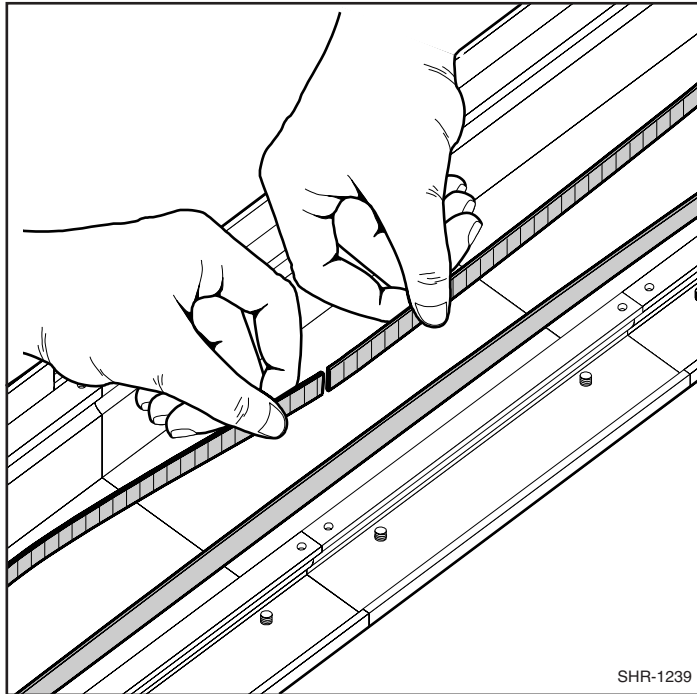


Figure 3-6. Threading the belt through the drive section

7. Thread the belt from the motor drive counter-clockwise around the idler pulley and back to the right end (Figure 3-5).
8. Holding the ends of the belt as shown in Figure 3-7, the two ends should be touching or very slightly overlapping.

Figure 3-7. Checking belt length



9. Loosen the four screws that hold the belt retaining plates to the block. Slide the ends of the belt under the plate until they engage the teeth on the block. Both ends of the belt should be visible through the gap between the plates as shown in Figure 3-8 (see Table 3-5). Set the belt so there is only a small space between the ends of the belt (approximately $\frac{1}{32}$ of an inch).

Figure 3-8. Belt block with belt in place

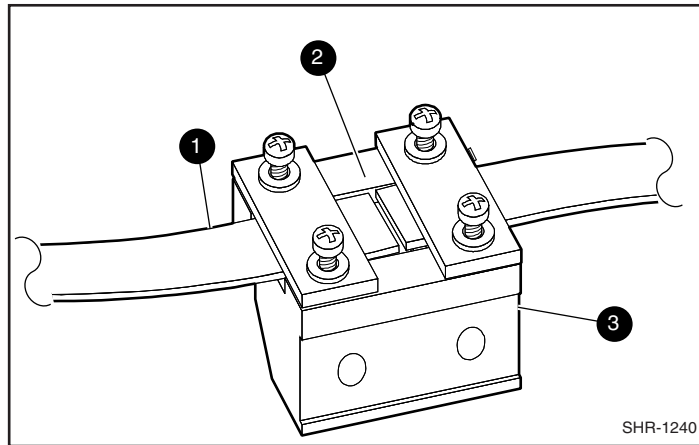


Table 3-5
Belt Block with Belt in Place

Figure Legend	Description
①	Belt
②	Gap visible
③	Block

10. Tighten the four screws that hold the belt retaining plates.
11. Pull out the paper clip previously installed in the base section. This applies the proper tension to the belt.
12. Locate the two captive screws in the car. Screw them backward approximately one thread into the bracket in the car so they are held in an upright position.
13. Position the belt block at least six inches from the motor drive pulley.
14. Locate the spring-loaded wheels of the car. Engage the spring-loaded wheels in the track, while positioning the car so the captive screws are directly over the holes in the belt block (Figure 3-9 and Table 3-6).

NOTE: Figure 3-9 omits the door on the car for clarity. Do not remove the door.

Figure 3-9. Aligning the captive screws with the block

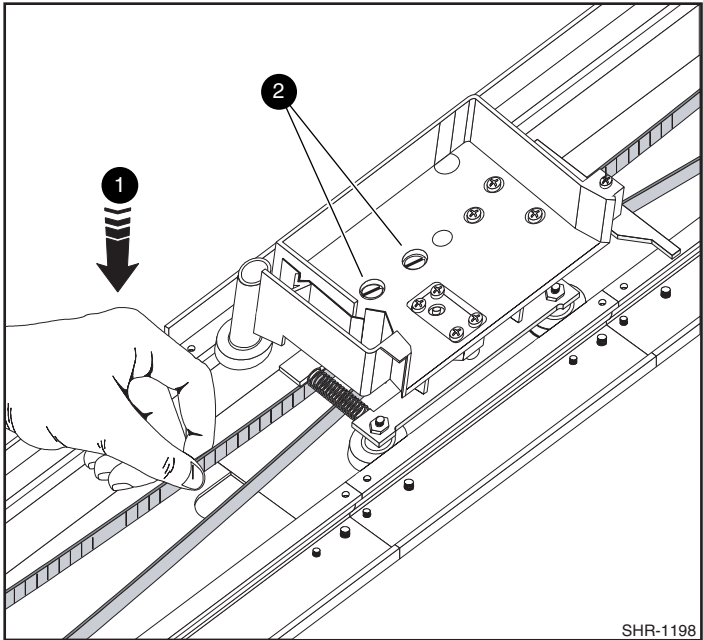


Table 3-6
Aligning the Captive Screws with the Block

Figure Legend	Description
①	Press down
②	Captive screws

15. To steady the belt block, grasp the belt several inches from the block and push toward the back of the track until the block is pressed firmly against the back of the track. While holding the belt with one hand, compress the springs and swing the car downward until the remaining wheels are aligned with their groove in the track.
16. While continuing to press the belt block against the back of the track, release the car so that the stationary wheels engage their groove in the track.

17. While continuing to press the belt block against the back of the track, begin to tighten the captive screws. When both screws are partially threaded into the belt block, release the belt and finish tightening the screws. Be sure that the block is fully seated against the bracket on the car. Close and secure the door on the car.
18. Using nylon button rivets, install covers over any exposed Pass-Through Mechanism sections that are not covered by modules.

NOTE: See Appendix E, "Additional Information on Pass-Through Section Covers."

Go to the section "Mechanical Installation of the Expansion and MiniLibrary Base Modules."

Adding to an Existing Pass-Through Mechanism

Before reading this section, familiarize yourself with the parts and procedures by reading the two preceding sections. To add to an existing Pass-Through Mechanism, you must first partly disassemble it, then make the necessary changes as described in the preceding sections. Use the following procedure for disassembly.

1. Locate the covers over the drive motor section and the base assembly. Note that the covers are held in place by nylon button rivet fasteners. Using a suitable thin-bladed tool, pry up the cover until the fasteners can be removed. Set the covers aside, and save the fasteners for re-use.
2. Place the Pass-Through Mechanism on a suitable work surface with the motor at the left and pointed upward. Open the door of the car to gain access to the captive screws (Figure 3-9). Do not remove the door. Loosen the captive screws until they are disengaged from the belt block.
3. Grasp the closed side of the car and pull it toward you so as to compress the springs underneath the car. When the wheels on the closed side are clear of the track, lift the car from the track and set it aside.
4. Locate the tensioner ramp in the base section (Figure 3-5). Compress the spring until the hole in the tensioner ramp is aligned with a hole in the base section. Insert a 0.050 in Allen wrench or a paper clip through the holes. This sets the idler pulley for zero belt tension.
5. Loosen the four screws on the belt block far enough to pull the ends of the belt free of the block (Figure 3-8). Pull the belt free of the motor drive assembly and the base section and set the belt aside.
6. Turn the Pass-Through Mechanism over and support it so that neither the motor nor the flange at the bottom of the base assembly is touching the work surface.

7. Remove the eight screws holding a pair of tie bars in place (Figures 3-1 and 3-4). Separate the Pass-Through Mechanism at that joint.
8. You can now add sections as needed and install a new belt as described in the sections “Assembling the Pass-Through Mechanism” and “Installing the Belt.”

Mechanical Installation of the Expansion and MiniLibrary Base Modules

The Expansion Unit and the MiniLibrary Base Module come with the basic RETMA/Metric slide rack set installed on either side. Note that the Compaq rackmount kit is packed with the unit.

The Expansion Unit and Base Module(s) can be rack-mounted in either a Compaq rack, a standard 19 in EIA/RETMA rack (with a depth of 24-30 in) or a StorageWorks (SW500, SW600, or SW800) metric rack using metric conversion brackets. Both rack types require two initial steps:

1. Separating the rack slides.
2. Attaching the mounting-brackets.

This section describes these common rackmount instructions, followed by rack-specific rackmount instructions. The cabling and configuration procedures for all rackmounted MiniLibraries are described in the section entitled, “Interfaces and Cabling.”

Follow the directions in the shipping container to unpack the module(s). Save the packing materials for re-use in case you need to return the module(s) for repairs.

The slide is attached to the MiniLibrary Base Module enclosure by means of three screws through the inner slide. Remove the packing tape from the slides, and separate each set of slides as described in the following section.

Rack Slide Separation (Includes Compaq Rack Template)

1. See Figure 3-10 and Table 3-7. Pull the outer slide toward the rear, along with the intermediate slide until the inner slide lock engages the intermediate slide.
2. Continue to pull the outer slide towards the rear until the outer slide lock engages the intermediate slide. Press down on the inner slide lock to permit the intermediate slide to continue to move toward the rear. Continue to move the outer and intermediate slides toward the rear until they are separated from the inner slide.

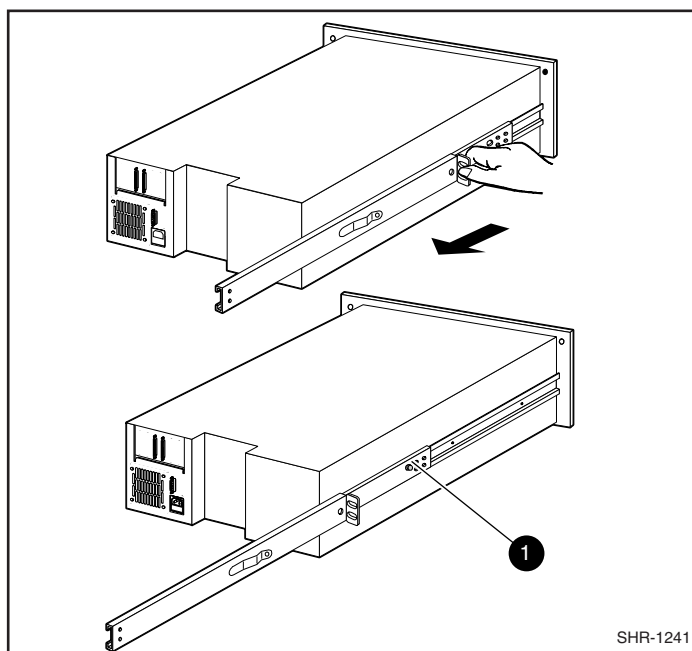


Figure 3-10. Separating a rack slide

Table 3-7
Separating a Rack Slide

Figure Legend	Description
①	Inner slide lock

3. Identify and orient the parts of the slides and hardware needed for your specific rack type. Figure 3-11 shows the parts required for standard EIA/RETMA rackmounting and Figure 3-12 shows the parts for rackmounting into a StorageWorks metric rack.

NOTES: All of the screws, washers, nutplates and/or metric conversion brackets required for rackmounting in either cabinet type are supplied with the Expansion Unit and Base Module. You will need a #2 Phillips screwdriver and a flathead screwdriver.

The left and right slides are alike, so there is no risk of confusing the parts on reassembly.

The front of the cabinet, and front rails in this text refers to where the module face will be exposed (typically opposite from the main power source location). The main power source location thus becomes the rear of the cabinet, and where the rear rails exist.

4. Loosely assemble a mounting bracket to each outer slide, using two 10-32 screws with washers and a nutplate for each. Select slots in the mounting brackets so the length of the assembly equals the distance between the front and rear rails of the rack.
5. Locate the screw holes in the front and rear rails of the cabinet or equipment rack where the drive is to be installed.



CAUTION: The cooling fan at the rear of the drive must not be obstructed when the drive is installed in the rack. It is advisable to allow 2 in (5 cm) of clearance behind the rear panel of the module.

6. From this point, the instructions vary depending on cabinet type, and you should proceed as follows:
 - a. See the Compaq rackmounting template, which is included with each module.
 - b. EIA/RETMA cabinet rackmounting - see section "Rackmounting in a Standard (19 in) EIA/RETMA Cabinet."
 - c. StorageWorks metric rackmounting - see section "Rackmounting in a StorageWorks (SW500, SW600, or SW800) Metric Cabinet."

Rackmounting in a Standard 19-Inch EIA/RETMA Cabinet

These procedures assume that you have already separated the slide racks and attached the mounting brackets to the slides as described in the beginning of this chapter.

1. Fasten each outer slide behind the front rail of the rack using two 10-32 low-profile screws with washers and one nut plate. Two 10-32 clip nuts are provided to engage the captive screws on the front panel (see Figure 3-11 and Table 3-8).
2. Fasten each of the mounting brackets to the front of the rear rail of the rack using two 10-32 screws and one nut plate.
3. Tighten the screws installed in Step 4 of the previous section.
4. If they are not already locked, pull the intermediate slides toward the front (out of the rack) so that they lock in the extended position.

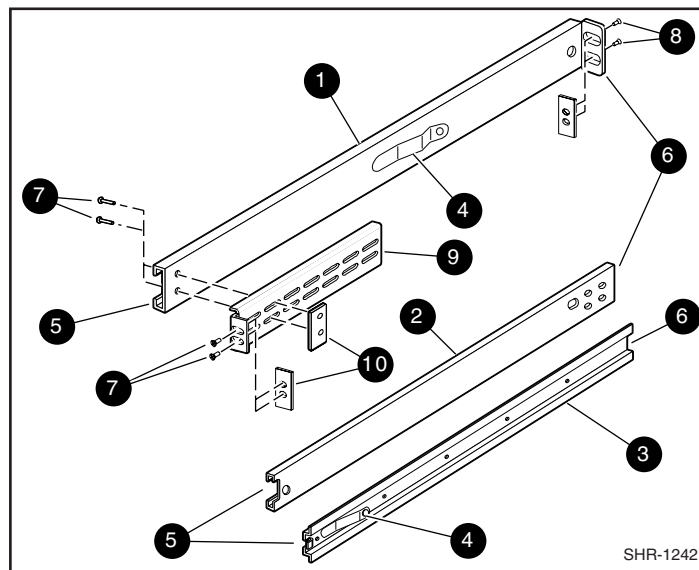


Figure 3-11. Rack slide parts for standard 19-inch EIA/RETMA rackmounting

Table 3-8
Rack Slide Parts (Standard 19-Inch EIA/REMTA)

Figure Legend	Description
❶	Outer slide
❷	Intermediate slide
❸	Inner slide (attached to module)
❹	Lock tab
❺	Rear
❻	Front
❼	10-32 screws
❽	10-32 low profile screws
❾	Mounting bracket
❿	Nut plate



WARNING: Step 5 should be performed by two people.

Make certain that when the module is fully extended that a force of 20% of the rack weight, but not more than 57 lb (26 Kg) applied in any direction but upwards does not cause the rack to overbalance.

5. In front of the rack, lift the module to its installed height. Engage the inner slides mounted on the module with the intermediate slides protruding from the rack, and slide the module toward the rack until the inner slide lock engages the intermediate slide. This leaves the entire module protruding from the rack, locked in position, supported by slides.
6. Press inward (toward the module) on each of the inner slide locks to permit the intermediate slides to move toward the rack.
7. Slide the module in and out several times, ensuring that the inner and outer slide locks engage, and that the module does not bind against the slides.
8. If binding occurs, loosen the four screws that secure the slides to the front rails and the four screws that secure the slides to the rear rails.
9. If necessary, repeat steps 8 and 9 until the module does not bind against the slides.

10. If the rails on your rack are not threaded, install a clip nut on each front rail at the height of the captive screws on the front panel of the MiniLibrary Base Module. If the rails on your rack are threaded, skip this step.
11. Slide the MiniLibrary Base Module into the rack, and tighten the captive screws.
12. Once you have securely installed the MiniLibrary into the standard rack, go to the section, "Interfaces and Cabling."

Rackmounting in a StorageWorks (SW500, SW600, or SW800) Metric Cabinet

These procedures assume that you have already separated the slide racks and have attached the mounting brackets to the slides as described in the beginning of this chapter.

You are now ready to install the metric conversion brackets supplied with the Base Module. These adapter brackets are designed to mount 4U high (IU=1.75 in) RETMA modules into a metric rack. The brackets maintain the 4U high unit-to-unit spacing on a metric rack that enables the pass-through system to work properly (Figure 3-12 and Table 3-9).

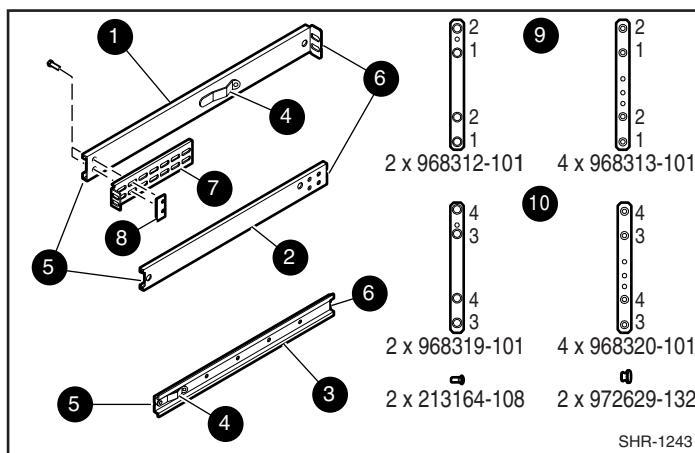


Figure 3-12. Parts list for StorageWorks metric rackmounting

Table 3-9
Parts List for StorageWorks Metric Rackmounting

Figure Legend	Description
❶	Outer slide
❷	Intermediate slide
❸	Inner slide
❹	Lock tab
❺	Rear
❻	Front
❼	Mounting bracket
❽	Nut plate
❾	For 1st or 2nd modules from top (units 1 and 2)
❿	For 3rd or 4th modules from top (units 3 and 4)

NOTE: Brackets for modules 5 and 6 are not shown in Figure 3-12.



WARNING: The cooling fan at the rear of the drive must not be obstructed when the drive is installed in the rack. It is advisable to allow two inches of clearance behind the rear panel of the module. Make certain that when the module is fully extended that a force of 20% of the rack weight, but not more than 57 lb (26 Kg) applied in any direction but upwards does not cause the rack to overbalance.

Metric Conversion Bracket Description and Identification

1. See Figure 3-12 to identify and take inventory of the metric conversion hardware included in your metric rackmount kit.
2. Determine where the module you are installing is going to be located relative to the top module.
 - a. If the module you are installing is going to be located on the top of the stack or the second from the top (unit 1 or 2), the parts which you will need to install this module are:

2 pieces (968312-101)

4 pieces (968313-101)

- b. If the module you are installing is going to be located third or fourth from the top (unit 3 and 4), the parts which you will need to install this module are:

2 pieces (968319-101)

4 pieces (968320-101)

- c. If the module you are installing is going to be located fifth or sixth from the top (unit 5 and 6), the parts which you will need to install this module are:

2 pieces (968608-101)

4 pieces (968609-101)

- d. Sort out the appropriate adapters for your application. The part number is stamped in the middle of the part for identification.

- 3. Next to each mounting hole in the bracket, numbers are stamped which correspond to the module number. If you are installing the first module for example, mount the flat head screws (P/N 213164-108) through the holes marked #1.

Metric Rackmount Procedure

- 1. Mount the appropriate metric conversion bracket to both ends of the slide using the 10-32 nuts provided in the slide kit (Figure 3-13 and Table 3-10). Do this for both the left and right slide assembly. For modules 1 and 2, use P/N 968313-101. For modules 3 and 4, use P/N 968320-101; for modules 5 and 6, use P/N 968609-101. Make sure that these brackets are oriented so that the numbers are right side up in all corners.

Figure 3-13. Metric rackmount installation layout

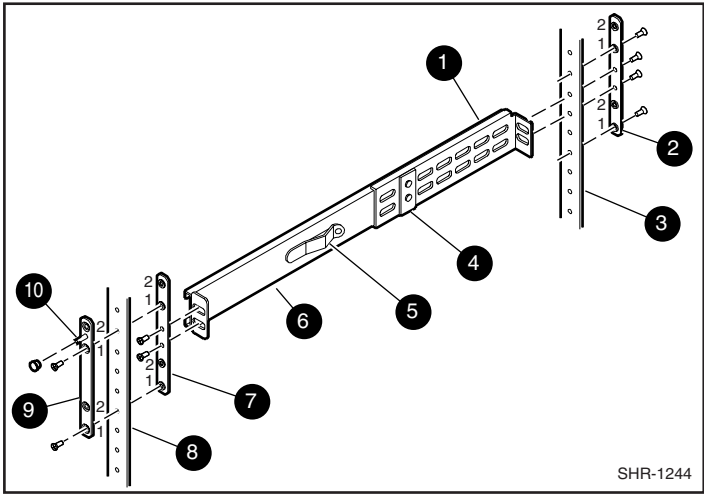


Table 3-10
Rack Slide Parts (Standard 19 in EIA/REMTA)

Figure Legend	Description
①	Attached mounting bracket
②	968313-101
③	Rear rail Of StorageWorks metric rack (attach this end first)
④	Nut plate
⑤	Lock tab
⑥	Outer right slide
⑦	968313-101
⑧	Front rail of StorageWorks metric rack (where Base Module face will reside)
⑨	968312-101
⑩	Threaded post for thumb screw

2. Mounting the bracket/slide assembly to the StorageWorks cabinet. If installing the first module, select a mounting location:
 - a. Mount each slide/bracket assembly to the rack by aligning the two mounting holes marked #1 to holes on the rack. Start by mounting the slide/bracket assembly to the **rear** of the StorageWorks first. Hold the bracket/slide assembly in place with one hand, fasten a mounting screw to the holes marked #1.
 - b. To mount the front bracket, place bracket (P/N 968312-101) in front of the rack with the holes marked #1 aligned to the holes on the rack.
 - c. Extend the slide/bracket assembly forward to mate with the rack. Align the holes marked #1 on the slide/bracket assembly with the hole #1 on the front bracket and fasten two mounting screws through the two #1 holes.
 - d. Be careful to mount all four brackets at the same height. You can use a ruler or count holes to achieve this.
 - e. Tighten all four corners and the slide extension.

Procedure for Installing Modules 2, 3, 4, 5 or 6

1. Each unit is 7 in (18 cm) high. To locate the mounting location of the next bracket/slide assembly, use a ruler to measure 7 in (18 cm) vertical distance of the protruding stud from the bracket above to the stud of the bracket which is to be installed. The mounting holes marked for the number of the module being installed should automatically line up with the rack holes.
2. Using mounting screws (P/N 213164-108), mount the slide bracket assembly using the two mounting holes marked 2, 3, 4, 5 or 6 to mount the second, third, fourth, fifth, or sixth module respectively. Start by mounting the slide/bracket assembly to the rear of the StorageWorks cabinet. Hold the bracket/slide assembly in place with one hand, fasten the mounting screw to the bracket holes marked with a number that corresponds to the module number.
3. Be careful to mount all four brackets at the same height. You can use a ruler or count the hole numbers to achieve this.
4. Tighten all four corners and the slide extension.

You are now ready to install the Pass-Through Mechanism in the rack as described in the section “Installing the Pass-Through Mechanism in the Rack.”

IMPORTANT: See Appendix E, “Information on Pass-Through Section Covers.”

Installing the Pass-Through Mechanism in the Rack

1. If you have not previously done so, install the angle brackets on the rack slide extensions of the top and bottom modules, using one 10-32 screw and an L-shaped nut plate for each angle bracket. The L-shaped nut plates should hang from the top of the slide extensions on the outside. Place the angle brackets so the front edge of the vertical part is $15/16$ of an inch behind the rear edge of the slide body, as shown in the inset in Figure 3-14.

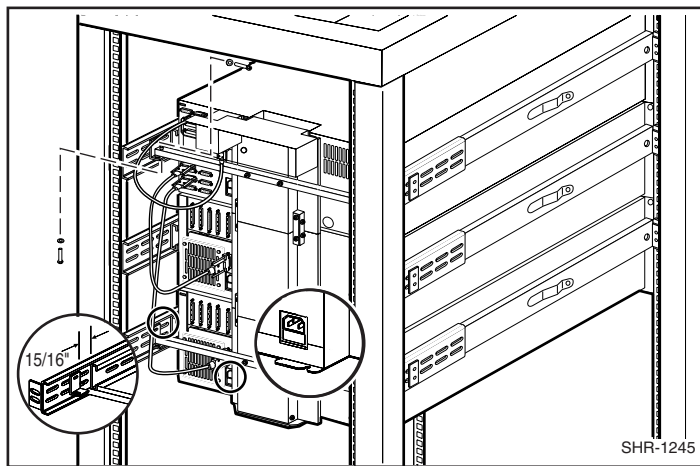


Figure 3-14. Installing the pass-through mechanism in the rack

2. Position the Pass-Through Mechanism against the back of the installed modules so that the support braces rest on the previously installed angle brackets (Figure 3-14). Install an M4 x 20 mm screw and washer through the rear hole in each angle bracket into the support braces. Do not tighten.
3. Look closely at the right flange of the Pass-Through Mechanism (left side as viewed from the rear of the rack) as shown in the inset in Figure 3-14. At the top module, position the Pass-Through Mechanism horizontally so that the edge of the flange fits exactly into the slot on the rear of the chassis of the top and bottom modules.
4. Make sure that the bottom edge of the Pass-Through Mechanism motor drive section is flush with the bottom surface of the module chassis. If necessary, adjust the vertical position of the angle brackets.

5. Repeat steps 3 and 4 at the bottom module. Tighten all of the screws that hold the Pass-Through Mechanism to the angle brackets while ensuring that:
 - a. The Pass-Through Mechanism is centered horizontally, as indicated by the flange engaging the slot on the top and bottom modules.
 - b. It is centered vertically, as indicated by the bottom of the bottom of the Pass-Through Mechanism being flush with the bottom of the lowest module.
 - c. The Pass-Through Mechanism is pressed firmly against the backs of the top and bottom modules.
6. One at a time, push the remaining modules into place and tighten the captive screws. In each case, ensure that the module does not bind against an adjacent module, that clearance between modules is evenly divided between top and bottom, and that the flange on the Pass-Through Mechanism engages the slot on the back of the module.
7. If binding occurs, or if the module is not centered on the Pass-Through Mechanism, loosen the four screws that secure the slides of the binding module to the front rails and the four screws that secure the slides to the rear rails, reposition the slides, then retighten the screws.
8. If necessary, repeat steps 6 and 7 until the module does not bind against the slides or against adjacent modules.
9. Repeat steps 6, 7, and 8 for all of the remaining modules.

Interfaces and Cabling

The connections required depend on the type of module (Figure 3-15 and Table 3-11). The Expansion Unit always has the SCSI connection to the host for the library robotics. MiniLibrary Base Modules have a separate SCSI connection to the host for each drive* (with the exception of the TL881 single-ended MiniLibrary), but the SCSI connectors for the robotics should not be used. The portion of the library robotics that is located in the MiniLibrary Base Modules are controlled by the Expansion Unit through a cable connected to the expansion interface connector on each module. Each module has a separate AC power connection.

*** IMPORTANT:** In principle it is possible to daisy-chain the SCSI connections for multiple drives, to save SCSI controllers. Compaq strongly recommends against this practice because it can severely limit the data throughput performance and reliability of the library.

Figure 3-15. Expansion unit SCSI connectors and cables (fast wide SCSI shown)

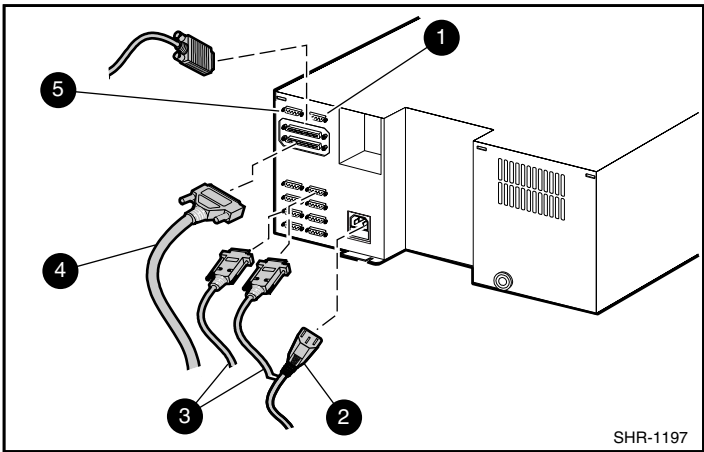


Table 3-11
Expansion Unit SCSI connectors and Cables
(Fast Wide SCSI Shown)

Figure Legend	Description
①	Pass-through motor cable connector
②	Power cable
③	Robotics cables to Base Modules
④	SCSI cable
⑤	Diagnostic connector

Pass-Through Mechanism Motor Cable

The Pass-Through Mechanism motor cable is 36 in (91 cm) long and has a male DB-15 connector on each end. Connect the cable from the connector on the motor housing of the Pass-Through Mechanism to the motor connector on the Expansion Unit.

Control Cables

Connect each MiniLibrary Base Module or Data Unit to the Expansion Unit using one of the cables with a DB-9 male connector at the base end and a DB-9 female at the Expansion Unit end. A cable is required for each MiniLibrary Base Module.

NOTE: Any of the control cables can be connected to any of the DB-9 connectors on the back panel of the Expansion Unit. The Expansion Unit determines the location of each module during power-up tests.

Power Cord

The detachable AC power cord is a standard grounding AC cord that attaches to an IEC-compatible connector on the rear panel. Connect a cord to the connector on each module, and connect the other end to a reliably grounded AC outlet or rack power outlet.

To maintain safety compliance, use a power cord with a suitable rating that is approved for the country in which the product is used. In the USA, cords must be UL listed, in Canada, CSA certified, and in Europe use a harmonized cord marked <HAR> or a nationally certified cord. Compaq specified power cords are available as part of the associated country kits (ordered separately.)

SCSI Interfaces

MiniLibrary modules come with a Fast Wide SCSI interface and one or two DLT drive(s). Fast Wide SCSI is available as Single-Ended, Low Voltage Differential (LVD/SE) interface using two parallel female high-density 68-pin D-Series connectors per bus. Fast Wide SCSI cables and terminators are secured to the connectors by jackscrews.

NOTE: Compaq strongly recommends that you use differential controllers and high-quality SCSI cables to ensure the highest performance of your MiniLibrary. Bus errors caused by excessive length or poor quality cables can significantly degrade performance and reliability.

In the MiniLibrary Base Module, each drive is wired to an independent bus with a pair of SCSI connectors. Because it can be used in free-standing applications, the MiniLibrary Base Module has a pair of SCSI connectors for that module's library robotics. The library robotics SCSI interface should not be connected when installed in a system with an Expansion Unit. The Expansion Unit controls the library robotics for all of the modules in the system. It has a single SCSI bus, with a pair of SCSI connectors, to enable a host to control the library robotics.

Each of the drives in the system and the library robotics is a separate SCSI device and is wired to a separate SCSI bus. Any of the separate buses can be combined using a SCSI jumper cable, available from Compaq. If any two or more devices are connected to the same SCSI bus, each must be assigned a unique SCSI address. For information on assigning SCSI addresses, see the section, "Configuration," later in this chapter.

NOTE: For reduced internal cable length the single-ended units have the robotics and first drive daisy-chained internally.

NOTE: For best performance, no more than two drives should be connected to a single SCSI bus, because of the bandwidth limitations of the SCSI bus.

A terminator of the proper type (68-pin LVD/SE or SE) must be installed on each unused connector at the end of each bus, as explained below in the section, "Interface Cable and Terminator Installation." Figure 3-15 shows the SCSI cable, connectors and bus terminator used on the module.

In order to connect a module to a host computer system, the host system must have at least one SCSI controller and the appropriate driver software. As noted earlier, higher-speed drives might require the use of separate SCSI controllers for each drive or each pair of drives. No more than two drives should be connected to a single SCSI bus. Your Technical Support representative is available to answer your questions about installation procedures for specific host systems. Before cabling the system, see the recommended SCSI cable specifications in the following section. Also, see the section, "Interface Cable and Terminator Installation" in this chapter.

Interface Cable Specifications

The MiniLibrary is a high-performance system. To avoid degradation of performance, use the highest-quality interface cables. The detailed requirements for SCSI cables are set forth in ANSI X3.131-1994. All SCSI cables used with the MiniLibrary module meet at least the following requirements:

- Shielded or double-shielded, as required to meet EMI specifications
- Impedance match with cable terminators of 132 Ω
- Characteristic impedance between 90 and 132 Ω , required
- Each end of the twisted pair ground must be connected to chassis ground
- The maximum cable length for a differential Fast SCSI bus is 82 ft. (25 m)

NOTE: See Appendix H, "Interconnect Characteristics for Signals," for LVD/SE, SE, and HVD recommended minimum conductor sizes.

IMPORTANT: When calculating the overall length of the bus, be sure to include the internal cabling of the module, which is as follows:

- ☐ MiniLibrary Base Module:

- Fast Wide SCSI
 - DLT0 14 in (36 cm)
 - DLT1 23 in (57 cm)

- ☐ Expansion unit: 32 in (81 cm)

- Cables of different types of impedance should not be used together.

Additional specifications to assure the highest SCSI performance can be found in ANSI X3.131-1994 or later.

NOTE: This equipment has been tested for electromagnetic emissions and immunity using good quality shielded cables. The use of unshielded cables, poor quality cables or other variances from good practice can result in non-compliance with national and international rules.

Terminators

A terminator must be installed on the device if the device is to be used at either end of a SCSI bus, such as the first or last device along a daisy-chain, or as a single SCSI peripheral. The appropriate type and quantity of terminator is shipped with your module. They are packaged in the accessory bag that arrives with the module.

NOTE: It is important to use only differential terminators on a differential SCSI bus.

Interface Cable and Terminator Installation

To properly cable a module:

1. Make sure that your host system has an appropriate SCSI interface card for each SCSI bus and software drivers installed.
2. Inspect the terminator and make sure it is a differential type (Figures 3-16 and 3-17 and Tables 3-12 and 3-13). SCSI terminators should be clearly marked single-ended, differential, or LVD/SE.
3. Determine whether the module is to be connected in daisy-chain fashion with other devices.
4. If not used in a daisy-chain, install the terminator in the second SCSI connector.
5. If used in a daisy-chain, and the drive is the last device of the chain, install the terminator in the second SCSI connector. Otherwise, do not use the terminator. Connect the next cable in the chain to the second SCSI connector.
6. Make sure that the cable you use meets the specifications listed earlier in this chapter.
7. Measure the cable length to connect the module to the computer system.
8. Be sure that the length of the entire bus falls below the maximum permissible length given in the section, "Interface Cable Specifications."

Figure 3-16. Base module SCSI connectors, terminators and cables (fast wide interface, independent bus connection shown)

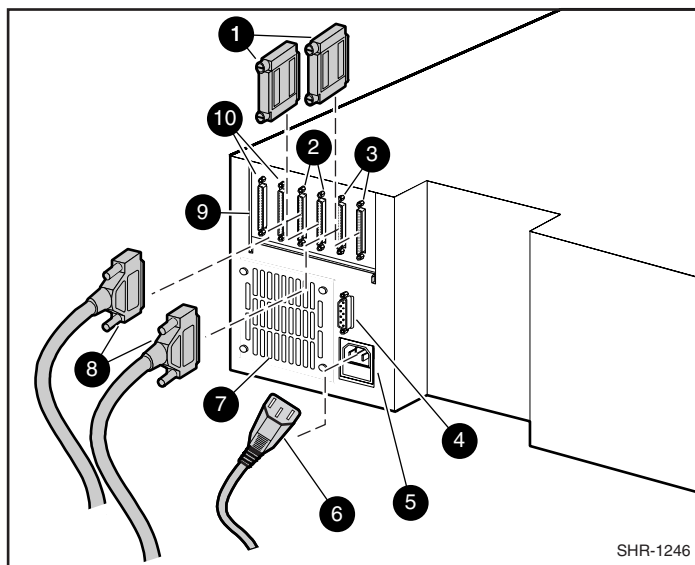


Table 3-12
Base Module SCSI Connectors, Terminators and Cables

Figure Legend	Description
①	SCSI terminator
②	DLT0
③	DLT1
④	Expansion unit interface
⑤	Power connector
⑥	Power cable
⑦	Fan
⑧	SCSI cables
⑨	SCSI interface
⑩	Library connectors (not used in slave mode)

Figure 3-17. Base module SCSI connectors, terminator, jumpers and cables (SCSI-2 interface, daisy-chained connection shown)

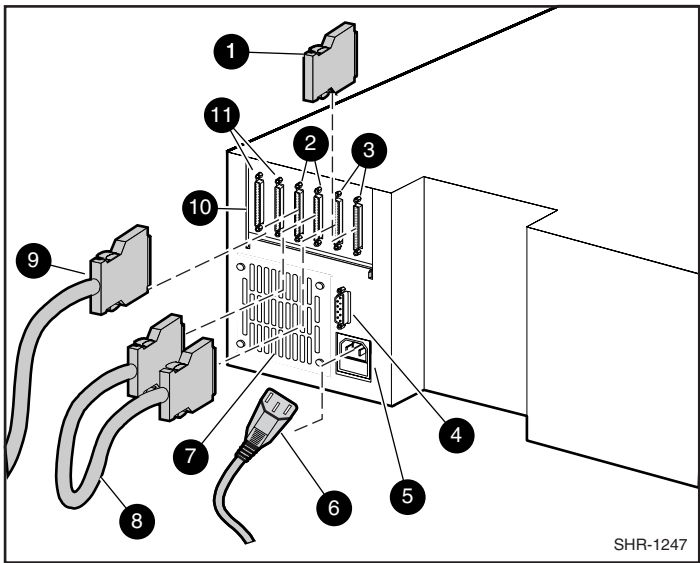


Table 3-13
Base Module SCSI Connectors, Terminator, Jumpers and Cables

Figure Legend	Description
①	SCSI terminator
②	DLT0
③	DLT1
④	Expansion unit interface
⑤	Power connector
⑥	Power cable
⑦	Fan
⑧	SCSI jumpers
⑨	SCSI interface
⑩	Library connectors (not used in slave mode)

Configuration

Individual MiniLibrary Base Modules in all newly assembled systems must be configured as described in the next section. In addition, the MiniLibrary system is designed with several configuration options, each offering multiple settings to support a variety of applications and platforms. The setting of each option is stored in non-volatile memory in the module. For most applications, you will not need to change the factory default settings.

To change settings, you need to use the control panel on the Expansion Unit. For an overview of how the control panel works, and a description of the functions of the buttons, indicators and display, see the sections, “Entering the Menu Mode,” “Exiting the Menu Mode,” and “Navigating Through the Menu Structure,” in Chapter 2, “Operation.”

The settings can be changed using the procedure described later in the section “A Configuration Example - Setting the SCSI ID.” Before changing any configuration settings, consult your host system documentation to determine which settings might need to be changed.

Setting MiniLibrary Base Module (Slave) Configuration

IMPORTANT: All MiniLibrary Base Modules are shipped configured as stand-alone systems. Before powering up the Expansion Unit in a MiniLibrary system for the first time, you must reconfigure each of the MiniLibrary Base Modules in the system as a slave. To do so, perform the following procedure on each MiniLibrary Base Module.

1. Turn on the power switch to the MiniLibrary Base Module. After a series of self-test screens, the following screen appears:

```
DLT0 Idle
DLT1 Idle
Loader Idle
0 _ _ _ _ _ 9
```

2. Press the **Enter** button to display the Main menu screen:

```
► Load/Unload
  Show Status Menu
  Maintenance Menu
  Configure Menu  ↓
```


3. Press the ▼ button three times to select the Configure menu, then press the **Enter** button. The following screen appears:

```

► Set Data Format
  Set SCSI
  Set Element Base
  Set Identification  ↓

```

4. Press the ▼ button repeatedly to select the Set Special Configuration screen:

```

Set Serial Number  ↑
Set Unload Mode
Set Negotiation
► Set Special Config  ↓

```

5. Press the **Enter** button. The following screen appears:

```

► Mode Page 1F Length
  *Short 0x0E
  Model Number:
  *COMPAQ TL89x  ↓

```

6. Press the ▼ button repeatedly to scroll down to select Alternate Config screen:

```

Unit Attn. Report:  ↑
  *All:
  ► Alternate Config:
    *Standalone  ↓

```

7. Press the **Enter** and then ▼ button to change the line to Slave. Press the **Enter** button again and after selection stops flashing. The following screen appears:

```

Change Not Effective
  Until Reboot

```

ENTER to Continue

8. Press the **Enter** button. When the Special Configuration submenu reappears, turn the power switch off to cycle power.

NOTE: Expansion unit installation re-maps the cartridge slot numbering system as follows: The 16-slots of the Expansion Unit become slot numbers 0-15. Slots 0-9 of the first MiniLibrary Base Module become slots 16-25, etc.

A Configuration Example - Setting the SCSI ID

1. Turn the system on, and wait until the Power-On Self Test (POST) completes and the following Default screen appears on the display. Yours might vary depending on the number of modules in your system, as shown in the second line.

READY

```
Modules:0_ _ _ _ _
0 ► _ _ _ _ _ ◀ 9
10 ► _ _ _ _ _ ◀ 15
```

2. At the Default screen, press the **Enter** button. The following Main menu screen appears:

```
► Load/Unload
Show Status Menu
Maintenance Menu
Configure Menu    ↓
```

3. Press the ▼ button three times to move the ► to Configure menu, then press the **Enter** button. The display shows the following Configure submenu screen. Note that the ↓ at the end of the fourth line means that there are additional configuration options that can be reached by scrolling with the ▼ button.

```
► Set Data Format
Set SCSI
Set Element Base
Set Identification ↓
```

4. To select a configuration option, press the ▲ or ▼ button on the control panel until the ► on the display is next to the option you want to change. In this case, choose Set SCSI. Press the **Enter** button to display the choices for that option. The following submenu appears:

```
► Library Parity:
*Enabled
Library Bus ID:
*0    ↓
```

NOTE: Look closely at the submenu. Note that the ► on the display is next to line 1, and that line 2 is indented. This tells you that the submenu is a two-tiered menu. The ▲ and ▼ buttons work on two levels in this kind of menu, which is typical of many submenus of the Configure menu. The first level is as follows: If you press the ▼ button, the ► moves to line 3. If you press the ▲ button, the ► moves back to line 1.

If you press the **Enter** button while the ► is next to line 1 (or line 3), the ▲ and ▼ buttons operate on the second level. You can tell because the ► moves next to line 2 (or line 4), and an ↓ appears at the end of line 4, indicating that there is a list of settings that can be scrolled using the ▲ and ▼ buttons.

The ↓ at the end of line 4 means that there are other items that can be displayed by scrolling, using the ▼ button repeatedly.

5. Note that the Library SCSI ID is set to 0. Suppose you want to set the DLT0 bus ID to 3. With the ► next to line 1, press the ▼ button repeatedly until the display scrolls as shown:

```

►DLT0 Bus ID:    ↑
*4
DLT1 Bus ID:
*5              ↓

```

6. With the ► next to line 1, press the **Enter** button. The ► moves to line 2 and the ↓ remains at the end of line 4, and an ↑ appears at the end of line 1. Now you can use the ▲ and ▼ buttons to scroll through the possible settings. Scroll downward so that 3 is displayed, then press the **Enter** button to save the new selection. An * appears to the left of the 4, to indicate that it is the current selection.

7. Press the **Escape** button repeatedly until the following submenu reappears.

```

►Library Parity:
*Enabled
Library Bus ID:
*0              ↓

```

8. Repeat this procedure for each configuration option you want to change.

Setting up a Mail Slot

Some of the available host software enables the system administrator to limit access to the library as a whole while permitting insertion into or removal from the library of one or more tape cartridges when needed. This feature is commonly called a mail slot. It is implemented using SCSI import/export elements.

In the MiniLibrary system, you can designate the magazine of any MiniLibrary Base Module as the mail slot magazine. When you do so, the entire magazine is withdrawn from the list of storage elements. You can designate any number of mail slots from one slot up to the full size of the magazine. To configure a mail slot, use the following procedure.

1. Move from the Default screen through the Main menu to the Configure submenu.
2. Scroll down on the Configure submenu until you see Set Mail Slot, and then select that option. The following screen appears:

```

▶ Mail Slot Emul:
  *Disabled
    
```

3. With the ▶ next to line 1, press the **Enter** button. The ▶ moves to line 2 and ↓ appears at the end of line 4. Now you can use the ▲ and ▼ buttons to scroll line 2 to display the possible settings. These options enable you to specify which module should have the mail slot enabled. Scroll downward to the desired module, then press the **Enter** button to save the new selection.

NOTE: The Expansion Unit is not on the list. Module 1 refers to the Base Module just below it.

4. Scroll line 2 to display Module 1, then press the **Enter** button to select it. The following screen changes as shown:

```

▶ Mail Slot Emul:
  *Module 1 Enabled
Mail Slot Count:
  *10
    
```

5. The ▶ returns to line 1. Press the ▼ button. The ▶ moves to line 3.

6. Press the **Enter** button. The ► moves to line 4. Now you can use the ▲ and ▼ buttons to scroll line 4 to specify how many slots will be designated as mail slots. Scroll to the desired number, then press the **Enter** button to save the new selection
7. Press the **Escape** button repeatedly to return to the Default screen.

Reserved Slots

Some host software imposes size limits on tape library magazines for licensing purposes, and will not operate with a library that exceeds the licensed size. This configuration option lets you withdraw some of the slots in the Expansion Unit from use as storage slots in order to meet licensing requirements.

1. Move from the Default screen through the Main menu to the Configure submenu.
2. Scroll down on the Configure submenu until you see Set Reserved Slots, and then select that option. The following screen appears:

```
► Reserved Slots:
*0
```

3. With the ► next to line 1, press the **Enter** button. The ► moves to line 2, a ↓ appears at the end of line 4, and a ↑ appears at the end of line 1. Now you can use the ▲ and ▼ buttons to scroll line 2 to specify the number of slots to be reserved. Scroll to the desired number, then press the **Enter** button to save the new selection.
4. Press the **Escape** button repeatedly to return to the Default screen.

Descriptions of Configuration Options

Table 3-14 lists the configuration settings for the MiniLibrary system.

Table 3-14 MiniLibrary Configuration Options	
Option	Setting
Set Data Format	DLT n Density: * Auto Selection THZ01 THZ02 DLT2000 DLT2000XT DLT4000 DLT7000 DLT8000 DLT n Compression: * Auto Selection On Off
Set SCSI	Library Parity: *Enabled Disabled Library Bus ID: *0 0-15 DLT0 0 Bus ID: *4 0-15 DLT 1 Bus ID: *5 0-15

continued

Table 3-14
MiniLibrary Configuration Options *continued*

Option	Setting
Set Library Mode (1)	Library Mode: *Random Sequential DLT 0 Sequential DLT 1 Sequential Split If Sequential Mode: *Normal Recirculate
Set Element Base	Set Element Base: Transport Base *0x0000 NNNN (hex) Storage Base *0x0001 NNNN (hex) Transfer Base 0x00F0 NNNN (hex)
Set Identification	Vendor ID: * DEC <Vendor Unique> Product ID: *TL800 (c) DEC < Vendor Unique>
Set Date	Day: DD Current Day Month: MMM Current Month Year: YYYY Current Year

continued

Table 3-14
MiniLibrary Configuration Options *continued*

Option	Setting
Set Time	Hour: HH Minute: MM
Set Baud Rate	Baud Rate: *38,400 Auto 2,400 9,600 19,200 38,400 57,600 115,200
Set serial number	Serial number field
Set Unload Mode	Unload Mode: *Implicit Explicit
Set Auto Clean Mode	Auto Clean: *Disabled Enabled
Set Negotiation Mode	Negotiation Mode: *Do Not Initiate Initiate Transfer Rate: *Sync. 10 MB/sec Sync. 5 MB/sec Asynch. Only
Set Mail Slot (2)	Mail Slot Emul.: *Disabled Module n Enabled
Set Reserved Slots	Reserved Slots: *0 0-9
Set Special Configuration	Note: See Table 3-15, MiniLibrary Special Configuration Options.
Set Defaults	*Compaq Defaults

The items available on the Configuration menu are :

1. Set Data Format: This setting lets you:
 - a. Set the data format to Auto Selection, THZ01, THZ02, DLT2000, DLT2000XT, DLT4000, DLT7000, or DLT8000.
 - b. Auto Selection, enable, and disable data compression. Compression can not be enabled when either THZ01 or THZ02 format is in use. This setting applies to the next or currently loaded cartridge only. An UNLOAD command returns to the default. This setting does not display the current format of the loaded tape. Use the Show Status menu for this purpose. The default for density and compression is Auto Selection.
2. Set SCSI: This setting lets you:
 - a. Enable or disable the library robotics SCSI bus parity checking.
 - b. Set the SCSI addresses of the drives and the library robotics. The defaults are: parity enabled; Library Bus ID = 0. The designators DLT 0 through DLT*n* refer to the first through *n*th drives, counting from top to bottom. The actual designator used by the system depends on the number of drives in the system and the placement of the module in the system.
3. Set Library Mode: This option lets you set the library robotics operating mode to Random, Sequential DLT0, Sequential DLT1, or Sequential Split. Random is the normal operating mode that affords complete host control of the library robotics. The Sequential modes are locally controlled modes. Sequential DLT0 begins with any cartridge loaded into DLT0. The Base Module monitors the status of DLT0, and when the cartridge is unloaded by the host, it loads the next cartridge in magazine numerical order. This operation continues to cycle until all of the cartridges have been loaded. Sequential DLT1 is the same, except that the cartridges are loaded into DLT1. Sequential Split mode provides two simultaneous sequential modes. Cartridges 0 through 4 are loaded sequentially into DLT0; cartridges 5 through 9 are loaded sequentially into DLT1.

4. **Set Element Base:** This setting lets you set the base addresses of each of the four SCSI elements of the module. In order to identify sources and destinations in commands to the robotics, the MiniLibrary System is divided into elements, each of which is assigned a separate designator or element address. The transport element is the robotics mechanism itself; the storage elements are the slots in the magazines; the transfer elements are the drives, and the import/export element is the mail slot or slots. The module reports these settings in response to the SCSI MODE SENSE command, in the Element Address Assignment Page. The defaults are transport element base = 0000, storage element base = 0001, transfer element base = 00F0, and import/export element base = 00E0.
5. **Set Identification:** This setting lets you:
 - a. Specify the response of the module's robotics to the SCSI INQUIRY command in the Vendor ID and the Product ID fields. The defaults are: Vendor ID = DEC; Product ID TL89x.
 - b. **Set Date:** Lets you set the MiniLibrary system calendar.
 - c. **Set Time:** Lets you set the MiniLibrary system clock.
6. **Set Baud Rate:** Lets you set the data transmission rate of the Expansion Unit's trace port. This function is intended for use by Customer Engineers (CEs) only. The default is 38400 bits/sec.
7. **Set Serial number:** This setting lets you alter the Expansion Unit's serial number as stored in the unit. The module's robotics reports these settings in response to the SCSI INQUIRY command, in the Unit Serial Number Page.
8. **Set Unload Mode:** This setting determines whether a SCSI MOVE MEDIUM command is interpreted as implicit or explicit. If implicit, the Expansion Unit unloads a drive before attempting to move a cartridge from that drive. If explicit, the host must issue a SCSI UNLOAD command to the drive before each MOVE MEDIUM command from a drive to a slot. The default is Implicit.
9. **Set Auto Clean Mode:** This function, when enabled, senses the tape drive's cleaning request and after the next unload, load a cleaning cartridge into the drive. After cleaning completes, the cartridge is returned to slot. The default is Disabled.

NOTE: This function is application-dependent.

10. Set Negotiation Mode: This option offers two choices: Initiate Negotiation and Set Transfer Rate. Initiate Negotiation, if set, enables the MiniLibrary System to initiate SCSI Synchronous Negotiation with the host (the default is No). The Expansion Unit always responds to host-initiated negotiation. Set Transfer Rate can be set to 10 Mbytes/sec, 5 Mbytes/sec or Asynchronous. The default is 10 Mbytes/sec.
11. Set Mail Slot: Some of the available host software enables the system administrator to limit access to the MiniLibrary as a whole while permitting insertion into or removal from the MiniLibrary of one or more tape cartridges when needed. This feature is commonly called a mail slot. It is implemented using SCSI import/export elements.
12. Set Reserved Slots: Some host software imposes size limits on tape library magazines for licensing purposes, and will not operate with a library that exceeds the licensed size. This configuration option enables you to withdraw some of the slots in the Expansion Unit from use as storage slots in order to meet licensing requirements.
13. Set Default: This option resets all of the preceding configuration options to their factory defaults. It does not affect the settings of the SCSI IDs of the DLT drives.
14. Set Special Configuration: This option contains predefined Compaq operational configurations. See Table 3-15 for default configuration characteristics.

NOTE: The options listed in Tables 3-14 and 3-15 represent the version of the firmware in use when this manual was written. If the displays on your control panel differ from those described here, you might find an up to date listing of configuration options on the Compaq web site listed at the front of this manual.

Table 3-14:

* Designates Default Settings

(1) Applies to Base Module Display

(2) Applies to Expansion Unit Display

Table 3-15:

The default settings are shown in the third column, and other possible settings are shown in the second column.

Table 3-15
MiniLibrary Special Configuration Options

Set Special Configuration Option	Settings	Default
Mode Page 1F Length	Short (0 x 0E)	Short (0 x 0E)
	Long (0 x 12)	
Model Number	Compaq TL89X	Compaq TL89X
	<Vendor Unique>	
TUR Reporting	Standard	Custom
	Custom	
Init. Element Status	No Inventory	Force Inventory
	Force Inventory Force Label Scan	
Unit Attn Report	All	All
	One	
Alternate Config.	Standalone	Standalone
	Slave	
Element Base	Zero based	Zero based
	One based	
Label Size	8 char	8 char
	1-7 char	
Label Alignment	Left Align	Left Align
	Right Align	
Abort Move Status	Not Ready	Not Ready
	Busy	
Auto Close	Enabled	Enabled
	Disabled	

continued

Table 3-15
MiniLibrary Special Configuration Options *continued*

Set Special Configuration Option	Settings	Default
Set Special Configuration Option	Settings	Default
Door Open Response (Expansion Unit)	Ready Not Ready	Ready
SCSI Mode	SCSI-2 SCSI-3	SCSI-2
Post Recv'd Error	Disabled Enabled	Disabled
Tape Alert Mode	Logging Disabled No exceptions Unit Attention Rec. Error (cnd) Rec. Error (uncd) No Sense On Request	Logging Disabled

Chapter **4**

Configuration

Configuration Overview

This chapter describes how to customize the configuration of the MiniLibrary Base Module and defines configuration options.

The MiniLibrary Base Module is designed with several configuration options, each offering multiple settings to support a variety of applications and platforms. The setting of each option is stored in non-volatile memory in the module. For most applications, you will not need to change the factory default settings. If you need to change the configuration, go on to the next section. If you are uncertain whether you need to change a setting, contact your Technical Support representative.

To change settings, you need to use the control panel. For an overview of how the control panel works, and a description of the functions of the buttons, indicators and display, see the sections, “Entering the Menu Mode,” “Exiting the Menu Mode,” and “Navigating Through the Menu Structure,” in Chapter 2, “Operation.”

The settings can be changed using the procedure listed in “Customizing Your Configuration.” Before changing any configuration settings, consult your host system documentation to determine which settings that might need to be changed.

Customizing Your Configuration

To customize your configuration:

1. Turn the Base Module on, and wait until the POST terminates and the following Default screen appears. Yours might vary depending on the number of drives in your MiniLibrary system (second line), and the number and locations of cartridges in the magazine (fourth line).

```
DLT0 Active
DLT1 Idle
Loader Idle
0 1 2 _ 4 _ 6 7 8 9
```

2. At the Default screen, press the **Enter** button. The following Main menu appears:

```
► Load/Unload
  Show Status Menu
  Maintenance Menu
  Configure Menu  ↓
```

3. Press the ▼ button three times to move the ► to Configure menu, then press the **Enter** button. The Configure submenu appears. The ↓ at the end of the fourth line means that there are additional configuration options that can be reached by scrolling with the ▼ button.

```
► Set Data Format
  Set SCSI
  Set Library Mode
  Set Element Base  ↓
```

4. To select a configuration option, press the ▲ or ▼ button on the control panel until the ► on the display is next to the option you want to change. In this case, choose Set Data Format. Press the **Enter** button to display the choices for that option. If your Base Module has two drives, the following submenu appears.

```
► DLT0 Format
  DLT1 Format
```


5. Press the **Enter** button to select DLT0, or, to select DLT1, press the ▼ button to move the ► next to DLT1, then press the **Enter** button. The following submenu for the Set Data Format option appears:

```

► DLT1 Density:
  *Auto. Selection
  DLT1 Compression:
  *Disable
  
```

As the submenu shows, the ► on the display is next to line 1, and line 2 is indented. This tells you that it is a two-tiered menu. The ▲ and ▼ buttons work on two levels in this kind of menu, which is typical of many submenus of the Configure menu. The first level is as follows: If you press the ▼ button, the ► moves to line 3. Pressing the ▼ button again has no effect. If you press the ▲ button, the ► moves back to line 1.

If you press the **Enter** button while the ► is next to line 1 (or line 3), the ▲ and ▼ buttons operate on the second level. You can tell because the ► moves next to line 2 (or line 4), and an ↓ appears at the end of line 4, indicating that there is a list of settings that can be scrolled using the ▲ and ▼ buttons. For example:

To set the DLT1 Density:

1. With the ► next to line 1, press the **Enter** button, moving the ► to line 2. Notice the ↓ appears at the end of line 4.
2. Use the ▲ and ▼ buttons to scroll line 2 to display the possible settings. After making your selection, press the **Enter** button to save the new selection. You can return to the Set Data Format screen by pressing the **Escape** button. The ► returns to line 1.
3. This time, if you press the ▼ button instead of the **Enter** button, the ► moves to line 3, allowing you to set DLT1 Compression.
4. Press the **Escape** button repeatedly until the DLT0/HLT1 Format submenu reappears.

Repeat this procedure for each configuration option you want to change.

Descriptions of Configuration Options

The items available on the Configuration menu follow.

Set Data Format

This setting lets you:

1. Set the data format to Auto Selection, THZ01, THZ02, DLT2000, DLT2000XT, DLT4000, DLT7000, or DLT8000.
2. Auto Select, enable, disable data compression.

Compression can not be enabled when either the THZ01 or THZ02 format is in use. This setting applies to the next or currently loaded cartridge only. An UNLOAD command returns to the default. This setting does not display the current format of the loaded tape. Use the Show Status menu for this purpose. The default for density and compression is Auto Selection.

Set SCSI

This option lets you:

1. Enable or disable the MiniLibrary system robotics SCSI bus parity checking.
2. Set the SCSI addresses of the drives and the MiniLibrary system robotics. The defaults are: parity on, DLT 0 address = 4, DLT 1 address = 5, robotics address = 0.

Set Library Mode

This option lets you set the MiniLibrary system robotics operating mode to Random, Sequential DLT0, Sequential DLT1, or Sequential Split. Random is the normal operating mode which affords complete host control of the MiniLibrary system robotics. The Sequential modes are locally controlled modes. Sequential DLT0 begins with any cartridge loaded into DLT0. The Base Module monitors the status of DLT0, and when the host unloads the cartridge, it loads the next cartridge in magazine numerical order. This operation continues to cycle until all of the cartridges have been loaded. Sequential DLT1 is the same, except that the cartridges are loaded into DLT1. Sequential Split mode provides two simultaneous sequential modes. Cartridges 0 through 4 are loaded sequentially into DLT0; cartridges 5 through 9 are loaded sequentially into DLT1.

Set Sequential Configuration

NOTE: Sequential Split mode requires two drives. The default is Random.

To operate the a standalone MiniLibrary Base Module in sequential mode, the following configuration parameters must be established:

- Library Mode- change from Random (default) to Sequential DLT0
- Sequential Mode must remain at Normal (default)
- Test Unit Ready (TUR) - must remain at Custom (default)

To establish these parameters for sequential mode operation:

1. From the Default menu press the **Enter** button. The following Main Menu appears:

```

▶ Load/Unload
  Show Status Menu
  Maintenance Menu
  Configure Menu
  ↓
  
```

2. Press ▼ three times so that the ▶ is next to Configure menu and press the **Enter** button. The following Configure submenu appears:

```

▶ Set Data Format
  Set SCSI
  Set Library Mode
  Set Element Base
  ↓
  
```

3. Press the ▼ twice so that the ▶ is next to Set Library Mode and then press the **Enter** button. The following Library Mode Selection menu appears:

```

▶ Library Mode:
  * Random
  
```

4. Press **Enter** again so the ▶ is next to *Random. The library mode options are:

- For a single-drive
 - ☐ Random
 - ☐ Sequential DLT0

- For a two-drive
 - ☐ Random
 - ☐ Sequential DLT0
 - ☐ Sequential DLT1
 - ☐ Sequential Split

Press the ▼ button to display the desired Sequential option and select it by pressing the **Enter** button. The Sequential Mode options Normal and Recirculate appears. To select Normal, which is the default (and recommended) setting, press the **Enter** button.

5. To set the TUR Reporting option - press the **Escape** button to move up one level to the following Configure submenu and use the ▼ arrow to move the ► to Set Special Config (11th menu item from top) and the press the **Enter** button.

```
►Set Data Format
  Set SCSI
  Set Library Mode
  Set Element Base  ↓
```

The following Special Config submenu appears:

```
►Mode Pg 1F Length
  * Short (0x0E)
  Model Number
  * Compaq TL89X  ↓
```

Press ▼ twice to position the ► next to the TUR Reporting option. Press the **Enter** button to move ► down one line to *Standard. Use the ▼ to change to Custom and press the **Enter** button to accept this setting. To return the Base Module to online status, press the **Escape** button three times.

Set Element Base

This option lets you set the base addresses of each of the three SCSI elements of the module. In order to identify sources and destinations in commands to the robotics, the Base Module is divided into elements, each of which is assigned a separate designator or element address. The transport element is the robotics mechanism itself; the storage elements are the 10 or 16 slots in the magazine; the transfer elements are the drives. The Base Module reports these settings in response to the SCSI MODE SENSE command, in the element address assignment page. The defaults are transport = 0000h, storage element base = 0001h, transfer element base = 00F0h.

Set Date

This command lets you set the Base Module calendar.

Tables 4-1 and 4-2 list the configuration settings for the MiniLibrary system Base Module.

NOTE: The options described in Table 4-1 and Table 4-2 represent the version of the firmware in use when this manual was written. If the displays on your control panel differ from those described here, you might find an up to date listing of configuration options on the Compaq web site listed at the front of this manual.

Table 4-1:

* Designates Default Settings

(1) Applies to Base Module display

(2) Applies to Expansion Unit display

Table 4-2:

The default settings are shown in the third column, and other possible settings are shown in the second column.

Table 4-1
MiniLibrary Configuration Options

Option	Setting
Set Data Format	DLT n Density: * Auto Selection THZ01 THZ02 DLT2000 DLT2000XT DLT4000 DLT7000 DLT8000 DLT n Compression: * Auto Selection On Off
Set SCSI	Library Parity: *Enabled Disabled Library Bus ID: *0 0-15 DLT0 0 Bus ID: *4 0-15 DLT 1 Bus ID: *5 0-15

continued

Table 4-1
MiniLibrary Configuration Options *continued*

Option	Setting
Set Library Mode (1)	Library Mode: *Random Sequential DLT 0 Sequential DLT 1 Sequential Split If Sequential Mode: *Normal Recirculate
Set Element Base	Set Element Base: Transport Base *0x0000 NNNN (hex) Storage Base *0x0001 NNNN (hex) Transfer Base 0x00F0 NNNN (hex)
Set Identification	Vendor ID: * DEC <Vendor Unique> Product ID: *TL800 (c) DEC < Vendor Unique>
Set Date	Day: DD Current Day Month: MMM Current Month Year: YYYY Current Year

continued

Table 4-1
MiniLibrary Configuration Options *continued*

Option	Setting
Set Time	Hour: HH Minute: MM
Set Baud Rate	Baud Rate: *38,400 Auto 2,400 9,600 19,200 38,400 57,600 115,200
Set serial number	Serial number field
Set Unload Mode	Unload Mode: *Implicit Explicit
Set Auto Clean Mode	Auto Clean: *Disabled Enabled
Set Negotiation Mode	Negotiation Mode: *Do Not Initiate Initiate Transfer Rate: *Sync. 10 MB/sec Sync. 5 MB/sec Asynch. Only
Set Mail Slot (2)	Mail Slot Emul.: *Disabled Module n Enabled
Set Reserved Slots	Reserved Slots: *0 0-9
Set Special Configuration	Note: See Table 3-15, MiniLibrary Special Configuration Options.
Set Defaults	*Compaq Defaults

Table 4-2
MiniLibrary Special Configuration Options

Set Special Configuration Option	Settings	Default
Mode Page 1F Length	Short (0 x 0E)	Short (0 x 0E)
	Long (0 x 12)	
Model Number	Compaq TL89X	Compaq TL89X
	<Vendor Unique>	
TUR Reporting	Standard	Custom
	Custom	
Init. Element Status	No Inventory	Force Inventory
	Force Inventory Force Label Scan	
Unit Attn Report	All	All
	One	
Alternate Config.	Standalone	Standalone
	Slave	
Element Base	Zero based	Zero based
	One based	
Label Size	8 char	8 char
	1-7 char	
Label Alignment	Left Align	Left Align
	Right Align	
Abort Move Status	Not Ready	Not Ready
	Busy	
Auto Close	Enabled	Enabled
	Disabled	

continued

Table 4-2
MiniLibrary Special Configuration Options *continued*

Set Special Configuration Option	Settings	Default
Set Special Configuration Option	Settings	Default
Door Open Response (Expansion Unit)	Ready Not Ready	Ready
SCSI Mode	SCSI-2 SCSI-3	SCSI-2
Post Recv'd Error	Disabled Enabled	Disabled
Tape Alert Mode	Logging Disabled No exceptions Unit Attention Rec. Error (cnd) Rec. Error (uncd) No Sense On Request	Logging Disabled

Set Time

This command lets you set the Base Module clock.

Set Baud Rate

This option lets you set the data transmission rate of the module trace port. This function is intended for use by Customer Engineers (CEs) only. The default is 38400 bits/sec.

Set Serial Number

This option lets you alter the Base Module serial number as stored in the unit. The Base Module's robotics reports these settings in response to the SCSI INQUIRY command, in the unit serial number page.

Set Unload Mode

This option determines whether a SCSI MOVE MEDIUM command is interpreted as implicit or explicit. If implicit, when the Base Module receives a SCSI MOVE MEDIUM command for a fetch from a drive, it unloads the drive before attempting to fetch a cartridge from that drive. If explicit, the host must issue a SCSI UNLOAD command before each MOVE MEDIUM command where the source element is a drive. The default is Implicit.

Set Auto Clean Mode

This function, when enabled, senses the tape drive's cleaning request and after the next unload, load a cleaning cartridge into the drive. After cleaning completes, the cartridge is returned to the slot. The default is Disabled.

NOTE: This function is application dependent.

Set Negotiation

This option enables the Base Module to initiate negotiations for synchronous data transfer and wide data transfer from the host. Only models with a fast/wide drive installed can initiate a 'wide' negotiation. The default is Do Not Initiate.

Set Mail Slot

Some of the available host software enables the system administrator to limit access to the MiniLibrary system as a whole while permitting insertion into or removal from the MiniLibrary system of one or more tape cartridges when needed. This feature is commonly called a mail slot. It is implemented using SCSI import/export elements.

Set Reserve Slot

Some host software imposes size limits on tape library magazines for licensing purposes, and will not operate with a MiniLibrary system that exceeds the licensed size. This configuration option lets you withdraw some of the slots in the Expansion Unit from use as storage slots in order to meet licensing requirements.

Set Special Configuration

This option contains predefined Compaq operational configurations. See Table 4-2 for default configuration characteristics.

Set Default

This option resets all of the preceding configuration options to their factory defaults, except Date and Time, which remain at their current settings.

Chapter **5**

Regular Maintenance

Introduction

This chapter describes the procedures for running and replacing the cleaning cartridge in the MiniLibrary system.

The only regular maintenance task that should be periodically performed is running or replacing the cleaning cartridge.

The Maintenance menu offers the following options:

- Clean Drive
- Diagnostic Menu
- Demo Menu
- Flash Update
- NOVRAM Update
- Clock Update
- Flash DLT
- Reboot Module

Of these, only Clean Drive and the Demo Menu are intended for you to use. Service personnel can perform Flash Update. NOVRAM Update and Clock Update are used in factory setup, however, these functions are duplicated by the options on the Configuration submenu.

A diagnostic diskette (Microsoft Windows NT, Windows 95/98 Operating Systems) which allows for firmware updates, via the diagnostic port, is included in the Accessories Kit.

This chapter explains how to clean the drives. The Diagnostic menu and the Demo menu are described in Chapter 6, “Diagnostics and Troubleshooting.”

Cleaning Cartridge

The cleaning cartridge is similar in appearance to the data cartridge, but is yellow. The command to run the cartridge is issued from the control panel. The procedures that follow tell you how to install a cleaning cartridge, how to clean a drive, and how to remove the cleaning cartridge.



CAUTION: The cleaning cartridge is abrasive, and should not be used unless the Use Cleaner LED comes on. To determine which drive requires cleaning on two-drive models, unload both drives and select Cleaning Needed on the Drive Status submenu of the Show Status menu.

Installing a Cleaning Cartridge

1. Examine the Default screen on the control panel to determine whether any cartridges are loaded into the drives. If so, then unload each as described in Chapter 2, “Operation.”
2. Using the key provided (if necessary), unlock the magazine security lock on the front panel.
3. Press the **Unlock/Open** button on the front panel.
4. Remove the magazine from the Base Module.
5. Remove any cartridge present in slot 0 (the slot nearest from the handle).
6. Insert the cleaning cartridge into slot 0. You can use any slot, but using slot 0 saves some keystrokes.
7. Press the **Unlock/Open** button on the front panel.
8. Insert the magazine into the Base Module.

Running the Cleaning Cartridge

This procedure assumes that the cleaning cartridge has been installed into Slot 0 of the magazine.

1. At the Default screen, press the **Enter** button. The following screen appears:

```

▶ Load/Unload
  Show Status Menu
  Maintenance Menu
  Configure Menu  ↓
  
```

2. Press the ▼ button twice to move the ▶ next to Maintenance, then press the **Enter** button to select the Maintenance menu. A screen similar to the following appears:

```

▶ Clean Drive
  Diagnostic Menu
  Demo Menu
  Flash Update  ↓
  
```

3. Press the **Enter** button once to select Clean Drive. The following screen appears:

```

Cleaning:
▶ *DLT0
  Using
  *Slot0  ↓
  
```

4. Lines 2 and 4 are scrollable. The choices available on Line 2 are DLT0, DLT1 and Both. Assume you want to clean DLT0. Press the **Enter** button once to accept DLT0. The ▶ moves to line 4 of the display. Press the **Enter** button again to use the cartridge in Slot 0. (If you cannot to use slot 0 for the cleaning cartridge, scroll to line 4 to select another slot.)

5. The following screen appears:

```

Clean:    DLT0
Use:      Slot0
ENTER To Execute
ESCAPE To Cancel
  
```

6. As the confirmation screen indicates, to execute the cleaning operation, press the **Enter** button. If the confirmation screen does not show your intended drive and cleaning cartridge, press the **Escape** button to return to the Cleaning submenu.

When you press the **Enter** button, The following screen appears:

Clean: DLT0
Use: Slot0

Cleaning In Progress

When the cleaning operation completes, the Default screen reappears.

Removing the Cleaning Cartridge

NOTE: If the Base Module is installed in a sufficiently secure area, you can elect not to use the magazine security lock. In that event, leave the lock in the unlocked position.

1. Examine the Default screen on the control panel to determine whether any cartridges are loaded into the drives. If so, then unload each using the Load/Unload menu, as described in Chapter 2, “Operation.”
2. Using the key provided (if necessary), unlock the magazine security lock on the front panel.
3. Press the **Unlock/Open** button on the front panel.
4. Remove the magazine from the Base Module.
5. Remove the cleaning cartridge from the magazine.
6. Insert any desired data cartridge into the slot vacated by the cleaning cartridge.
7. Press the **Unlock/Open** button on the front panel.
8. Insert the magazine into the Base Module.
9. Using the key provided, lock the magazine security lock on the front panel (optional).

Chapter **6**

Diagnostics and Troubleshooting

Introduction

This chapter describes the procedures for diagnosing platform problems and drive errors that can cause the MiniLibrary system to malfunction. It also provides Fault Symptom Codes (FSCs) and Error Recovery Procedures (ERPs) to help restore operability.

Diagnosing Problems

There are two main types of problems that can cause the MiniLibrary system to malfunction or fail to perform correctly: platform problems and general drive errors. Some errors cause FSCs that are displayed on the control panel, along with a description of the fault. An ERP is available for each FSC as described in this chapter.

Platform Problems

Platform errors typically arise out of incorrect installation and configuration. The most common characteristic of this type of error is that the drive appears to operate normally, except that no data can be interchanged. You might not get an error code on the control panel. To identify an error as this type of problem, check your installation and configuration setup. See Chapter 3, “Installation” and Chapter 4, “Configuration.”

General Drive Errors

These errors usually result from a miscommunication between the drive processors or involve a mechanical malfunction. In most cases, these types of errors report an error message and an FSC to the control panel. The only exceptions are power supply problems and display malfunctions. The FSC can be used to determine a recovery procedure.

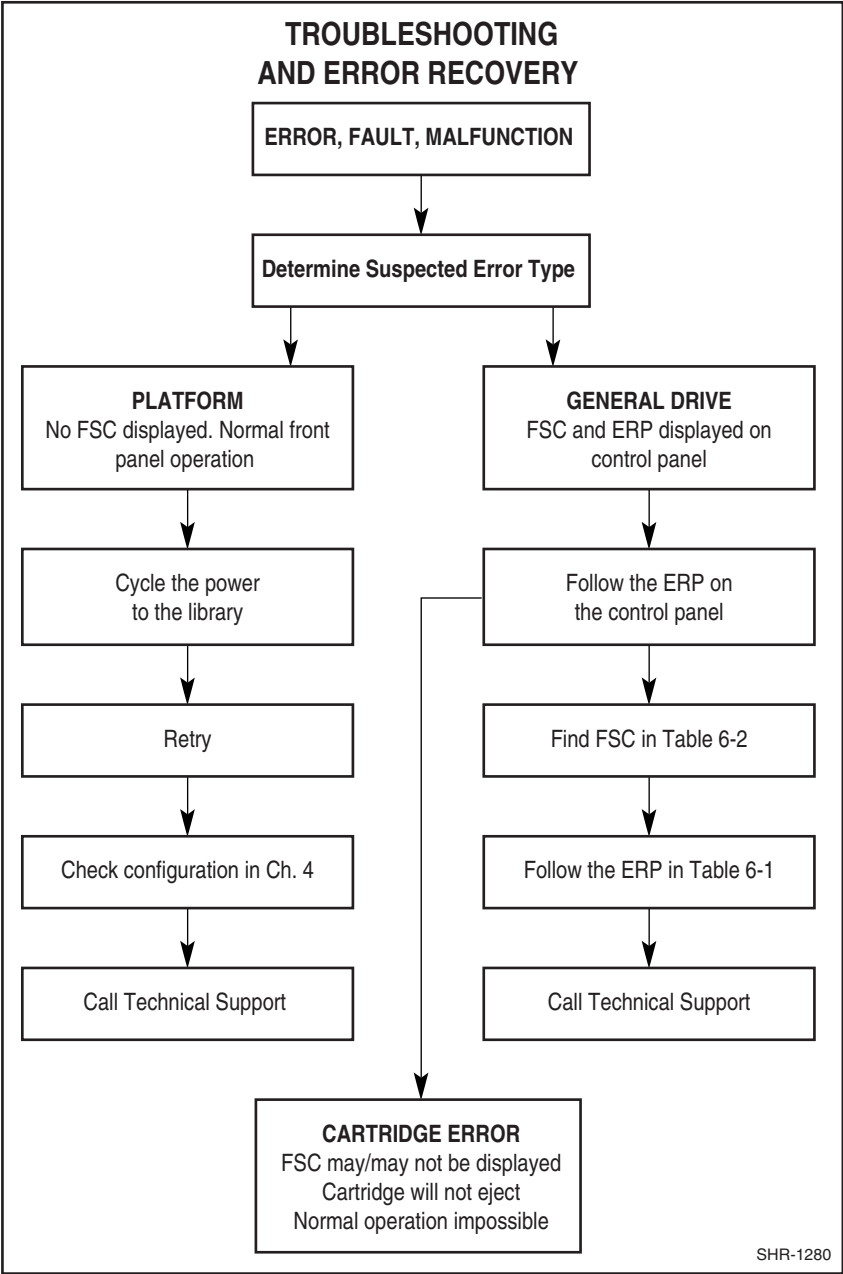
Pressing the **Enter** button on the control panel, others by cycling the power to the MiniLibrary system can clear some error messages. Often the MiniLibrary system will resume normal operation. Other errors are repeated when the operation is attempted again. Such recurrent errors might require more extensive recovery procedures, such as replacement of a part.

To aid you in localizing persistent errors, there is Customer Engineer (CE) diagnostics available in the Maintenance submenu and a user diagnostic available on the Demo submenu. The diagnostics are described at the end of this chapter.

Error Recovery

Figure 6-1 shows the recommended steps for error recovery. This chart should be followed in all cases.

ERPs are listed in Table 6-1. FSCs are listed in Table 6-2 through 6-10.



Error Recovery Procedures

Table 6-1 lists error recovery instructions for errors reported on the front panel. This list includes procedures that should only be performed by a qualified service technician.

Table 6-1
Error Recovery Procedures

ERP Number	Procedure Detail
A	Run the cleaning cartridge. See Chapter 5, "Regular Maintenance."
B	Change the cartridge. It might be damaged or incorrectly formatted.
B3	Inspect cartridge. Check for damage and leader alignment. See Chapter 2, "Operation, Tape Requirements."
B4	Disable cartridge write-protect switch.
C	Cycle power to the drive using the AC switch on the front panel of the MiniLibrary system. Wait 30 seconds to power on again.
D	Turn off power to the MiniLibrary system and inspect connectors and cables.
D1	Turn off power to the MiniLibrary system and check cabling to the DLT drives. Inspect the cables and connectors.
D2	Check cabling and configuration. See Chapter 3, Installation. and Chapter 4, "Configuration."
E(x)	Run diagnostic (x).
F	Invalid operation. Select parameters correctly and try again.
G	Call technical support.

FSCs

FSCs appear in the Fault screen described in Chapter 2. A descriptive message and instructions for clearing the fault accompany each FSC. When a fault persists, you should look up the FSC in Tables 6-2 through 6-10 to determine the error recovery procedure to be followed. If you call Compaq Technical Support about a fault condition, be sure to furnish the FSC to aid in identifying the problem.

Table 6-2
System Error Codes (0xxx)

FSC	Message	Description
0101	Unused Interrupt	An undefined interrupt occurred.
0102	Enqueue'g a Null Ptr	A NULL pointer was passed to one of the enqueueing functions. This is generally a firmware bug.
0103	Invalid Cmd Rec'd	An illegal trace command was received by the trace process.
0201	Trc Comm Open Error	The trace port could not be opened.
0301	Novram Init Error	A failure occurred when trying to initialize the NOVRAM.
0302	Novram Chksum Error	A checksum error was detected while reading the NOVRAM.
0303	Novram Program Error	A problem was detected while trying to update the NOVRAM.
0304	Novram Downld Error	An error was detected while trying to download configuration data.
0305	Novram Data Error	An error was detected while trying to validate the NOVRAM.
0306	Novram Update Error	A problem was detected while trying to update the NOVRAM.
0401	Invalid Display Char	Indicates a problem in the LCD display routines.
0402	Invalid Display Line	Indicates a problem in the LCD display routines.
0501	Barcode Comm Error	The bar code comm port could not be opened.
0601	Clock Init	The real-time clock could not be initialized.
0602	LP-RAM Init Error	An error occurred in the low-power ram initialization.
0603	Clock Download Error	An error occurred while downloading real-time clock information.

continued

Table 6-2
System Error Codes (0xxx) *continued*

FSC	Message	Description
0701	Slv Comm Open Error	Failed to open a Slave comm port.
0801	Not In Br. Menu Mode	The device is not in browser menu mode.
0802	Invalid Novram Upd.	An invalid NOVDRAM update occurred in browser mode.
0803	Executing Immed. Cmd	Executing an Immediate command in browser mode.

Table 6-3
SCSI Error Codes (1xxx)

FSC	Message	Description
1001	SCSI Firmware Error	
1002	SCSI FIFO Empty	While getting SCSI command bytes, the SCSI chip reported an empty FIFO before it was expected.
1003	SCSI FIFO Error	While getting SCSI command bytes, the SCSI chip reported that the FIFO was not empty when it should be empty.
1004	SCSI Gross Error	Gross error status was returned by the SCSI chip. This usually means that the SCSI chip is in an illegal state.
1005	Illegal SCSI Cnt Cmd	The SCSI chip rejected a command from the firmware.
1006	SCSI Message Error	Not reported.
1007	SCSI Invalid Element	Firmware error.
1008	SCSI No Pending Int	An interrupt was returned from the SCSI chip when one was not expected.
1009	SCSI Invalid Int	An invalid interrupt was returned from the SCSI chip.
1020	No Active Command	Status was returned from the control process when no command was active.
1021	SCSI Invalid Request	An invalid request was received from the control process (firmware error).

continued

Table 6-3
SCSI Error Codes (1xxx) *continued*

FSC	Message	Description
1022	SCSI Invalid Semaphore	Firmware error.
1023	SCSI Invalid State	Firmware error.
1024	SCSI Invalid Ctl Msg	A message sent from the control process was not valid.
1025	Overlapped Ctl Cmds	The control process sent a command while one was in process.
1026	Overlapped Ctl Msgs	The control process sent a message while one was in process.
1027	Control Process .	The SCSI control process is busy.
1028	Control Initializing	The SCSI control process is initializing.
1030	Invalid SCSI ID	The SCSI in NOVRAAM is set to ≥ 8 and the PWB is not configured for Wide SCSI. Would only occur during SCSI initialization.

Table 6-4
Control Error Codes (2xxx)

FSC	Message	Description
2001	Ctl Invalid Command	Ctl. Invalid Command.
2002	Undefined Config	An unsupported configuration was detected.
2003	Invalid Drive State	One of the DLT drives was in an invalid state. This is caused by either attempting to fetch a cartridge from an empty drive, or stowing to a drive that already has a cartridge loaded.
2004	Loader Not Ready	Currently not displayed.
2005	SCSI Id Not Set	An attempt to set the DLT SCSI ID failed.
2006	DLT Comm Open Error	An attempt to open a COM port failed.
2007	Door Fault	An error occurred while attempting to move the door.

continued

Table 6-4
Control Error Codes (2xxx) *continued*

FSC	Message	Description
2008	Illegal Move	While attempting to perform a MOVE operation, the source or destination locations were in the wrong state (FULL or EMPTY). This also occurs if the MOVE is attempted with an invalid cartridge map.
2009	Door Open	A command was received while the door was open.
200A	Menu Mode	A command was received while the unit was in Menu mode.
200C	Cart Unaccessible	An attempt was made to fetch a cartridge from a drive that is not in the unloaded state. This only applies when the system is configured for explicit unloads.
200D	Drive In Error	An attempt was made to access a drive that is in an error state.
200E	No Magazine	The element is not available because the magazine is not installed.
200F	Removal Prevented	Medium removal was attempted when in a Prevent Removal State.
2010	Ctl Firmware Error	An invalid configuration was detected. The configuration jumpers on the main board might not be set properly.
2011	Ctl Firmware Error	A status block was received by the Control Process operating in a Stand-Alone or Slave configuration. Since commands are never sent in these modes, status cannot be received.
2012	Ctl Firmware Error	A command was received that was invalid for the current configuration.
2013	Ctl Firmware Error	
2014	Ctl Firmware Error	
2015	Ctl Firmware Error	
2016	Ctl Firmware Error	

continued

Table 6-4
Control Error Codes (2xxx) *continued*

FSC	Message	Description
2030	DLT Timeout Error	During power up, communication with one of the DLT drives was unsuccessful.
2031	DLT Timeout Error	While trying to update the front panel, communication with one of the DLT drives was unsuccessful.
2032	DLT Timeout Error	Communication with DLT drive 1 was unsuccessful (sequential mode).
2033	DLT Timeout Error	Communication with DLT drive 2 was unsuccessful (sequential mode).
2034	DLT Timeout Error	While attempting to update the cartridge map, communication with one of the DLT drives was unsuccessful.
204x	Invalid Ctl Msg	An illegal message type code was received. This can be the result of receiving a NULL type code, a status code without a command being active, or a command code while a command is currently active.
205x	No Free Queues	The system could not allocate a free queue.
206x	Calib. Error Port x	When trying to locate the unit attached to port x, the pass-through elevator reached the top of rail.
206f	Pass-thru Init Error	The pass-through elevator did not travel a minimum distance to reach the top of its travel.
2070	Command Timeout	Enter to reboot. The 10 minute timer was exceeded when trying to fetch from a drive.
2071	Command Timeout	Internal error only. Not reported to the operator or host.
2072	Command Timeout	Power down, Wait 30 seconds, Power up. Occurs if the power is cycled too quickly and the DLT drive comes up in an error state and doesn't communicate with the MiniLibrary system controller.

continued

Table 6-4
Control Error Codes (2xxx) *continued*

FSC	Message	Description
2073	Drive Config Error	Set if the Alternate Unload has not been selected. This currently applies only to DLT7000's and DLT8000's with a controller microcode revision greater than 50.
2074	Stow Error	A stow timeout error has occurred when accessing a remote unit. Press the Enter button to reboot for orphan cartridge recovery.
2075	Fetch Error	During a remote fetch operation, the remote unit returned an error.

Table 6-5
Motor Process Error Codes (3xxx)

FSC	Message	Description
3001	Picker Retries Exceeded	Remove from code.
3002	Picker Tach Errors	TACH errors were detected during a picker movement.
3003	Elevator Tach Errors	TACH errors were detected during an elevator movement.
3004	Elevator Init Error	An elevator jam was detected during initialization.
3006	Passthru Tach Errors	TACH errors were detected during pass-through elevator movement.
3007	DLT Timeout Error	Communication with one of the DLT drives was unsuccessful.. A command was issued but status was not returned.
3008	Invalid Drive State	Currently unused.
3009	Door Tach Errors	TACH errors were detected during a door movement.
300A	Door Fault	During initialization, the door was found to be in an improper state.
300B	Elev Open Tach	Open Tach detected on elevator motor.

continued

Table 6-5
Motor Process Error Codes (3xxx) *continued*

FSC	Message	Description
300C	Picker Open Tach	Open Tach detected on picker motor.
300D	Door Open Tach	Open Tach detected on door motor.
300E	Drive Stow Error	A problem was encountered while trying to stow a cartridge to a drive. Couldn't close the door.
3010	Picker Retries Exceeded	While attempting to fetch a cartridge, the picker was not able position properly within 16 attempts.
300F	Slave Init Error	Check the Pass-Through Mechanism access plate removed at the rear of the MiniLibrary Base Module.
3011	Picker Retries Exceeded	While attempting to fetch a cartridge, the picker was not able position properly within 16 attempts.
3012	Picker Retries Exceeded	While attempting to fetch a cartridge, the picker was not able position properly within 16 attempts.
3013	Picker Retries Exceeded	While attempting to fetch a cartridge, the picker was not able position properly within 16 attempts.
3014	Picker Retries Exceeded	While stowing to a drive, the initial push failed.
3020	Undefined Config	An unsupported configuration was detected.
3021	Wrong Codebase	An attempt was made to flash the incorrect firmware image into the MiniLibrary system. Press the Enter button to flash or the Escape button to cancel.
3040	Motor Firmware Error	An undefined picker position was specified.
3042	Motor Firmware Error	An undefined door position was specified.
3100	Picker Jammed	The picker stalled during an inventory.
3101	Picker Jammed	During a stow operation, the picker was not able to insert the cartridge into the bin.
3102	Picker Jammed	While stowing to a bin, the picker moved too far. This generally occurs if the arm slips in between two cartridges during the final push.

continued

Table 6-5
Motor Process Error Codes (3xxx) *continued*

FSC	Message	Description
3103	Picker Jammed	While stowing to a bin, the picker moved too far. This generally occurs if the arm slips in between two cartridges during the final push.
3104	Picker Jammed	During a bin stow, the picker did not reach a position far enough to insure that the cartridge was fully inserted.
3105	Picker Jammed	The picker was not able to home properly after stowing a cartridge to a bin.
3106	Picker Jammed	The picker was not able to position to the cartridge notch while performing a bin fetch operation.
3107	Picker Jammed	During a bin fetch, the picker stalled while attempting to pull a cartridge into the shuttle.
3108	Picker Jammed	The picker stalled while fetching from a bin.
3109	Picker Jammed	The picker was not able to position to the cartridge notch while performing a drive fetch operation.
310A	Picker Jammed	During a drive fetch, the picker stalled while attempting to pull a cartridge into the shuttle.
310B	Picker Jammed	During a stow operation, the picker was not able to insert the cartridge into the drive.
3200	Elevator Jammed	The elevator was not able to position properly while attempting to recover an orphaned cartridge.
3201	Elevator Jammed	The elevator was not able to position properly during an inventory.
3202	Elevator Jammed	The elevator was not able to position properly during a fetch operation.
3203	Elevator Jammed	The elevator was not able to position properly during a stow operation.
3204	Elevator Jammed	The elevator was not able to position properly during a home operation.
3205	Elevator Jammed	The elevator stalled while attempting to open the DLT door.
3300	Passthru Jammed	The pass-through elevator was not able to position properly.

Table 6-6
Power-On Error Codes (4xxx)

FSC	Message	Description
4001	ROM CRC Error	
4002	Ram Test Failed	You chose the Load/Unload menu selection, but no DLT drives are currently attached to the MiniLibrary system.
4003	Xilinx Progr Error	You chose the Load/Unload menu selection, but all drive and slot locations are currently devoid of tape cartridges.
4010	Comm UART Error	You chose the Load/Unload menu selection, but all drive and slot locations are currently occupied with tape cartridges.
4011	Trace UART Error	You chose the Load/Unload menu, with no magazine.
4012	Barcode UART Error	You chose the Clean Drive menu selection, but no DLT drives are currently attached to the MiniLibrary system.
4013	DLT 1 UART Error	You chose the Clean Drive menu selection, but all slot locations are currently devoid of tape cartridges.
4014	DLT 2 UART Error	

Table 6-7
Power-On Error Codes (5xxx)

FSC	Message	Description
5001	No DLTs Attached	You chose the Load/Unload menu selection, but no DLT drives are currently attached to the MiniLibrary system.
5002	All DLTs/Slots Empty	You chose the Load/Unload menu selection, but all drive and slot locations are currently devoid of tape cartridges.
5003	All DLTs/Slots Full	You chose the Load/Unload menu selection, but all drive and slot locations are currently occupied with tape cartridges.

continued

Table 6-7
Power-On Error Codes (5xxx) *continued*

FSC	Message	Description
5004	No Slots Installed	You chose the Load/Unload menu, with no magazine.
5010	No DLTs Attached	You chose the Clean Drive menu selection, but no DLT drives are currently attached to the MiniLibrary system.
5011	All Slots Empty	You chose the Clean Drive menu selection, but all slot locations are currently devoid of tape cartridges.
5012	All DLTs Full	You chose the Clean Drive menu selection, but all DLT drive locations are currently occupied with tape cartridges.
5013	DLT Timeout Error	A DLT, previously determined at boot-up to be attached, has not responded to a communication attempt.
5014	DLT Already Loaded	You chose the Clean Drive menu selection, but a DLT previously determined to be unloaded and now selected to be cleaned, has indicated the presence of a tape cartridge.
5015	Expired Clean'g Cart	You chose the Clean Drive menu selection, but has specified a slot which contains an expired cleaning cartridge.
5016	Not a Clean'g Cart	You chose the Clean Drive menu selection, but has specified a slot which does not contain a cleaning cartridge.
5017	No Slots Installed	The Clean Drive menu is selected with no magazine installed.
5020	All DLTs/Slots Empty	You chose the Map Info menu selection, but all drive and slot locations are currently devoid of tape cartridges.
5021	Bad Cartridge Map	
5030	Bad Novram Setting	A setting restored from NOVRAM, which successfully passed the NOVRAM checksum verification performed at power-up, nevertheless was determined to be invalid.

continued

Table 6-7
Power-On Error Codes (5xxx) *continued*

FSC	Message	Description
5031	Bad Calendar Setting	A time or date setting obtained from the real-time clock, which was indicated as being running, nevertheless was determined to be invalid.
5032	Bad Setting	A default setting was determined to be invalid.
5033	Set Density Failed	You chose the DLT Density menu selection, but the chosen DLT has failed to successfully execute the density change request.
5034	Set Compression Failed	You chose the DLT Compression menu selection, but the chosen DLT has failed to successfully execute the compression mode change request.
5035	DLT Timeout Error	Drive communication error during a menu operation.
5036	DLT Timeout Error	Drive communication error during a menu operation.
5037	DLT Set Bus ID Error	Error returned from drive when trying to set a SCSI ID with the configure menu.
5038	SCSI Lock Overrides	Display message only if an attempt is made to remove a magazine while a Prevent Medium removal is in effect.
5039	Invalid Unlock Code	Display message only when an invalid unlock code is entered..
503A	Auto Cleaning	Display message only -not an error.
5090	Slave Command Failure	Error occurred sending a menu mode command to a slave module.

Table 6-8
Intermodule Error Codes (6xxx)

FSC	Message	Description
6001	Comm Open Error	An attempt to open the RS-232 serial communication port used by the inter-module processes failed.
6002	Comm Port Send Error	An inter-module process (Master or Slave) was sending a packet to a remote module, but the UART detected an error condition during the transfer.
6003	Comm Port Recv Error	An inter-module process (Master or Slave) was receiving a packet from a remote module, but the UART detected an error condition during the transfer.
6004	EnQ Without IDs	
6005	DeQ Without Ids	
6006	EnQ Null Pointer	
6007	No Free Comm Blks	
6010	Pkt Send Error	The Master inter-module process has repeatedly attempted to send a packet to a Slave inter-module process, but all retries have been exhausted before the packet could be successfully sent.
6011	Pkt Receive Error	The Master inter-module process has repeatedly attempted to receive a packet from a Slave inter-module process, but all retries have been exhausted before the packet could be successfully received.
6012	Status Unexpected	The Master inter-module process received a Status packet, but no command is currently active.
6013	Invalid Com Blk Type	The Master inter-module process received a packet from a Slave inter-module process, but the packet's CommBlock type was invalid.
6014	Invalid Com Blk Type	The Master inter-module process received a packet from the Command/Message queue, but the packet's CommBlock type was invalid.

continued

Table 6-8
Intermodule Error Codes (6xxx) *continued*

FSC	Message	Description
6015	Ack Timeout - Out	The Master inter-module process attempted to initiate a packet transmission to a Slave inter-module process, but a timeout occurred waiting for the Slave's acknowledge.
6016	Ack Timeout - In	The Master inter-module process attempted to initiate a packet transmission from a Slave inter-module process, but a timeout occurred waiting for the Slave's acknowledge.
6017	Ack Invalid - Out	The Master inter-module process attempted to initiate a packet transmission to a Slave inter-module process, but the Slave's acknowledge was invalid.
6018	Ack Invalid - In	The Master inter-module process attempted to initiate a packet transmission from a Slave inter-module process, but the Slave's acknowledge was invalid.
6019	Comm Port Ack Error	The Master inter-module process, after sending a control byte to a Slave, was waiting for an acknowledge, but the UART detected an error condition.
6020	Command Overlap	The Master inter-module process received a Command from the Master control process, but a previously issued command is still being executed.
6021	Slave RTS Still Set	The Master inter-module process has received a valid acknowledge from a Slave, but the Slave's RTSi line has remained asserted.
6022	Slave Addr Invalid	The Master inter-module process received a CommBlock from the Master control process, but the specified Slave address exceeds the maximum valid range.
6023	Slave Req Unknown Power Down To Clear	The Master inter-module process detected an active SRVREQ line, but, after sequencing through all slave addresses, determined that no Slave had its RTSi line asserted.

continued

Table 6-8
Intermodule Error Codes (6xxx) *continued*

FSC	Message	Description
6024	Slave Has No Pkts	The Master inter-module process is requesting the Slave to send a packet, but the Slave has no packets to send.
6025	Pkt ID Invalid	
6026	No Slaves to Flash	
6027	Master Has No Flash	
6028	Slave Unavailable	
6029	Slave Has No Flash	
6030	Slave Dev. Incompat	
6031	Slave Boot Incompat	
6032	Slave Main Flash Err	
6033	Slave Boot Flash Err	
6034	Slave Re-boot Failed	
6035	Slave Update Err	
6036	Invalid Image Size	
6037	Command Timeout	
6040	Pkt Send Error	Slave inter-module process has repeatedly attempted to send a packet to the Master inter-module process, but all retries have been exhausted before the packet could be successfully sent.
6041	Pkt Receive Error	A Slave inter-module process has repeatedly attempted to receive a packet from the Master inter-module process, but all retries have been exhausted before the packet could be successfully received.
6042	Status Unexpected	A Slave inter-module process received a Status packet, but no Command is currently active.
6043	Invalid Com Blk Type	A Slave inter-module process received a packet from the Master inter-module process, but the packet's CommBlock type was invalid.

continued

Table 6-8
Intermodule Error Codes (6xxx) *continued*

FSC	Message	Description
6044	Invalid Com Blk Type	A Slave inter-module process received a packet from the Status/Message queue, but the packet's CommBlock type was invalid.
6045	Command Overlap	A Slave inter-module process received a Command from the Master inter-module process, but a previously issued command is still being executed.
6046	No Pkts To Send	A Slave inter-module process has been requested to send a packet to the Master inter-module process, but the Slave inter-module process has no packets to send.
6047	Invalid Direction	A Slave inter-module process has received a direction control byte from the Master inter-module process, but the direction control byte is invalid.
6048	Master Pkt ID Bad	

Table 6-9
Boot Error Codes (Bxxx)

FSC	Message	Description
B001	Boot ROM CRC Error	
B002	Boot RAM Test Failed	
B004	Boot Comm Open Error	
B005	Boot Novram Error	
B006	Boot Unused Int	
B007	Flash Init Error	
B010	Boot UART 0 Error	
B011	Boot UART 1 Error	
B012	Boot UART 2 Error	
B013	Boot UART 3 Error	
B014	Boot UART 4 Error	

Table 6-10
Flash Error Codes (Fxxx)

FSC	Message	Description
F001	No Flash Installed	
F002	Invalid Comm Port	
F003	Could Not Open Comm	
F004	Host Sync Failed	
F005	Invalid H/W Config	
F006	Incompatible Image	
F010	Flash Erase Error	
F011	Flash Download Error	
F012	Flash Program Error	
F013	Flash CRC Error	

Using System Diagnostics

The system diagnostics are intended to be used by a CE or other technically trained person. To use system diagnostics:

1. At the Default screen, press the **Enter** button. The following screen appears:

```

► Load/Unload
  Show Status Menu
  Maintenance Menu
  Configure Menu  ↓
  
```

2. Press the ▼ button twice to move the ► next to Maintenance, then press the **Enter** button to select the Maintenance menu. A display similar to the following appears:

```

► Clean Drive
  Diagnostic Menu
  Demo Menu
  Flash Update  ↓
  
```

3. Press the **Enter** button to select the Diagnostic menu. The following screen appears:

Cartridge Cycle
Friction Test
Tach Feedback
Scanner Feedback ↓

This screen is scrollable. The list of diagnostics available is as follows.

- Cartridge Cycle
- Friction Test
- Tach Feedback
- Scanner Feedback

Of these selections, only Cartridge Cycle is intended for use in the field. The remaining tests are used during factory setup.

Cartridge Cycle Diagnostic

When you select Cartridge Cycle, the MiniLibrary system robotics begin to move cartridges randomly from slot to slot in the magazine, while reporting on the front panel the number of passes.

This diagnostic runs continuously as long as the Base Module has power. To stop the test, press the **Escape** button. A flashing message appears on the display telling you that the test is paused. Pressing the **Escape** button a second time terminates the diagnostic and returns to the Maintenance menu.

Using the Demo Submenu

The only user diagnostic is found on the Demo submenu on the Maintenance menu. The submenu lists five demos, numbered 1 through 5. At present, only Demo 1 is implemented. Demo 1 lets you fully exercise the MiniLibrary system robotics.

When you select Demo 1, the MiniLibrary system robotics begins to move cartridges randomly from slot to slot in the magazine, while reporting on the front panel the number of passes. If all 10 or 16 slots in the magazine are full, Demo 1 will load a cartridge into DLT0 and leave it there. If you press the ▲ button while Demo 1 is running, the MiniLibrary system will load a cartridge into DLT0, unless DLT0 is full. If you press the ▲ button again, the cartridge is unloaded from DLT0 and returned to the magazine. The ▼ button causes DLT1 to be loaded and unloaded in the same way.

Demo 1 runs continuously as long as the Base Module has power. To stop the test, press the **Escape** button. A flashing message appears on the display telling you that the test is paused. Pressing the **Escape** button a second time terminates Demo 1 and returns to the Maintenance menu.

Appendix **A**

Specifications

Introduction

This appendix lists the specifications and regulatory requirements met by the MiniLibrary system, Expansion Unit, Data Unit, and MiniLibrary Base Module(s).

Table A-1
Operational Performance Specifications

Description	Specification
Host Interface	Fast Wide SCSI (differential) Low Voltage Differential (LVD) High Voltage Differential (HVD) SCSI-2 Single-Ended Fast Wide SCSI
Number of cartridges, full magazine:	
MiniLibrary system Base Module	10
Expansion unit	16
Data unit	16
Media type:	
TL881/TL891 family of drives	DLTtapeIII DLTapeIIIXT DLTtape IV

continued

Table A-1
Operational Performance Specifications *continued*

Description	Specification
Tape speed	
DLT20/40	110 in/sec read/write, 150 in/sec search
DLT35/70	160 in/sec read/write, 175 in/sec search
DLT40/80	168 in/sec read/write, 175 in/sec search
Tape tension	3.0 +/- 1 oz when stationary 4.7 +/- 1 oz at operating speed
Load time	10 sec (max), including picking from slot
Unload time	10 sec (max), including returning to slot
Rewind time	
DLT20/40	45 sec (avg)
DLT35/70	60 sec (avg)
DLT40/80	60 sec (avg)
Sustained native data transfer rate, maximum	
DLT20/40	1.5 MB/sec
DLT35/70	5 MB/sec
DLT40/80	6 MB/sec
Peak SCSI transfer rate, synchronous mode	
DLT20/40	3 MB/sec
DLT35/70	10 MB/sec
DLT40/80	10 MB/sec
Native data capacity (per cartridge)	
DLT20/40	20/40 GB
DLT35/70	35/70 GB
DLT40/80	40/80 GB

Table A-2
Reliability Specifications (Drives)

Description	Specification
Mean cycles between operator intervention	150,000
Data error rate (recoverable)	1 in 10^{17} bits
MTBF	250,000 hr (unlimited duty cycle)
MTTR	15 min
Head life	50,000 tape motion hrs
Design life	7 yrs @ 3,300 power-on hrs/year

Table A-3
Reliability Specifications (MiniLibrary System Robotics)

Description	Specification
Life expectancy, load/unload operations	500,000
Design life	7 yrs

Table A-4
Power Specifications

Description	Specification
Voltage	115-240 VAC
Amperage, each module: MiniLibrary Base Module	1.8 A @ 5 VDC $\pm 5\%$ 1.2 A @ 12 VDC $\pm 10\%$
Expansion unit and Data Unit	1.0 A @ 5 VDC $\pm 5\%$ 0.5 A @ 12 VDC $\pm 10\%$
Line frequency	50-60 Hz

Table A-5
Mechanical Specifications

Description	Specification
Height	6.97 in (17.70 cm)
Width	17.00 in (43.18 cm)
Depth:	
Overall	23.75 in (60.35 cm)
Behind panel	22.75 in (57.79 cm)
Weight:	
MiniLibrary system Base Module:	
Dual-drive	62 lbs (28 kg)
Single-drive	48 lbs (22 kg)
Expansion unit	41 lbs (20 kg)
Data unit	41 lbs (20 kg)
Pass-through mechanism (2-module height)	5 lbs (2.3 kg)
Shipping weight:	
MiniLibrary system Base Module:	
Dual-drive	70 lbs (32 kg)
Single-drive	56 lb. (25 kg)
Expansion unit (packed with pass-through mechanism)	75 lbs (34 kg)
Data unit	55 lbs (25 kg)

Table A-6
Environmental Specifications (Operating)

Description	Specification
Dry bulb temperature	41°F to 104°F (5°C to 40°C)
Temperature gradient	3.8°F/min (1°C/min)
Temperature shock	59°F (15°C) over 2 min
Wet bulb temperature	78.8°F (26°C)
Relative humidity (non-condensing)	20% to 80%
Humidity gradient	10%/hr
Altitude	-1000 ft to +10,000 ft (-305 m to 3050 m)

Table A-7
Environmental Specifications (Packed or Unpacked)

Description	Specification
Dry bulb temperature	41°F to 104°F (5°C to 40°C)
Temperature gradient	68°F (20°C)/hr (across the range)
Temperature shock	59°F (15°C) (over 2 min)
Wet bulb temperature	86°F (30°C)
Relative humidity (non-condensing)	40% to 60%
Humidity gradient	10%/hr
Altitude	-1000 ft to +10,000 ft (-305 m to 3050 m)

Table A-8
Environmental Specifications (Storage/Transit)

Description	Specification
Dry bulb temperature	-40°F to 158°F (-40°C to 70°C)
Temperature gradient	77°F (25°C)/hr (across the range)
Temperature shock	59°F (15°C) (over 2 min)
Wet bulb temperature	86°F (30°C)
Relative humidity (non-condensing)	20% to 80%
Humidity gradient	10%/hr
Altitude	-1000 ft to +50,000 ft (-305 m to 15,240 m)

Table A-9
Acoustic Emission Level

Drive Condition	Emission Level
Two drives operating (Intermittent robot motion excepted)	<50 dBA

Safety

The MiniLibrary Base Module, Expansion Unit, and Data Unit carry the following Regulatory Agency product safety certifications.

Table A-10
Regulator Agency Product Safety Certifications

Description	Specification
Certification	Standard
UL Listed	UL 1950
TUV/Product Service	EN 60 950
GS Mark	
CE Mark	EMC Directive, Low Voltage Directive
Canadian UL Listed	CSA 22.2 No. 950

Electromagnetic Emission (EM)

Notice

This equipment has been tested using double shielded cables for EM compliance. The use of unshielded cables or modifications requires system testing for EMI testing for compliance to the standard.

Industry Canada

This Class A digital apparatus meets all requirements of the Canadian Interference-causing equipment regulations.

Industrie Canada

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

FCC Notice

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

Table A-11
Acoustic Noise Declaration Declared per ISO 9296 and ISO 7779

Product	Sound Power Level L_{WAd} , B		Sound Pressure Level L_{pAm} , dBA (bystander position)	
	Idle	Operate	Idle	Operate
TL881/TL891 Family MiniLibrary System	6.4	7.0	48	48

NOTE: Current values for specific configurations are available from Compaq representatives 1 B = 10 dBA.

Table A-12
Schallemissionswerte - Werteangaben nach ISO 9296 und ISO 7779 /DIN EN27779

Gerät	Schalleistungspegel L_{WAd} , B		Schalldruckpegel L_{pAm} , dBA (Bediener position)	
	Leerlauf	Betrieb	Leerlauf	Betrieb
TL881/TL891 Family MiniLibrary System	6,4	7,0	48	48

NOTE: Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Compaq Vertretungen erhältlich. 1 B = 10 dBA.

FCC and VCCI Requirements

The following FCC and VCCI notices apply to the TL881/TL891 Family MiniLibrary System.

Statement for Equipment Meeting FCC Class A Requirements

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. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and (2) This device must accept any interference that may cause undesirable operation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

Equipment Meeting VDE Class B Requirements (VFG 1046/84 and VFG 243/91 for Germany)

Für Bundesrepublik Deutschland
For Federal Republic of Germany
Pour la République fédéral d'Allemagne

Bescheinigung des Herstellers/Importeurs

Dieses Gerät ist Übereinstimmung mit den Bestimmungen der BMPT Vfg. 243/1991 und Vfg. 46/1992 in Verbindung mit EN55022:1987 (DIN VDE 0878-3:11.89) oder Vfg. 1046/1984 mit Vfg. 483/1986, funkentstört. Es trägt als Nachweis der EMV-Konformität entweder eine Konformitätskennzeichnung oder das freiwillige VDE-Funkschutzzeichen.

Der vorschriftsmäßige Betrieb mancher Geräte (z.B. Meßsender) kann allerdings gewissen Einschränkungen unterliegen. Beachten Sie deshalb die unten aufgeführten Hinweise.

Für Geräte die nicht mit dem VDE-Funkschutzzeichen versehen sind wurde dem Bundesamt für Zulassungen in der Telekommunikation (BZT) des Inverkehrbringen dieses Gerätes angezeigt und die Berechtigung Zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

Betreiberhinweis

Wir sind verpflichtet, Sie auf folgende Fakten hinzuweisen (BMPT-Amtsblattverfügung 243/91 bzw. 1046/84 §2, Abschnitt 5):

Dieses Gerät wurde funktechnisch sorgfältig entstört und geprüft. Wird deises Gerät innerhalb einer Anlage zusammen mit anderen Geräten betrieben, muß bei Inanspruchnahme der "Allgemeinen Betriebsgenehmigung" nach BMPT-AmtsblVfg. 243/91 bzw. 1046/84 die gesamte Anlage den unter §2, Abschnitt 1, genannten Voraussetzungen entsprechen.

Externe Datenkabel:

Sollte ein Austausch der von Digital spezifizierten Datenkabel nötig werden, muß der Betreiber für eine einwandfreie Funkentstörung sicherstellen, daß Austausch kabel im Aufbau und Abschirmqualität dem Compaq Originalkabel entsprechen.

VCCI Notice for Japan Class I Equipment

Japanese Voluntary Control Council for Interference (VCCI).

この装置は、第一種情報処理装置（商工業地域において使用されるべき情報処理装置）で商工業地域での電波障害防止を目的とした情報処理装置等電波障害自主規制協議会（VCCI）基準に適合しております。
従って、住宅地域またはその隣接した地域で使用すると、ラジオ、テレビジョン受信機等に受信障害を与えることがあります。
取扱説明書に従って正しい取り扱いをして下さい。

This equipment is in the 1st Class category (information equipment to be used in commercial and/or industrial areas) and conforms to the standards set by the Voluntary Control Council for Interference by Information Technology Equipment aimed at preventing radio interference in commercial and/or industrial areas.

Consequently, when used in a residential area or in an area adjacent thereto, radio interference may be caused to radios and TV receivers, etc. Read the instructions for correct handling.

Appendix B

Accessories

Introduction

This appendix lists the supplies available for the TL881/TL891 Family MiniLibrary System.

Data and Cleaning Cartridge Ordering Information

You can order additional CompacTape Data or Cleaning Cartridges for the TL881/TL891 Family MiniLibrary System by contacting your authorized Compaq reseller or by calling Compaq ordering service at 1-800-345-1518. Table B-1 lists cartridge ordering part numbers.

Table B-1
Data and Cleaning Cartridge Part Numbers

Part Number	Part Number	Description
199702-001	TK85K-01	CompacTape III Data Cartridge (quantity, 1)
242465-001	TK87X-01	CompacTape IIIXT Data Cartridge (quantity, 1)
295194-B21	TK88K-01	CompacTape IV Data Cartridge (quantity, 1)
295195-B22		TL891DLX CompacTape IV Data Cartridge (quantity, 1)
199704-001	TK85-HC	TL891 Cleaning Tape Cartridge (quantity, 1)
199680-002		TL891DLX Cleaning Tape Cartridge (quantity, 1)

Bar Code Label and Magazine Ordering Information

Additional Bar Code Labels or Magazines can be ordered by calling Compaq. Part numbers are listed in Table B-2.

Table B-2
Bar Code Label and Magazine Part Numbers

Part Number	Description
120881-B31	10-Slot Magazine (quantity, 1)
295368-001	DLT Cleaning Cartridge Bar Code Labels (quantity 10)
295596-001	DLT Data Cartridge Bar Code Labels (quantity 50)

Appendix **C**

Product Notes for Microsoft Windows NT and Novell Netware

Introduction

This appendix provides information for the system administrator who should read this appendix before installing and using DLT tape drives with a host system operating under the Windows NT or Novell NetWare operating systems.

Host SCSI Interface

Compaq Computer Corporation has tested and supports DLT tape drives under the Windows NT and Novell NetWare operating systems.

The DTL tape drives use the standard SCSI-2 command set to interface to a PC-based host system. The host system must be equipped with a SCSI adapter to properly interface the tape drive with the host. For example, the host SCSI adapter might interface the computer's PCI bus to the SCSI-2 port of the tape drive. A host PC SCSI adapter is normally supplied with compatible software drivers for use with several operating systems. The software driver(s) must be pre-loaded in accordance with the SCSI adapter manufacturer's installation procedure.

In addition, there are many commercial software products available that provide host or network-based functionality (data backup and restore, archiving, data logging, etc.) for these operating systems. Before selecting a user-level software product, ensure that DLT tape drives are supported by that product. Commercial software vendors usually publish a supported hardware list, or have telephone technical support personnel that will answer questions regarding compatibility of a particular tape drive or other storage device.

Additionally, Compaq Computer Corporation publishes a list of commercial software products that support DLT tape drives. When choosing a software product to operate your DLT tape drive, follow the software vendor's installation procedure to implement support for your DLT tape drive.

Appendix **D**

Adding a Second Tape Drive

Introduction

This appendix explains how to add a second tape drive to the TL881/TL891 Family MiniLibrary System.

IMPORTANT: All screws that do not use lock washers, captive washers or lock nuts must have Loctite 222 applied when parts are reassembled in the field. If you ignore this step, you might cause premature failure of the mechanism.

Parts Location

Figure D-1 shows the location of most of the field-replaceable parts.

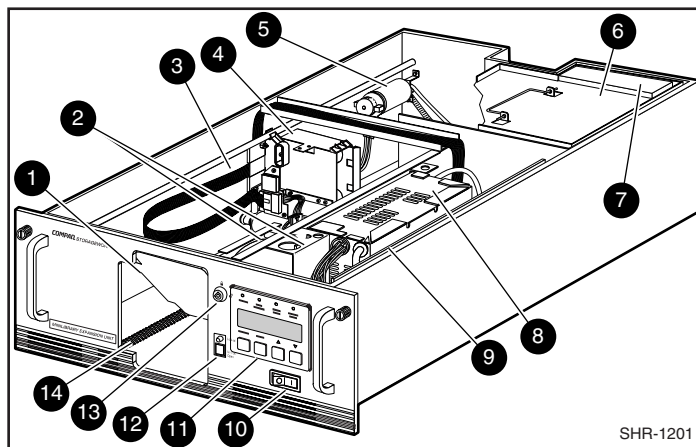


Figure D-1. Parts location

Table D-1
Parts Location

Figure Legend	Description
①	Magazine door
②	Door opener/magazine lock
③	Shuttle cable
④	Shuttle
⑤	Shuttle motor
⑥	Drive caddy assembly
⑦	Fan
⑧	Power supply
⑨	Controller PWB
⑩	AC power switch

continued

Table D-1
Parts Location *continued*

Figure Legend	Description
11	Control panel
12	Unlock/Open button and locked indicator
13	Magazine security lock
14	Leadscrew

Overall Procedure

NOTE: If the Base Module is part of an expanded TL881/TL981 Family MiniLibrary System, see the *Compaq TL881/TL890/TL891 Family MiniLibrary System Maintenance and Service Guide* for information on removing the Base Module from the MiniLibrary system.

To add a second drive to the Base Module:

1. Remove the skin cover, if present.
2. Remove the cover plate.
3. Remove the drive caddy assembly.
4. Install the new drive.
5. Replace the drive caddy assembly.
6. Replace the cover plate.
7. Replace the skin cover.

Removing and Replacing the Skin Cover (Desktop Models Only)

The skin cover is held in place by two captive screws near the top of the front panel, and two screws on each side of the Base Module (Figure D-2).

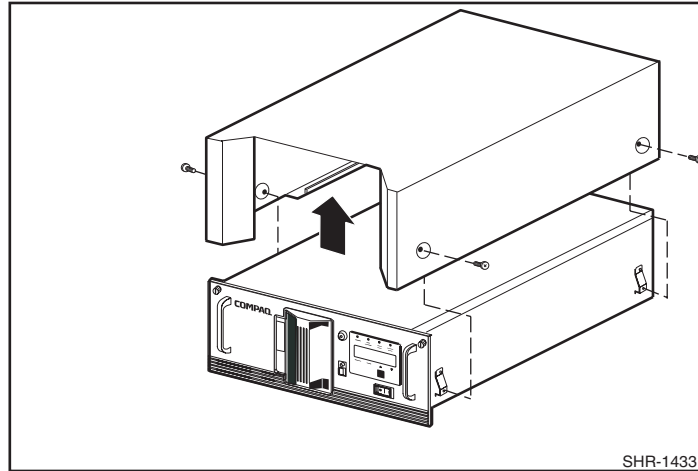


Figure D-2. Removing the skin cover

Removing

To remove the skin cover from the Base Module:

1. Remove the two screws on each side of the Base Module.
2. Grasp the cover at the lower edge of each side and then lift it straight up. There are two notches on each side of the cover to help clear the mounting brackets.

Replacing

To replace the skin cover on the Base Module:

1. Slide the skin cover over the module until it touches the front panel.
2. Insert the two screws through the skin cover into the Base Module, but don't tighten the screws yet.
3. Position the front edge of the skin cover so that it is flush against the back of the front panel. Tighten the captive screws in the clip nuts.
4. Tighten the two screws into the Base Module.

Removing and Replacing the Cover Plate

Removing

To remove the cover plate from the Base Module:

1. If the Base Module is a desktop model, remove the skin cover as described in "Removing and Replacing the Skin Cover (Desktop Models Only)."
2. Disconnect the power and interface cables at the rear of the module.
3. Unscrew the captive screw in the center of the cover plate (Figure D-3).
4. Slide the cover plate one-half inch toward the rear of the module.
5. Lift the cover plate off the Base Module.

Replacing

To replace the cover plate on the Base Module:

1. Place the cover plate on the Base Module so that it overhangs one-half inch at the rear of the module (Figure D-3).
2. Slide the cover plate toward the front of the Base Module until the cover plate touches the front panel.
3. Tighten the captive screw in the center of the cover plate.

4. Connect the power and interface cables at the rear of the module.
5. If the Base Module is a desktop model, replace the skin cover as described in “Removing and Replacing the Skin Cover (Desktop Models Only).”

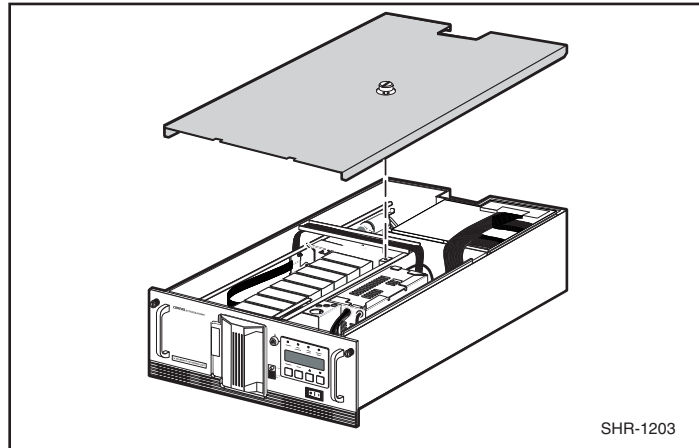


Figure D-3. Removing the cover plate

Removing and Replacing the Drive Caddy Assembly

The drive caddy assembly is an enclosure that holds one or two DLT drives and the interconnecting cables. The assembly includes the SCSI interface connectors and cables for the Base Module, the power cables for the drives, and communication cables from the drives to the controller PWB.

Removing

Remove the drive caddy assembly from the Base Module:

1. Remove the cover plate as described in “Removing and Replacing the Cover Plate.”
2. Disconnect the SCSI cable connectors ❶, Figure D-4 from the controller SCSI extension cable.

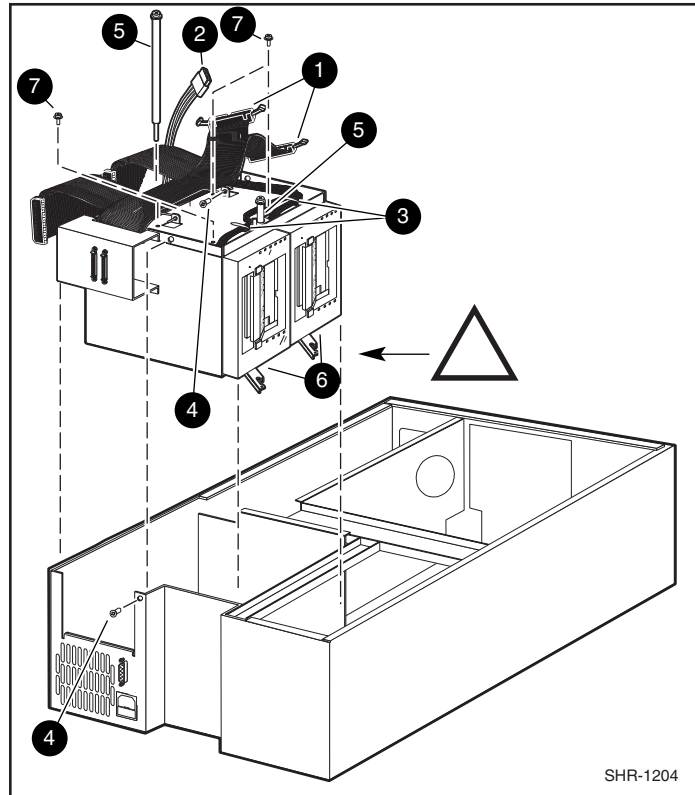


Figure D-4. Drive caddy

3. Disconnect the drive power Y cable ❷ from the power supply connector.
4. Disconnect the drive 1 RS-422 cable ❸ from the controller PWB end.
5. Remove two M4 x 8 mm flat-head screws ❹ from along the upper edge of the drive caddy assembly.

6. Remove two M4 extension screws ⑤ from the top of the drive caddy assembly.



CAUTION: If you're not careful, you might break the door levers when you lift the drive caddy assembly out of the Base Module in the next step. To prevent this, steady the caddy so it cannot rock forward as it clears the platform when you're lifting it up, and do not allow the door levers to touch the strut across the top of the Base Module.

7. Grasp the handle on top and lift the drive caddy assembly out of the Base Module carefully. Make sure you tilt the rear end of the caddy as it is being removed so the door levers don't bump against the chassis crossbrace.
8. Set the drive caddy assembly on the work surface and install the second tape drive as described in "Installing the Second Tape Drive."

Replacing

To replace the drive caddy assembly in the Base Module:



CAUTION: To prevent breaking the door levers, steady the assembly as you lower it by the handle so it cannot rock forward as it approaches the platform, and do not allow the door levers to touch the strut across the top of the chassis.

1. Grasp the drive caddy assembly by the handle, tilt the front end down at a slight angle, and then lower it into position in the Base Module. Orient it as shown in Figure D-4.
2. Replace the two M4 extension screws ⑤ at the top of the assembly.
3. Coat the threads of the two M4 x 8 mm flat-head Phillips screws ④ with Loctite 222, and replace them on the upper edge of the drive caddy assembly.
4. Connect the drive 0 and drive 1 RS-422 cables ③ to the controller PWB.
5. Connect the drive power cable ② to the power supply connector.
6. Connect the SCSI cable connectors ① to the controller SCSI extension cable.
7. Replace the cover plate as described in "Removing and Replacing the Cover Plate."

Installing the Second Tape Drive

To install the second tape drive:

1. Remove the four 6-32 sems pan-head Phillips screws ⑦ that hold the blank panel in place in the drive caddy assembly; there are two on the top of the assembly (Figure D-4) and two on the bottom of the assembly.
2. Slide the blank panel out of the drive caddy assembly.
3. Disconnect the RS-422 cable that's located toward the front on the top of the drive. Lift the cable clear of the cable clamps and set it aside.
4. Install the door lever on the flattened shaft at the bottom of the drive.
5. Slide the drive ⑥ into the drive caddy assembly. Position the drive so the threaded holes in the top and bottom of the drive are aligned with the screw holes.
6. Install the four 6-32 sems pan-head Phillips screws that were removed in Step 1.
7. Connect the unused connector on the power Y-cable to the drive just installed.
8. Connect the unused connector on the SCSI cable to the drive just installed.
9. Install the RS-422 cable supplied with the kit, sliding it under the clamps so that the connector is adjacent to the connector on top of the new drive.
10. Install the RS-422 cable removed in step 3 over the top of the new RS-422 cable so that the connector is adjacent to the connector on top of the original drive.
11. Connect the RS-422 cables to the connectors on the top of the drives, through the holes in the top of the drive caddy assembly.
12. Replace the drive caddy assembly as described in "Removing and Replacing the Drive Caddy Assembly."

Information on Pass-Through Section Covers

Introduction

This appendix supplements the information presented in the section “Mechanical Installation” of Chapter 3.

IMPORTANT: These procedures should be performed by a qualified service technician.

Pass-Through Section Covers

The Pass-Through Mechanism moves tape cartridges vertically between the TL881/TL891 Family MiniLibrary System modules. Each module section is covered by an individual sheet-metal enclosure. These covers protect the mechanism during shipping and are an important safety shield during operation.

A separate detachable side plate is part of the cover assembly. During installation the side plates should be removed on any mechanism sections located behind a MiniLibrary system module. This allows easy access to a cartridge stranded in transit by a commercial power outage. The remaining portion of the cover can also be removed from any section behind a module.

IMPORTANT: Both parts of the covers must remain in place over any section of the mechanism that is not behind a MiniLibrary system module. Any gaps between modules should remain completely covered.

Figure E-1 shows the cover assembly side plate ❶ and Figure E-2 shows the mechanism section cover ❷.

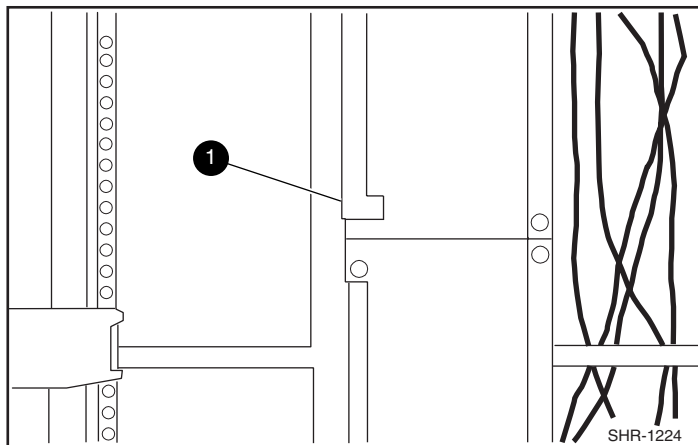


Figure E-1. Cover assembly side plate

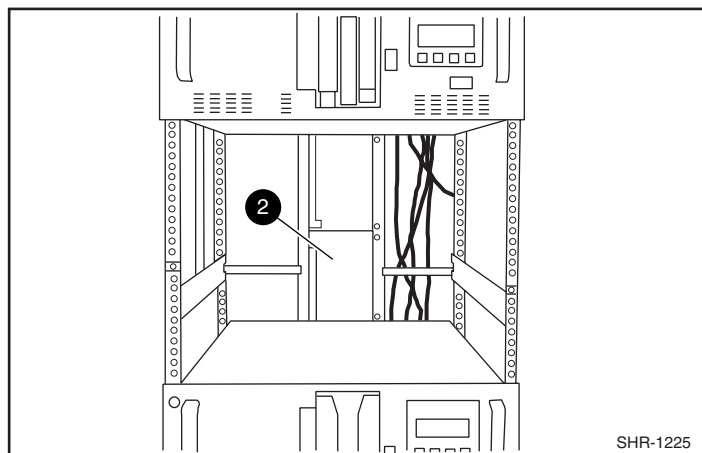


Figure E-2. Mechanism section cover

Tape Drives and Cartridges

Introduction

This appendix discusses:

- Care and handling of cartridges
- Preparing cartridges for use
- Adding and removing cartridges through the load port
- Adding and removing cartridges through the storage array door
- Using the tape drives
- Removing cartridges from the tape drives

Care and Handling of Cartridges

CompacTape is a Digital Linear Tape (DLT) that has been designed and formulated for use in DLT tape drives and tape libraries. The high-grade metal particle tape features demonstrated tape durability and a long archival life.

As with any data storage medium DLT tape cartridges require some care in handling and storage. The following guidelines will help protect your valuable data.

Handling and Storage Guidelines

- Do not carry cartridges loosely in a box or other container that exposes them to unnecessary physical shock.
- Store each cartridge in its protective case until you select it for use in a tape drive or MiniLibrary system.
- Do not drop or bump the cartridge. This might dislodge and/or damage internal components.
- Avoid unnecessary opening of the cartridge door; this might expose the tape to contamination or physical damage.
- Do not allow direct contact with tape or the tape loader. Even dust or natural skin oils can contaminate the tape and impact tape performance.
- Do not expose the tape cartridge to moisture or direct sunlight.
- Maintain a clean operating, working, and storage environment.
- Do not place cartridges on or near devices that may produce a magnetic field, such as computer terminals, motors, and video or x-ray equipment. Such exposure can alter or erase data on the tape.
- Do not attempt to remove a cartridge from the drive unless the drive indicator (the green LED) is lit. Overriding the drive handle can cause damage to both the media cartridge and the drive.

- The ambient operating environment for the tape cartridge is:
 - Temperature: 50°F to 104°F (10°C to 40°C)
 - Relative Humidity: 20% to 80% (non-condensing)

If storage and/or transportation of a tape cartridge has exposed it to conditions outside the ambient values above, allow the cartridge to remain unused in its operating environment for 24 hours before using it.

Checking a Cartridge for Damage

If a cartridge has been dropped or if you have other reason to believe it might be damaged, inspect it carefully before inserting it into the MiniLibrary system. Inspect the cartridge as follows:

1. Shake the cartridge and listen for any sound of a broken part (such as a reel lock). Any rattling noise is an indication that the cartridge has been damaged and must not be used.
2. Look at the plastic case carefully for any sign of distortion, bending or cracks.
3. Open the spring-loaded cartridge door by releasing the slide lever ❶ at the door hinge until you see the cartridge (takeup) leader ❷ (Figure F-1).

Figure F-1. Opening the cartridge door

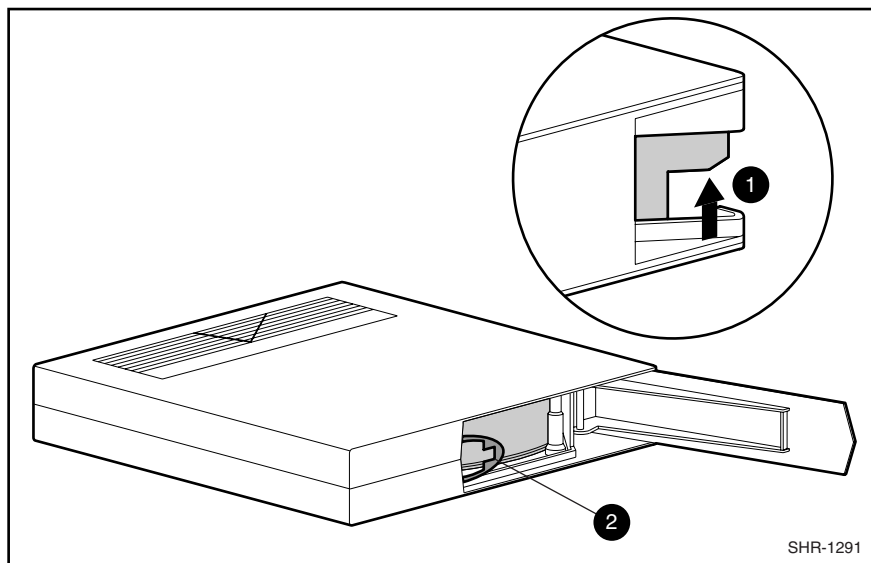


Table F-1
Opening the Cartridge Door

Figure Legend	Description
①	Slide lever
②	Cartridge (takeup) leader

4. Verify that the cartridge (takeup) leader appears in its normal position (protrudes about a 5-degree angle from the case.) If necessary, compare it to a cartridge that has not been dropped.



CAUTION: If the leader is out of position, do not use the cartridge; it can cause the drive takeup leader to fail.

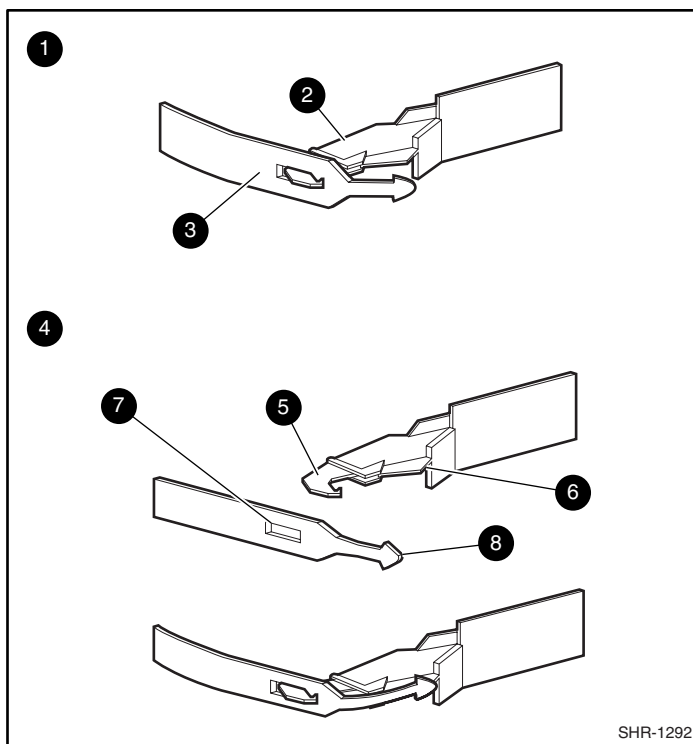


Figure F-2. Correct and incorrect cartridge (takeup) leader positions

Table F-2
Opening the Cartridge Door

Figure Legend	Description
①	Acceptable
②	Buckling link
③	Takeup leader
④	Not Acceptable
⑤	Buckling link hook
⑥	Buckling link
⑦	Takeup leader notch
⑧	Takeup leader nose

5. Verify that the two reel lock levers are in position: one is located on the same surface as the cartridge leader door, the other is located on the bottom of the cartridge near the front left-hand corner. Both reel locks should be visible and in the same position as a cartridge that has not been dropped.
6. Verify that the hub reel is flush with the case surface. If the hub reel is compressed it could become misaligned

Archival Guidelines

Ensure the reliability of archived cartridges that contain recorded data by storing them in a clean, controlled environment with the following conditions:

- Temperature 64°F to 82°F (18°C to 28°C)
- Relative Humidity: 40% to 60% non-condensing
- The above environment also ensures maximum shelf life of cartridges that do not yet contain data

Unrecorded (blank) cartridges can be stored under the following conditions:

- Temperature 61°F to 89°F (16°C to 32°C)
- Relative Humidity: 20% to 80% non-condensing

Transportation Guidelines

Keep within the following environmental guidelines as listed in Tables F-3 and F-4.

Table F-3
Unrecorded (Blank) Cartridges

Description	Specification
Temperature	-10°F to 118°F (-23°C to 48°C)
Relative humidity	5% to 100%
Wet bulb temperature	48.8°F (26°C), maximum
Duration	10 consecutive days, maximum

Table F-4
Recorded Cartridges

Description	Specification
Temperature	41°F to 89°F (5°C to 32°C)
Relative humidity	5% to 80%
Wet bulb temperature	48.8°F (26°C), maximum
Duration	30 years at 68°F (20°C) and 40% relative humidity, non-condensing

Also follow these guidelines:

- Avoid mechanical stress that might distort the shape of cartridge, such as dropping or bumping the cartridge.
- Fit cartridges into a rigid container with adequate shock-absorbing material. The container should have a clean interior and construction that provides sealing to prevent invasion by dirt and/or water.
- Mark the shipping container to clearly identify its correct orientation.
- Avoid exposing cartridges to widely varying temperatures and/or humidity whenever possible

- Condition newly received cartridges in their operating environment for at least 24 hours before use.
- Minimize potential damage from stray magnetic fields by ensuring a nominal spacing of not less than 3.2 in (80 mm) between the cartridge and the outer surface of its shipping container.

Cleaning Guidelines

See the following guidelines and Table F-5 for instructions on using the cleaning cartridge to clean the tape drive heads.

- Under normal conditions, the cleaning cartridge is effective for about 20 cleanings. If the cleaning cartridge has been overused, the Use Cleaning Tape remains lit after you load the cleaning cartridge and no cleaning action takes place. When this happens, use another cleaning tape.
- DLT tapes do not usually need regular cleaning, as their design allows for minimal head contamination. The action of loading and using any tape tends to clean the heads of the tape drive.
- Use the cleaning tape no more than once every 2 weeks (or after 50 hours of continuous tape use).
- When the Use Cleaning Tape LED lights, take note the tape in use at the time. This tape might be causing head contamination. Try another tape before using the cleaning tape, to see whether the Use Cleaning Tape LED stays on.
- Use the cleaning tape more than once if a tape has severely contaminated the drive heads. If the problem persists after two cleanings, contact Compaq for service.

Table F-5
Cleaning Cartridge Guidelines

Problem	Cause	Solution
The Use Cleaning Tape LED Lights.	The drive heads need cleaning or the tape is defective.	Use the cleaning cartridge. The cleaning operation begins automatically as soon as the cartridge insert/release handle is closed. When cleaning is complete, the internal beeper sounds to tell you to remove the cleaning cartridge.
A particular cartridge causes the Use Cleaning Tape LED to turn on frequently.	The data cartridge might be defective.	Back up this data on another cartridge, then discard the old cartridge. A damaged cartridge might cause unnecessary use of the cleaning cartridge.
The Use Cleaning Tape LED turns on after you clean the drive heads and reload your data cartridge.	Your data cartridge might be the problem.	Try a different data cartridge.
The Use Cleaning Tape LED is on after you load the cleaning cartridge.	Cleaning has not been done and the cleaning cartridge has expired.	Replace the cleaning cartridge with a new one.

Cleaning the Tape Drive Heads

The tape drive heads physically read and write data to and from the tape cartridge. Under normal conditions, the heads require cleaning only when the Use Cleaning Tape LED indicates that it is required.

IMPORTANT: Never attempt to clean the heads in a manner other than described in the following procedure. Doing so can void the product warranty.

To clean the heads:

1. Apply power to the tape drive and wait for the green Operate Handle LED to light.
2. Raise the cartridge insert/release handle and insert the cleaning cartridge into the drive, then lower the handle.

3. The drive automatically executes the head-cleaning operation, which takes at least 30 seconds. When the cleaning cartridge has completed this task, the green Operate Handle LED lights.
4. Remove the cleaning cartridge.
5. Mark the frequency-of-use label on the cleaning cartridge, placing a check mark in the next available square on the card each time you use the cleaning cartridge.



CAUTION: Remove the cleaning cartridge as soon as possible following completion of the cleaning operation. Leaving a cleaning cartridge in the drive can result in redundant cleaning operations each time power to the tape drive is turned off and on, resulting in unnecessary wear on the tape drive's read/write heads.

Preparing Cartridges for Use

The MiniLibrary system comes with one DLT tape cartridge and one cleaning cartridge.

IMPORTANT: The MiniLibrary system accepts only CompacTape III, CompacTape IIIXT, and CompacTape IV cartridges. For best performance, use CompacTape IV cartridges in the MiniLibrary system. Do not use CompacTape I or CompacTape II cartridges.

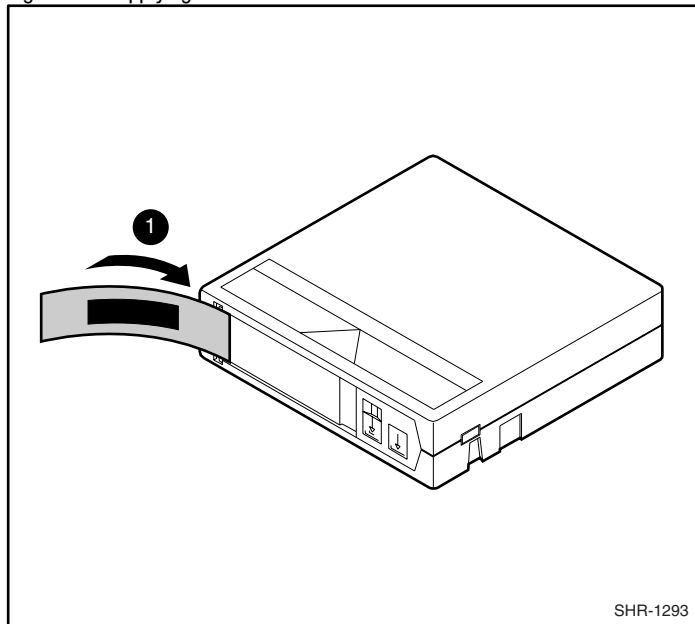
NOTE: To order additional tape cartridges, contact your Compaq authorized dealer or reseller.

Applying Bar Code Labels

Before placing a cartridge in the MiniLibrary system, you must apply a bar code label that uniquely identifies it to the MiniLibrary system. When applying the bar code label:

1. Use only the labels provided with the MiniLibrary system.
2. Apply cleaning cartridge labels only to cleaning cartridges; apply data labels only to data cartridges.
3. Apply the label ❶ to the front face of the cartridge as shown in Figure F-3.

Figure F-3. Applying a bar code label



Write-Protecting and Write-Enabling Cartridges

Each DLT cartridge has a write-protect switch ❶ and an orange protection tab

❷. Use the switch as follows:

1. To write-protect a cartridge (prevent data from being written onto the tape), move the switch to the left. The orange tab appears.
2. To write-enable a cartridge (allow data to be written), move the switch to the right. The orange tab disappears.

NOTE: When write-protected, the cartridge can only be read by the library; it cannot be written to or erased.

Figure F-4. Write-protecting a cartridge

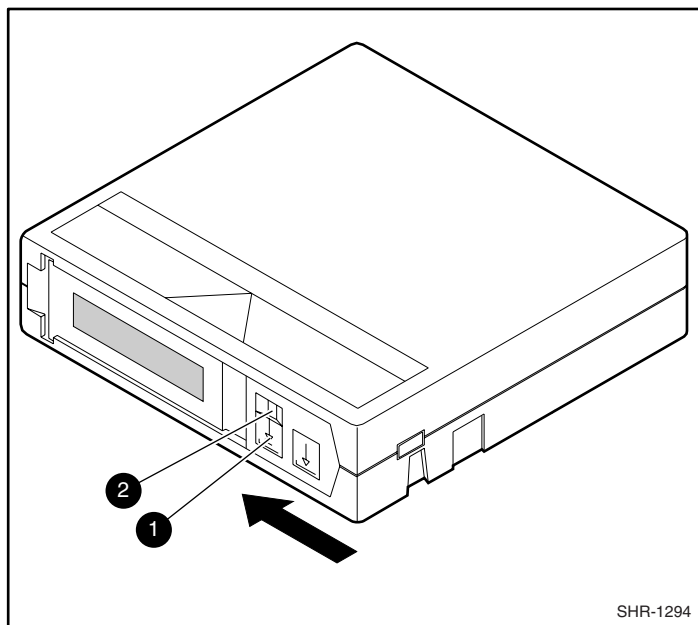


Table F-6
Write-Protecting a Cartridge

Figure Legend	Description
①	Write-protect switch
②	Orange protection tab

Using the Tape Drives

Each tape drive has a control panel consisting of status indicators (lights) and buttons. Each tape drive control panel can be accessed through the front door or storage array door.

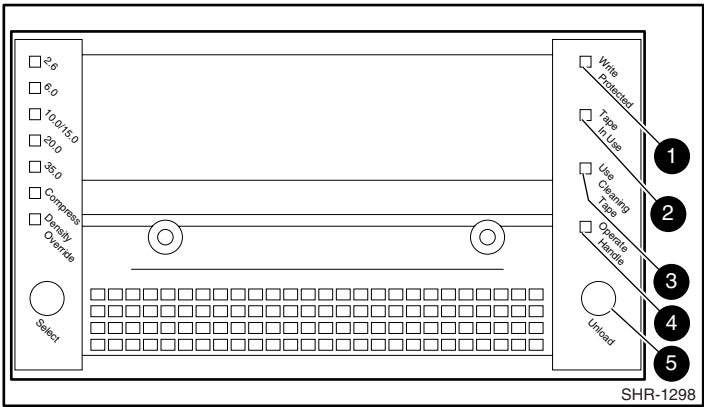


Figure F-5. Tape drive control panel

Table F-7 lists the operation of the right-side control panel buttons and indicators.


 **CAUTION:** To reduce the risk of damaging data on the tape cartridges, do not attempt to manually change the tape density using the controls on the left side of the control panel. To change tape density, issue the appropriate commands from the application software on your host computer.

Table F-7
Tape Drive Control Panel

Figure Legend	Name	Function
❶	Write Protect indicator (orange)	Lights when the loaded tape cartridge is write-protected.
❷	Tape in Use Indicator (yellow)	<p>Blinks while the tape cartridge loads and calibrates. After calibration, it remains lit.</p> <p>If the indicator remains on after a cleaning cartridge is unloaded, the drive heads were not adequately cleaned.</p>
❸	Use Cleaning Tape Indicator (yellow)	Lights when the drive head needs cleaning or the current cleaning tape is bad. After unloading the cleaning tape cartridge, the indicator remains lit if the cleaning operation was not completed or the cleaning tape cartridge is bad.
❹	Operate Handle indicator (green)	Lights when the insert/release handle is ready to operate.
❺	Unload button	<p>Rewinds the tape and prepares it for removal from the tape drive (press and hold for 2 seconds).</p> <p>IMPORTANT: Depending on the tape, the tape cartridge must be completely rewound before you can eject it from the drive.</p>

NOTE: When all right-side indicators are steadily lit, a POST starts. When all right-side indicators blink, an error has occurred. To clear the error, press the **Unload** button.

Interconnect Characteristics for Signals

Table G-1 Recommended Minimum Conductor Size					
	SE		LVD		HVD
	3 m Cable	6 m Cable	12 m Cable	>12 m Cable	25 m Cable
All conductors except terminator power and reserved	0,050 92 mm ² (30 AWG)	0,080 42 mm ² (28 AWG)	0,032 4 mm ² (32 AWG)	0,080 42 mm ² (28 AWG)	0,050 92 mm ² (30 AWG)
Single terminator power line	0,080 42 mm ² (28 AWG)	0,080 42 mm ² (28 AWG)	N/A	N/A	N/A
Multiple terminator power lines	0,050 92 mm ² (30 AWG)	0,050 92 mm ² (30 AWG)	0,032 4 mm ² (32 AWG)	0,080 42 mm ² (28 AWG)	0,050 92 mm ² (30 AWG)

- NOTE:**
- 1. SE 6 m cable applies to SCSI devices running at or below fast-5 data transfer rates.
 - 2. For interconnects supporting LVD/SE multimode, the larger conductor size should be used.
 - 3. The conductor size recommendations assume voltage drops only due to the cables (that is, does not include voltage drops due to connectors, ground effects, and so on).

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