HP StorageWorks

1/8 Tape Autoloader User and Service Guide

Ultrium 960, Ultrium 448, Ultrium 460, Ultrium 230, DLT VS80, SDLT 320

invent

1/8 Tape Autoloader User and Service Guide

Contents

About this guide

This guide provides information about:

- Installing the HP StorageWorks 1/8 Tape Autoloader
- Configuring and operating the HP StorageWorks 1/8 Tape Autoloader
- Troubleshooting the HP StorageWorks 1/8 Tape Autoloader

Rack stability

⚠ **WARNING!**   To reduce the risk of personal injury or damage to equipment:

- Extend leveling jacks to the floor.
- Ensure that the full weight of the rack rests on the leveling jacks.
- Install stabilizing feet on the rack.
- In multiple-rack installations, secure racks together.
- Extend only one rack component at a time. Racks may become unstable if more than one component is extended.

Registering your product

Registering your product at www.register.hp.com ensures fast and easy access to Hewlett-Packard Customer Support. HP customers who register join a select group registered to receive:

- Technical support updates
- Special Hewlett-Packard offers
- Direct-to-you details on:
    - Ideas and ways to use your new HP StorageWorks 1/8 Autoloader
    - Other exciting HP products
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HP technical support

Telephone numbers for worldwide technical support are listed on the HP support web site: http://www.hp.com/support/.

Collect the following information before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages

- Operating system type and revision level
- Detailed, specific questions

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

HP strongly recommends that customers sign up online using the Subscriber's choice web site at http://www.hp.com/go/e-updates.

- Subscribing to this service provides you with e-mail updates on the latest product enhancements, newest versions of drivers, and firmware documentation updates as well as instant access to numerous other product resources.
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- In the United States, call 1-800-345-1518.
- Elsewhere, visit the HP web site: http://www.hp.com. Then click **Contact HP** to find locations and telephone numbers.

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For third-party product information, see the following HP web sites:

- http://www.hp.com
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- http://www.hp.com/support/
- http://www.docs.hp.com

1 Installing the autoloader

Autoloader features and requirements

The unique design of the 1/8 Tape Autoloader has the drive in the center with slots rotating around it. This design houses up to eight cartridges in a compact 2U form factor.

The HP StorageWorks 1/8 Ultrium 960 and Ultrium 448 Tape Autoloader models and the DLT VS80 Tape Autoloader model occupy one SCSI target address and use dual LUNs for the tape drive and autoloader robotic (see also "SCSI host bus adapters (HBAs)" on page 18). The HP StorageWorks 1/8 Ultrium 230, Ultrium 460 and SDLT 320 Tape Autoloaders occupy two SCSI target addresses: one for the tape drive and the other for the autoloader robotic.

The 1/8 Tape Autoloader is compatible with most operating systems and environments that support the SCSI interface, but requires either direct support from the operating system or a compatible backup application to take full advantage of its many features.

The HP StorageWorks 1/8 Tape Autoloader utilizes the following interface for your specific model type:

Table 1   Model and interface type

Model	Interface	SCSI target address
Ultrium 960	Ultra320 SCSI LVD (SE is not recommended as it will severely degrade performance)	One with LUN scanning
Ultrium 448	Ultra160 SCSI LVD/SE	One with LUN scanning
Ultrium 460	Ultra160 SCSI LVD/SE	Two
Ultrium 230	Ultra2 SCSI LVD/SE	Two
DLT VS80	Ultra2 SCSI LVD/SE	One with LUN scanning
SDLT 320	Ultra2 SCSI LVD/SE	Two

Maximum storage capacity and data transfer rate

Maximum storage capacity and maximum data transfer rates for each 1/8 Tape Autoloader model are as follows:

1/8 Ultrium Tape Autoloaders

Table 2 Ultrium 960 Tape Autoloader specifications

Characteristic	Specification
Maximum storage capacity, 8 data cartridges	Native: 3.2 TB (8 x 400 GB) Compressed: 6.4 TB (2:1 compression)
Maximum data transfer rate	Native: 80 MB/s (288 GB/hour) Compressed:160 MB/s (576 GB/hour (2:1 compression)

Table 3 Ultrium 448 Tape Autoloader specifications

Characteristic	Specification
Maximum storage capacity, 8 data cartridges	Native: 1.6 TB (8 x 200 GB) Compressed: 3.2 TB (2:1 compression)
Maximum data transfer rate	Native: 24 MB/s (86 GB/hr.) Compressed: 48 MB/s (172 GB/hr.) (2:1 compression)

Table 4 Ultrium 460 Tape Autoloader specifications

Characteristic	Specification
Maximum storage capacity, 8 data cartridges	Native: 1.6 TB (8 x 200 GB) Compressed: 3.2 TB (2:1 compression)
Maximum data transfer rate	Native: 30 MB/s (108 GB/hr.) Compressed: 60 MB/s (216 GB/hr.) (2:1 compression)

Table 5 Ultrium 230 Tape Autoloader specifications

Characteristic	Specification
Maximum storage capacity, 8 data cartridges	Native: 800 GB (8 x 100 GB) Compressed: 1.6 TB (2:1 compression)
Maximum data transfer rate	Native: 15 MB/s (54 GB/hr.) Compressed: 30 MB/s (108 GB/hr.) (2:1 compression)

1/8 DLT and SDLT Tape Autoloaders

Table 6 DLT VS80 Tape Autoloader specifications

Characteristic	Specification
Maximum storage capacity, 8 data cartridges	Native: 320 GB (8 x 40 GB) Compressed: 640 GB (2:1 compression)
Maximum data transfer rate	Native: 3 MB/s (10.8 GB/hr.) Compressed: 6 MB/s (21.6 GB/hr)(2:1 compression)

Table 7 SDLT 320 Tape Autoloader specifications

Characteristic	Specification
Maximum storage capacity, 8 data cartridges	Native: 1.28 TB (8 x 160 GB) Compressed: 2.56 TB (2:1 compression)
Maximum data transfer rate	Native: 16 MB/s (57.6 GB/hr.) Compressed: 32 MB/s (115.2 GB/hr.) (2:1 compression)

SCSI requirements

The autoloader incorporates a wide SCSI-2 or SCSI-3 (see Table 1 on page 9 for your specific model) Low-Voltage Differential (LVD) SCSI bus, but may also be attached to a Single-Ended (SE) SCSI bus. Make sure your SCSI host adapter or controller supports these standards. If you connect the autoloader to an SE SCSI bus, or if there are SE devices attached to the same SCSI bus, the autoloader's performance is limited to the maximum data transfer speed and maximum cable lengths of the SE bus. For these reasons, HP strongly recommends that you do not use a SE SCSI bus with the 1/8 Tape Autoloader.

> **NOTE:** Do not connect an Ultrium 960 device to a SE SCSI bus. It will severely degrade performance.

The 1/8 Tape Autoloader is **NOT** compatible with a standard differential (Diff) or High-Voltage Differential (HVD) SCSI bus. The autoloader is compatible with a narrow (50-pin) SCSI bus using a 68-pin to 50-pin adapter that terminates the unused 18 pins (**NOT** included with the autoloader). These adapters are sometimes labeled high-byte termination.

> **NOTE:** HP does not recommend connecting any of the Ultrium or SDLT 320 Tape Autoloaders to a 50-pin adapter as this will degrade performance.

Autoloader product overview

Figure 1 Front panel overview
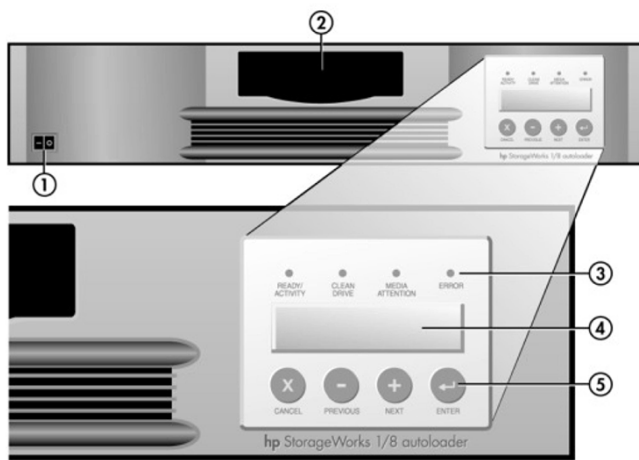
Number	Description
1	Power switch
2	Mailslot
3	Front panel LEDs
4	Front panel LCD screen
5	Control keys

Figure 2 Rear panel overview
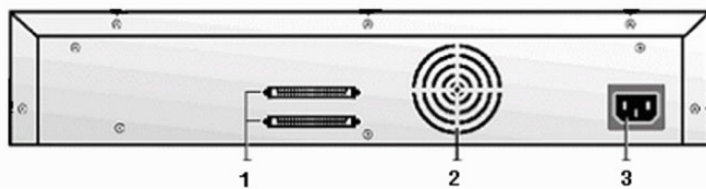
Number	Description
1	68-pin HD SCSI connectors
2	Fan vent
3	Power connector

Choosing a location

Choose a location that meets the following criteria:

Table 8 Location criteria

Criteria	Definition	
Standalone requirements	Select a location that is flat, sturdy, level, and close to a host server. Do not place the autoloader on the floor or other carpeted surfaces. Do not place the autoloader on its side, upside down, or stack items on top of the autoloader.	
Rack requirements	Standard 19-inch rack with 2U of clearance	
Room temperature	10-35° C (50-95° F)	
Power source	AC power voltage: 100-127 VAC; 200-240 VAC Line frequency: 50-60 Hz Locate the AC outlet near the autoloader. The AC power cord is the product's main AC disconnect device and must be easily accessible at all times.	
Weight	26 lbs (12 kg)	
Air quality	Minimal sources of particulate contamination. Avoid areas near frequently used doors and walkways, stacks of supplies that collect dust, printers, and smoke-filled rooms. Excessive dust and debris can damage tapes and tape drives.	
Humidity	20-80% RH non-condensing	
Clearance	Back	Minimum of 15.4 cm (6 inches)
	Front	Minimum of 30.8 cm (12 inches)
	Sides	Minimum of 5.08 cm (2 inches)

Unpacking the autoloader

Before you begin, clear a work surface to unpack the autoloader. Select an open 2U computer rack location or choose a desktop location near the host server.

△ **CAUTION:** If the temperature in the room where the autoloader will be installed varies by 30 degrees F (15 degrees C) from the room where the autoloader was stored, allow the autoloader to acclimate to the surrounding environment for at least 12 hours before opening the shipping container.

Unpacking the autoloader:

1. Before opening and removing the autoloader from the shipping container, inspect the container for shipping damage. If you notice any damage, report it to the shipping company immediately.
2. Open the shipping container; remove and set aside the accessory package.

△ **CAUTION:**   Do not set the autoloader on either end or sides.

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3. Lift the autoloader and padding out of the container and place it on the work surface, top facing up.
4. Carefully remove the shipping materials from the left and right sides of the autoloader. Remove the bag from the autoloader. Save the packing materials in case you need to move or ship the autoloader in the future (see Figure 3).

Figure 3 Removing the autoloader from the shipping container
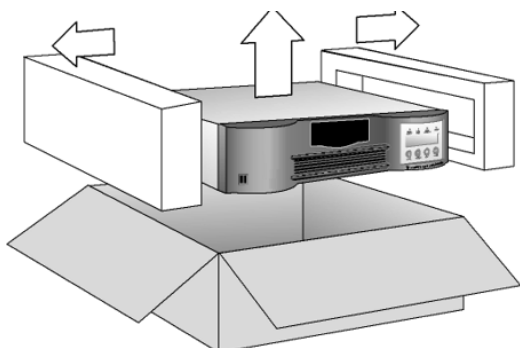
Identifying product components

Confirm that you have received the following:

- SCSI cable
- SCSI terminator
- Power cable
- Documentation kit
  - Documentation CD
  - Installation Poster
  - HP OpenView Storage Data Protector Installation Instructions
  - HP Worldwide Warranty
  - HP Safety Guide

Rack mount kit (optional)

If you purchased the optional rack mount kit, verify that you have received the following components:

Figure 4 Rack mount kit components
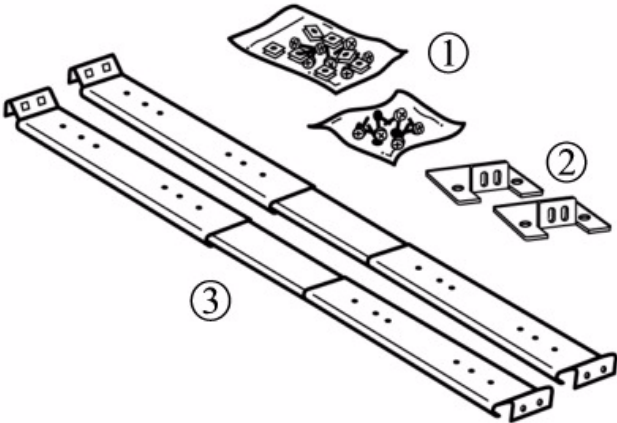
Number	Description
1	Screws and clip nuts
2	Mounting brackets
3	Mounting rails

Installing the autoloader into a rack (optional)

The autoloader fits all standard 19-inch racks, taking up 2U of space. To install the autoloader into a rack, install the mounting brackets on both sides of the autoloader and the rails in the selected rack location.

To install the autoloader:

1. Use a medium-sized Phillips screwdriver to remove the two screws near the front on each side of the autoloader cover (see Figure 5).
2. Using the screws you removed in step 1, secure one mounting bracket (from the rack mount kit) to each side of the autoloader as shown in Figure 5.

Figure 5 Installing mounting brackets (left side shown)
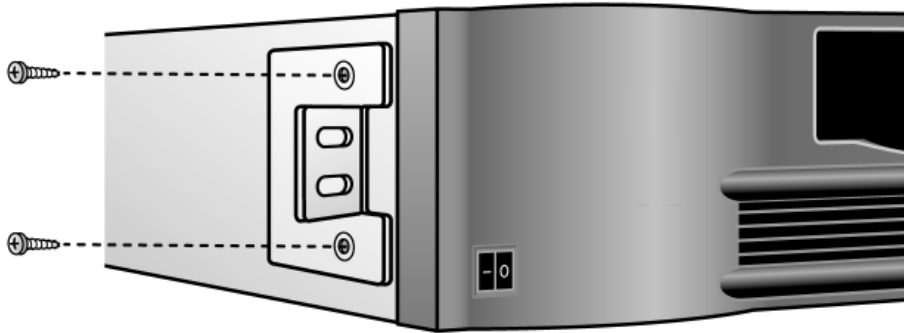
3. Using the screws and clip nuts from the rack mount kit, secure one rail to each side of the rack in the location in which you plan to install the autoloader.
   - Be sure to secure both the front and rear of each rail to the rack. The rails extend to fit a variety of rack depths.

- The correct orientation of the left rail is shown in Figure 6. Repeat this procedure for the right rail.

Figure 6 Installing rails in the rack (left side shown)
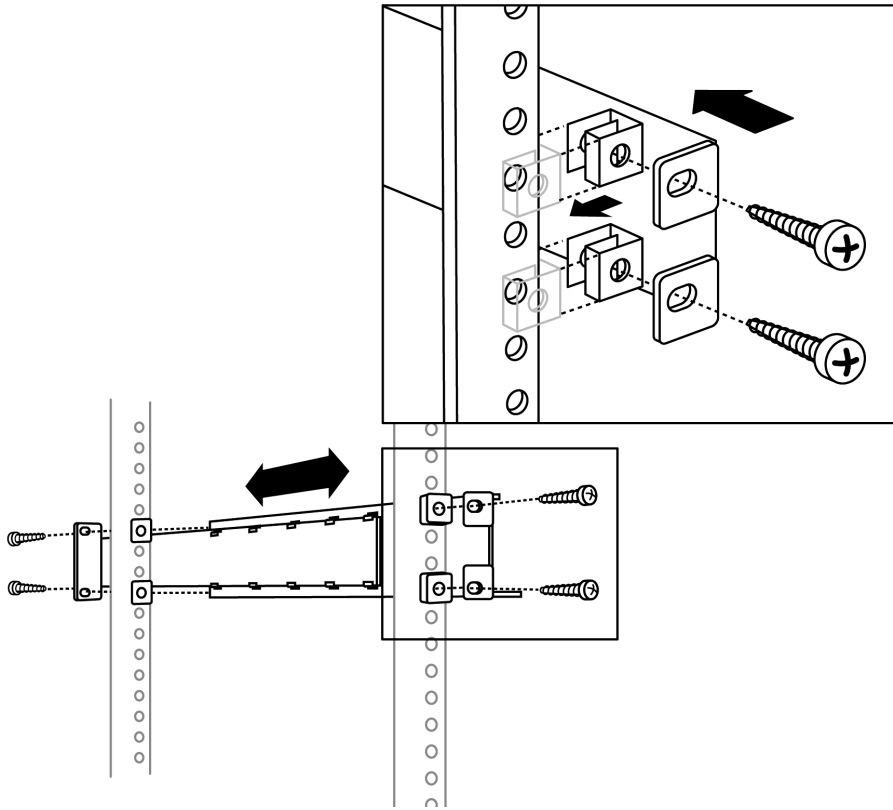
4. Slide the autoloader onto the rails and secure the mounting bracket to the rack using the screws and clip nuts from the rack mount kit (see Figure 7).

Figure 7 Sliding the autoloader into the rack slot and securing the mounting bracket
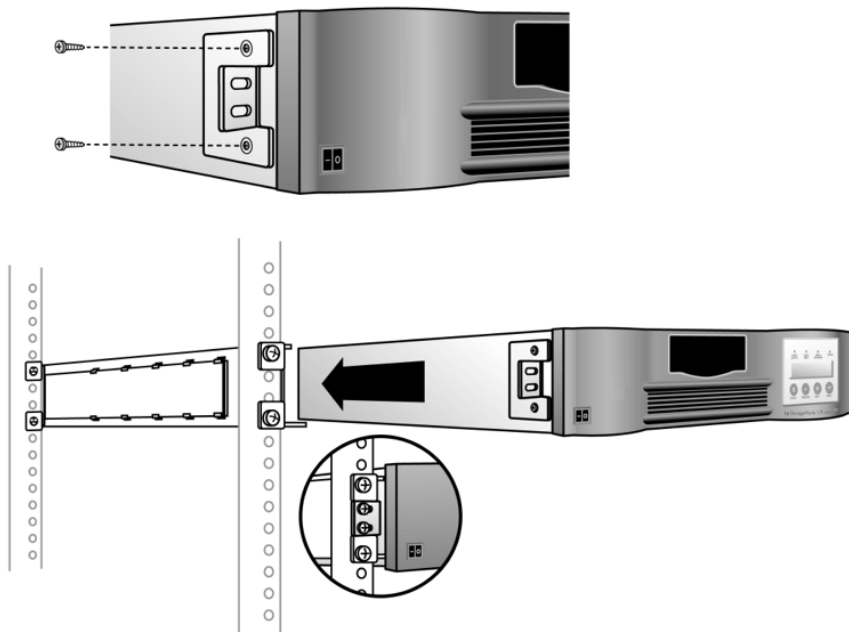
SCSI host bus adapters (HBAs)

To get optimum performance from your 1/8 Tape Autoloader you need a SCSI bus that can transfer data at a rate that supports the Tape Autoloader's maximum burst transfer speed, see "Maximum storage capacity and data transfer rate" on page 9.

If necessary, install a SCSI host adapter, software, and compatible driver(s). Refer to the manuals for the host computer and SCSI host adapter for detailed instructions.

📝 **NOTE:**   The host bus adapter used with the HP StorageWorks 1/8 Ultrium 460, Ultrium 960 and Ultrium 448 Tape Autoloaders should be SCSI-3 LVDS. To ensure optimum performance we recommend an Ultra320 HBA for the Ultrium 960 Tape Autoloader and an Ultra160 or higher HBA for the Ultrium 448 and 460 Tape Autoloaders.

A single-ended SCSI host bus adapter will severely degrade performance. Also, if there are any SE devices on the same SCSI bus, the entire SCSI bus will negotiate down to SE speed and severely degrade performance.

LUN scanning

The HP StorageWorks 1/8 Ultrium 960 and Ultrium 448 Tape Autoloaders and the DLT VS80 Tape Autoloader use a single SCSI ID and dual LUNs to control the tape drive (LUN 0) and autoloader robotic (LUN 1). These models require an HBA that supports LUN scanning. If it is not enabled, your host system will not scan beyond LUN 0 and will fail to discover the library. It will just see the tape drive.

Some HBAs, such as RAID controllers, do not support LUN scanning. Refer to the EBS matrix at http://www.hp.com/go/ebs for the most up-to-date SCSI HBA compatibility information.

Connecting the SCSI and power cables

> ✎ **NOTE:**   The HP StorageWorks 1/8 Ultrium 960 Tape Autoloader is an Ultra320 SCSI LVD device. Only cables and terminators specified for Ultra320 use or labeled as MultiMode should be used.

> ✎ **NOTE:**   The HP StorageWorks 1/8 Ultrium 448 and 460 Tape Autoloaders are Ultra160 SCSI LVD/SE devices. Only cables and terminators specified for Ultra160 use or labeled as MultiMode should be used.

> ⚠ **WARNING!**   This product can ONLY be used with an HP approved power cord for your specific geographic region. Use of a non-HP approved power cord may result in: 1) not meeting individual country specific safety requirements; 2) insufficient conductor ampacity that could result in overheating with potential personal injury and/or property damage; and
> 3) an unapproved power cord could fracture resulting in the internal contacts being exposed, which potentially could subject the user to a shock hazard. HP disclaims all liability in the event a non-HP approved power cord is used.

To connect the SCSI and power cables to the autoloader:

1. Shut down and turn off the selected server. Turn off all attached devices, such as printers and other SCSI devices. Remove the power cables from the server and all attached accessories.

> △ **CAUTION:**   Failure to remove the power cables from these devices could result in damage to the autoloader.

2. Attach one end of the SCSI cable (included in the accessory package) to one of the connectors on the rear panel of the autoloader (see Figure 8 on page 20).
3. Attach the other end of the SCSI cable to the connector on the SCSI host bus adapter or to the connector on the previous device on the SCSI bus.

NOTE: The host bus adapter should be LVDS. A SE SCSI host bus adapter will work, but will severely degrade performance. If there are any SE devices on the same SCSI bus, the entire SCSI bus will negotiate down to SE speed and severely degrade performance. Never attach the Ultrium 960 Tape Autoloader to a SE SCSI bus.

Figure 8 Attaching the SCSI and power cables
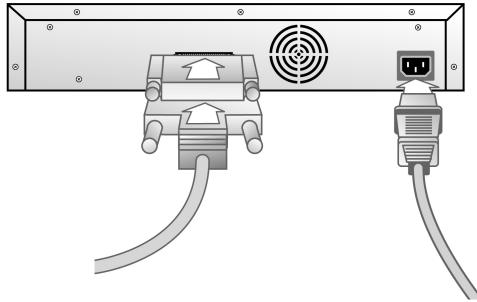
NOTE: If the supplied SCSI cable does not fit the connector on your SCSI host adapter, you either have an incompatible SCSI host adapter or you need to purchase a cable adapter or a different cable. Contact your service representative or your SCSI host adapter manufacturer for information.

4. Attach the terminator to the remaining SCSI connector on the rear panel of the autoloader (if the autoloader is the last or only device on the SCSI bus). Otherwise, attach the cable to the next device on the SCSI bus. Make sure that the last device on the SCSI bus is properly terminated.
5. Attach the power cable to the power connector on the rear panel of the autoloader.
6. Plug the power cable into the nearest properly grounded power outlet.

△ **CAUTION:** To disconnect all power from the autoloader, remove the power cord from the outlet. The power switch only puts the power on stand-by.

7. Plug in the host server or workstation and all attached devices.
8. Turn on the autoloader by setting the power switch on the front panel to the **ON** position. You will need to use the tip of a pen or similar item to move the switch to the desired position. Check the LCD display to make sure the autoloader is receiving power. If it is not, check the power connections and your power source.

   During the Power-On Self Test (POST), all four LEDs are illuminated briefly, followed by a flashing Ready/Activity LED. When the initialization sequence is complete, the LCD displays the Home screen.
9. Turn on any other devices you turned off earlier.
10. Turn on the server.

Preparing the host and verifying the connection

Follow these general guidelines:

- Connect to a suitably-rated HBA, see "SCSI host bus adapters (HBAs)" on page 18. Remember that if there are any SE devices on the same SCSI bus, the entire SCSI bus will negotiate down to SE speed and severely degrade performance.
- When the host server is powered on, install software and/or driver(s) that are compatible with the autoloader. Software compatibility information is available at www.hp.com/go/automated. Most backup software packages require an additional module to communicate with the autoloader robotics.
- If the host server is connected to a network, check with the system administrator before turning off power.
- Use proper procedures to prevent electrostatic discharge (ESD) (see "Electrostatic Discharge" on page 95). Use wrist-grounding straps and anti-static mats when handling internal components.
- Make sure that the host server has an open expansion slot.
- Make sure that your backup application supports the SCSI host adapter.
- For HP StorageWorks 1/8 DLT VS80, Ultrium 960 and Ultrium 448 Tape Autoloader models make sure that LUN scanning is enabled on the SCSI host adapter (see also "LUN scanning" on page 19).
- Depending on the server configuration, you may need to change the SCSI IDs of the autoloader (see "Changing the SCSI ID" on page 49).
- Ensure the autoloader is properly terminated. If the autoloader is the only SCSI device, other than the SCSI host adapter on the selected SCSI bus, it must be terminated. Likewise, if the autoloader is physically the last SCSI device on the SCSI bus, it must be terminated. Only the devices physically located at the beginning and end of the SCSI bus should be terminated.
- Verify the connection between the autoloader and host by:
  - Installing the HP Library & Tape Tools diagnostic/installation check utility available at www.hp.com/support/TapeTools. Install this utility onto the host server. This utility verifies that the autoloader is connected and communicating with the host server. It also verifies that the autoloader is functioning and provides diagnostic information.
  - Confirm the host server's operating system recognized the autoloader in Microsoft®
    In **Windows® Server 2003** or in **Windows 2000**® by going to:
    Settings > Control Panel > System > Hardware > Device Manager > Tape Drive and/or Media Changer.

For more information on verifying the connection of SCSI devices, consult the operating system documentation.

2 Operating the autoloader

Operator's panel overview

The operator's panel consists of four LEDs, four buttons, and a 2-line by 16-character LCD screen. The operator's panel provides everything you need to monitor autoloader status and control all of its functions.

The display defaults to the Home screen. The Home screen consists of the autoloader status on the top line and the current cartridge inventory on the second line. If the tape drive does not have a cartridge loaded, the top line display either the drive type, as shown in Figure 9 or `Drive empty`.

📝 **NOTE:** `SEQ` may appear next to the front panel inventory when the autoloader is in Sequential mode. Nothing will appear when the autoloader is in Random mode.

The cartridge inventory indicates all slots that contain a cartridge by displaying the slot number. Empty slots are indicated by a dash `(-)`.

Figure 9 Home screen, no cartridge loaded
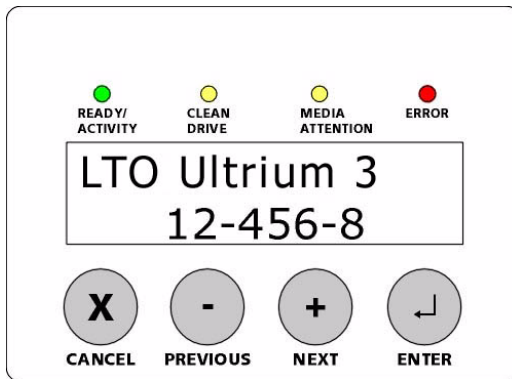
Ultrium 960
(Ultrium 448 displays LTO Ultrium 2)
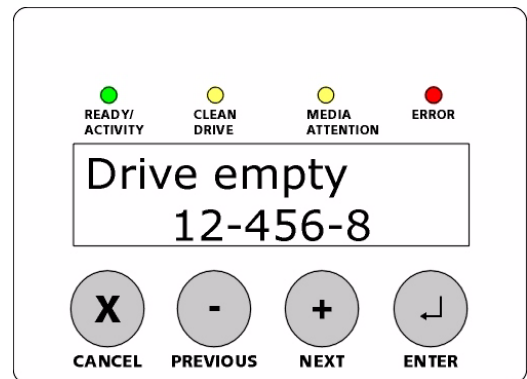
All other models

An exclamation point `(!)` displayed in the inventory indicates that the autoloader has identified a cartridge in the indicated slot that is either an invalid cartridge type or has had a media-related error. These can be caused by faulty media or dirty read/write heads in the tape drive. The Media Attention LED is also illuminated in this case. See "LED indicators" on page 24 for more information.

Exporting the indicated cartridge will clear the error condition. See "Exporting tape cartridges" on page 30. If these symptoms occur on multiple known-good cartridges, consider cleaning the tape drive. See "Cleaning the tape drive" on page 34. If a particular cartridge causes these symptoms repeatedly, that cartridge may be defective or invalid.

If the tape drive has a cartridge loaded, the top line displays: Drive ready or Drive loaded. The cartridge currently loaded in the drive is indicated by an alternating black block and the slot number. This display can also indicate that the specified cartridge is being loaded, unloaded, imported, or exported. The autoloader status line indicates the current operation. An example of this display is shown in Figure 10.

Figure 10 Home screen, cartridge loaded

Ultrium 960 and Ultrium 448   All other models
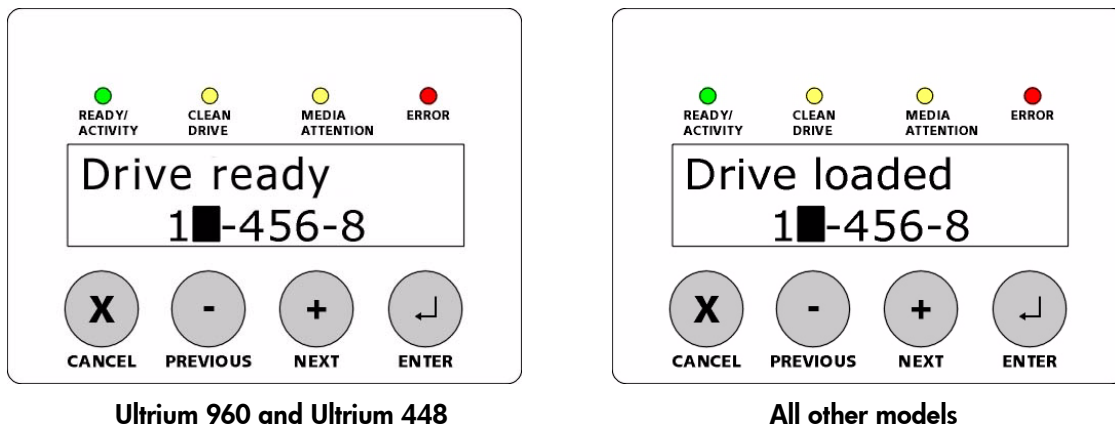
LED indicators

The operator's panel includes four LED indicators that provide a variety of information as detailed in the following table:

Table 9   LEDs

LED	Color	Description
Ready/Activity	Green	Illuminated when power is on. Blinking when there is tape drive or autoloader robotics activity.
Clean Drive	Amber	Illuminated when the tape drive has determined that a cleaning cartridge should be used. See "Cleaning the tape drive" on page 34. Cleaning is only necessary when the Tape Autoloader directs you to do so. Additional cleaning is not necessary.

Table 9 LEDs

LED	Color	Description
Media Attention	Amber	Illuminated if the tape drive has detected a cartridge or tape fault. Recommended action is to export the cartridge from the autoloader. Doing so turns off the LED. See "Exporting tape cartridges" on page 30. If a particular cartridge causes these symptoms repeatedly, that cartridge may be defective.
Error	Red	Illuminated if an unrecoverable tape drive or autoloader error occurs. A corresponding error message displays on the LCD screen (see "Autoloader Error Codes" on page 26 for more information).

Operator's panel control buttons

The Operator's Panel includes four buttons that provide access to all operations and information menus.

Table 10 Control buttons

Button	Description
Cancel	Cancels the current menu option and returns to the previous menu level or Home screen.
Previous	Selects the previous item or value in the currently displayed menu.
Next	Selects the next item or value in the currently displayed menu.
Enter	Executes the current menu or selects the current option displayed on the LCD panel.

Understanding the menu structure (Ultrium 960 and Ultrium 448)

The Ultrium 960 and Ultrium 448 Tape Autoloaders have an online and an offline mode. You need to be in Offline mode to access the full menu structure; in Online mode only the Information menu is available, as illustrated in Figure 11 on page 26. For all other Tape Autoloader models see "Understanding the menu structure (all other models)" on page 27.

To access Offline mode

1. From the Home screen, press **+** or **-** until `Go Offline` displays on the top line of the LCD screen.
2. Press **Enter** to select.

You can either use the menu to `Go Online` again or the autoloader will automatically revert to online mode, if it receives no further commands from the Operator's Control Panel for three minutes.

Figure 11 Operator's panel menu structure (Ultrium 960 and Ultrium 448)
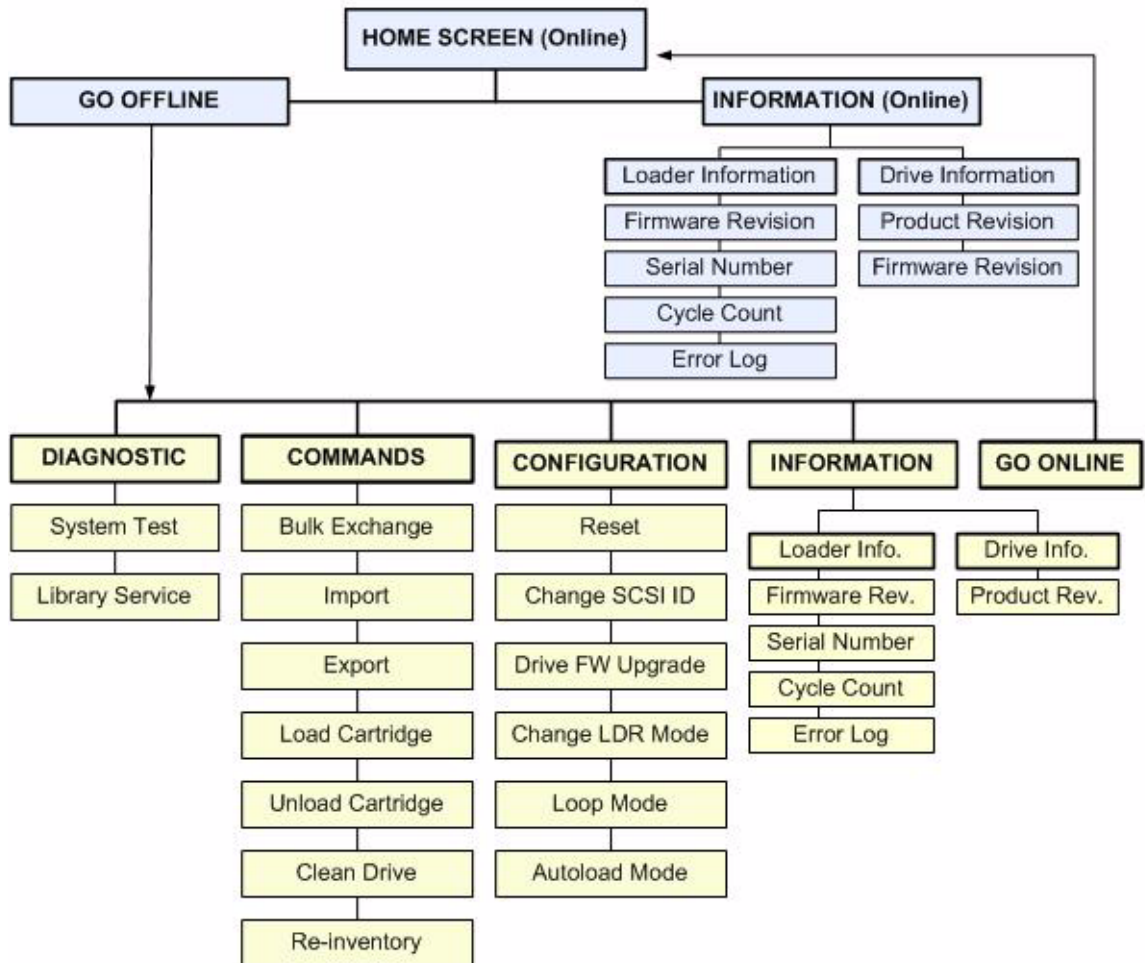
Understanding the menu structure (all other models)

This menu structure is available for all Tape Autoloader models except the Ultrium 960 and Ultrium 448 Tape Autoloaders, which are described on page 25.

Figure 12 Operator's panel menu structure (other models)
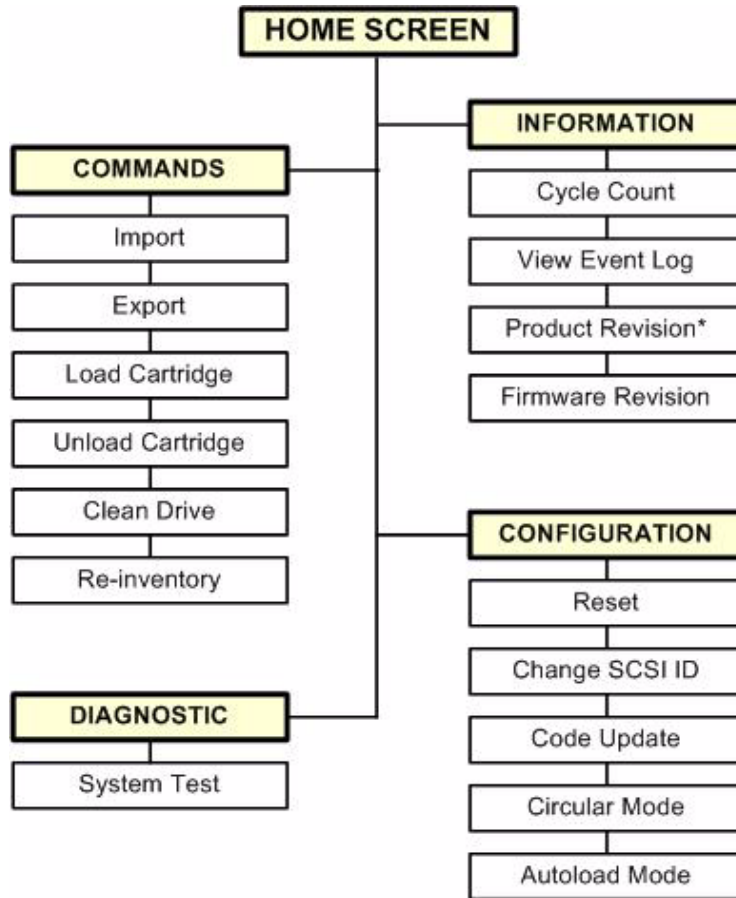
* These options are not available on the VS80 1/8 Tape Autoloader

Using tape cartridges

⚠ **CAUTION:** **Do not degauss HP Ultrium data cartridges!** Ultrium data cartridges are pre-recorded with a magnetic servo signal. This signal is required in order to use the cartridge with the Ultrium 460, Ultrium 960 and Ultrium 448 Tape Autoloader. Keep magnetically charged objects out of close range.

Before you use the autoloader, make sure you observe these general rules:

- Use only the data cartridges that are designated for your model of tape autoloader (see "Cartridge type" on page 28).
- You can order data cartridges at www.hp.com/go/storagemedia.
- Clean the tape drive when the Clean Drive LED is illuminated.
    - Be sure to use only Ultrium Universal cleaning cartridges in any of the 1/8 Ultrium Tape Autoloaders.
    - Be sure to use only the DLT VS cleaning cartridge for the 1/8 DLT VS80 Tape Autoloader.
    - Be sure to use only SDLT cleaning cartridges in the 1/8 SDLT 320 Tape Autoloader.
- You can order cleaning cartridges at www.hp.com/go/storagemedia.

📝 **NOTE:** If you are using the operator's panel to clean the drive, import the cleaning cartridge only when the operator's panel requests it. You may keep a cleaning cartridge in the autoloader if the backup software can manage the drive cleaning.

Cartridge type

Table 11 Ultrium 960 tape autoloader

Cartridge Type	Part Number
HP Ultrium 800 GB data cartridge Ultrium 3, yellow	C7973A
HP Ultrium 800 GB WORM data cartridge Ultrium 3, two-tone (yellow and white)	C7973W
HP Ultrium universal cleaning cartridge, (50 cleans), orange	C7978A

Table 12 Ultrium 448 tape autoloader

Cartridge Type	Part Number
HP Ultrium 400 GB data cartridge Ultrium 2, red	C7972A
HP Ultrium universal cleaning cartridge, (50 cleans), orange	C7978A

Table 13 Ultrium 460 tape autoloader

Cartridge Type	Part Number
HP Ultrium 400 GB data cartridge Ultrium 2, **red**	C7972A
HP Ultrium universal cleaning cartridge, (50 cleans), **orange**	C7978A

Table 14 Ultrium 230 tape autoloader

Cartridge Type	Part Number
HP Ultrium 200 GB data cartridge Ultrium 1, **blue**	C7971A
HP Ultrium universal cleaning cartridge, (15 cleans), **orange**	C7978A

📝 **NOTE:** The HP Ultrium StorageWorks 960 tape drive includes support for both rewriteable and WORM data cartridges. Write-Once, Read-Many (WORM) data cartridges provide an enhanced level of data security against accidental or malicious alteration of data on the tape cartridge. The WORM data cartridge can be appended to maximize the full capacity of the tape cartridge, but the user will be unable to erase or overwrite data on the cartridge. WORM data cartridges are clearly identified by their distinctive, two-tone cartridge color.

To check whether your backup or archive software application supports WORM cartridges, refer to the following web site: www.hp.com/go/connect.

Table 15 DLT VS80 tape autoloader

Cartridge Type	Part Number
HP DLTtape IV data cartridge, **brown**	C5141F
HP DLT VS cleaning cartridge (20 cleans)	C7998A

Table 16 SDLT 320 tape autoloader

Cartridge Type	Part Number
HP Super DLTtape 1 data cartridge 220/320GB, **green**	C7980A
HP SDLT cleaning cartridge (20 cleans)	C7982A

Importing tape cartridges

⚠ **CAUTION:** Importing or exporting media during a data backup may result in adverse results that could include backup failure or other errors.

This operation imports a cartridge into a specific empty slot on the carousel. To import tapes into the autoloader:

1. Make sure the write-protect switch is set as desired for each data cartridge (see "Write-protecting tape cartridges" on page 32).

2. **Ultrium 960 and Ultrium 448:** From the Home Screen, press **+** or **-** until `Go Offline` displays on the top line of the LCD screen. Press **Enter** to select. Press **+** or **-** until `Commands` displays on the top line of the LCD screen. Press **Enter** to select.
   All other models: From the Home Screen or Main menu, press **+** or **-** until `Commands` displays on the top line of the LCD screen. Press **Enter** to select.

3. Press **+** or **-** until `Import` displays on the LCD screen. Press **Enter** to select.

4. Press **+** or **-** until the desired slot number displays on the LCD screen and press **Enter**. You are not given the option to import a cartridge to an occupied slot.

5. When `Insert Cartridge Slot` displays on the LCD screen and the mail slot opens, insert the desired data cartridge into the mailslot so that the write-protect switch is facing out from the autoloader (see Figure 13).

6. Repeat steps 5 and 6 as needed for any additional cartridges.

7. Press **Cancel** when you have finished importing cartridges.

8. Verify that the LCD screen shows that the desired slots have cartridges installed.

Figure 13 Importing a cartridge
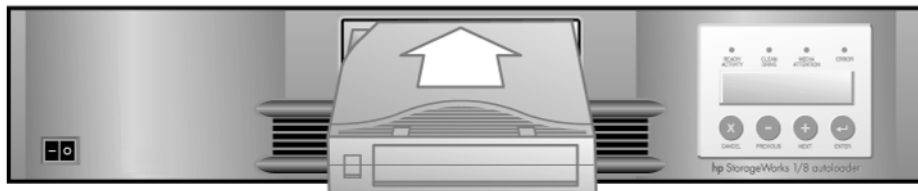
Exporting tape cartridges

△ **CAUTION:** Importing or exporting media during a data backup may result in adverse results that could include backup failure or other errors

This option moves a cartridge from a specific slot to the mailslot. It is accessed from the `Commands` menu. To export one or more cartridges from the autoloader:

1. **Ultrium 960 and Ultrium 448:** From the Home Screen, press **+** or **-** until `Go Offline` displays on the top line of the LCD screen. Press **Enter** to select. Press **+** or **-** until `Commands` displays on the top line of the LCD screen. Press **Enter** to select.
   All other models: From the Home Screen or Main menu, press **+** or **-** until `Commands` displays on the top line of the LCD screen. Press **Enter** to select.

2. Press **+** or **-** until `Export` displays on the LCD screen. Press **Enter** to select.

3. Press **+** or **-** until the desired slot number displays on the LCD screen and press **Enter**. You are not given the option to export from an empty slot, and you cannot export directly from the drive.

When `Remove Cartridge` displays on the LCD screen and the cartridge is ejected through the mailslot, remove the exported cartridge from the autoloader and press **Enter**. (See Figure 14.)

4. Repeat steps 3 and 4 as needed for any additional cartridges.
5. Press **Cancel** when you have finished exporting cartridges.
6. Check the LCD screen to verify that the desired slots no longer contain cartridges.

Figure 14 Exporting a cartridge
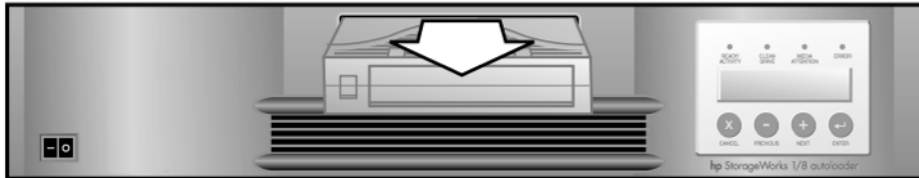
Bulk Exchange (Ultrium 960 and Ultrium 448 only)

This option allows you to import or export a specific number of cartridges and is useful if you want to exchange a complete set of cartridges. Bulk Exchange operation starts with slot #1. If a cartridge is available this cartridge will be exported. You must then import a new cartridge or move to the next slot #2. The procedure is repeated for slot #2 to slot #8.

NOTE: You must go offline to run Bulk Exchange and Import from the Commands menu. See "To access Offline mode" on page 26.

Loading tape cartridges

This option loads a cartridge from the autoloader slots into the tape drive. To use this option:

1. **Ultrium 960 and Ultrium 448:** From the Home Screen, press **+** or **-** until `Go Offline` displays on the top line of the LCD screen. Press **Enter** to select. Press **+** or **-** until `Commands` displays on the top line of the LCD screen. Press **Enter** to select.
   All other models: From the Home Screen or Main menu, press **+** or **-** until `Commands` displays on the top line of the LCD screen. Press **Enter** to select.
2. Press **+** or **-** until `Load Cartridge` displays on the LCD screen. Press **Enter** to select.
3. Press **+** or **-** until the desired slot number displays on the LCD screen and press **Enter**. The slot number you select indicates the cartridge to be loaded into the tape drive.

NOTE: Only slot numbers containing cartridges are displayed.

4. Status messages will be displayed while the cartridge is loading.
   Ultrium 960 and Ultrium 448: `Drive Ready` will be displayed when the operation is complete.
   All other models: `Drive Stopped` will be displayed when the operation is complete.

Unloading tape cartridges

This option unloads the cartridge from the tape drive into its original slot. To use this option:

1. **Ultrium 960 and Ultrium 448:** From the Home Screen, press **+** or **-** until `Go Offline` displays on the top line of the LCD screen. Press **Enter** to select. Press **+** or **-** until `Commands` displays on the top line of the LCD screen. Press **Enter** to select.
   All other models: From the Home Screen or Main menu, press **+** or **-** until `Commands` displays on the top line of the LCD screen. Press **Enter** to select.

2. Press **+** or **-** until `Unload Cartridge` displays on the LCD screen. Press **Enter** to unload the cartridge from the tape drive.

3. Status messages will be displayed while the cartridge is unloading.
   Ultrium 960 and Ultrium 448: `<Drive Type>` will be displayed when the operation is complete.
   All other models: `Drive Empty` will be displayed when the operation is complete.

Write-protecting tape cartridges

All cartridges have a write-protect switch to prevent accidental erasure or overwriting of data. Before loading a cartridge into the autoloader, make sure the write-protect switch on the front of the cartridge is positioned as desired:

Ultrium 800 GB, 400 GB and 200 GB cartridges

- Slide the switch to the **right** to write-protect the cartridge. A small pad-lock is visible indicating that the cartridge is write-protected (see Figure 15).
- Slide the switch to the **left** to allow the autoloader to write data to the cartridge (see Figure 15). You cannot write-enable Ultrium 800 GB WORM cartridges because you cannot erase or overwrite data on WORM data cartridges; you can only append data up to the maximum, full capacity of the tape cartridge.

NOTE: When a write-protected cartridge is loaded into the drive, a `WP` will be displayed on the bottom line of the LCD screen next to the inventory information. This message will be displayed until the cartridge is unloaded from the drive.

Figure 15 Write-protecting a 200 GB, 400 GB or 800 GB Ultrium data cartridge
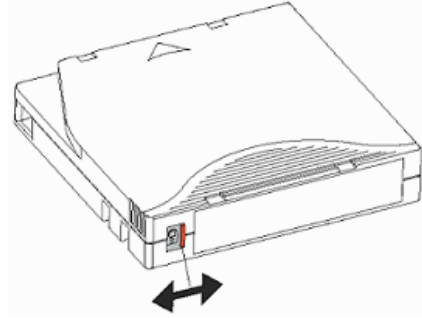
DLTtape IV and Super DLTtape 1 cartridges

- Slide the switch to the **left** to write-protect the cartridge. A small orange rectangle is visible indicating that the cartridge is write-protected (see Figure 16).
- Slide the switch to the **right** to allow the autoloader to write data to the cartridge (see Figure 16).

Figure 16 Write-protecting a DLTtape IV or Super DLTtape 1 cartridge
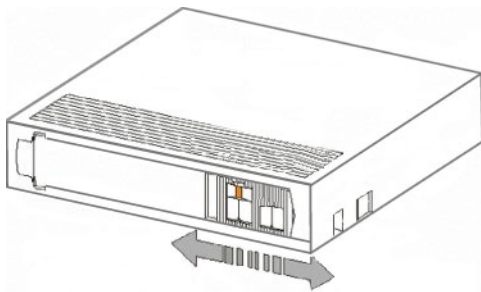
Maintaining cartridges

△ CAUTION: **Do not degauss HP Ultrium data cartridges!** These data cartridges are pre-recorded with a magnetic servo signal. This signal is required in order to use the cartridge with the Ultrium 960, 448 or 460 tape drive. Keep magnetically charged objects out of close range.

To ensure the longest possible life for all of your data cartridges, follow these guidelines:

- Do not drop a cartridge. Excessive shock can damage the internal contents of the cartridge, or the cartridge case itself, making that cartridge unusable.

- Do not expose your data cartridges to direct sunlight or sources of heat, including portable heaters and heating ducts.
- The operating temperature range for your data cartridges is 10 to 35 degrees C. The storage temperature range is -40 to +60 degrees C in a dust-free environment in which relative humidity is always between 20% and 80% (non-condensing).
- If an data cartridge has been exposed to temperatures outside the ranges specified above, stabilize the cartridge at room temperature for the same amount of time it was exposed to extreme temperatures or 24 hours, whichever is less.
- Do not place data cartridges near sources of electromagnetic energy or strong magnetic fields such as computer monitors, electric motors, speakers, or X-ray equipment. Exposure to electromagnetic energy or magnetic fields can destroy data and the embedded servo code, written on the media by the cartridge manufacturer, which can render the cartridge unusable.
- Place identification labels only in the designated area on the cartridge.

Cleaning the tape drive

When the Clean Drive LED is on, the autoloader's tape drive needs to be cleaned. Cleaning times can range from a few seconds to a few minutes during which time the Ready LED blinks.

△ **CAUTION:** Use the correct cleaning cartridge for your Tape Autoloader model. All cartridges are available at www.hp.com/go/storagemedia.
- Use only Ultrium Universal cleaning cartridges in any 1/8 Ultrium Tape Autoloader
- Use only DLT VS cleaning cartridges in the 1/8 DLT VS80 Tape Autoloader
- Use only SDLT cleaning cartridges in the 1/8 SDLT 320 Tape Autoloader

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📝 **NOTE:** If you are using the operator's panel to clean the drive, import the cleaning cartridge only after you have selected the Clean Drive command. If you would like to keep a cleaning cartridge in the autoloader, the backup software must manage drive cleaning.

To clean the tape drive:

1. **Ultrium 960 and Ultrium 448:** From the Home Screen, press **+** or **-** until Go Offline displays on the top line of the LCD screen. Press **Enter** to select. Press **+** or **-** until Commands displays on the top line of the LCD screen. Press **Enter** to select.
   All other models: From the Home Screen or Main menu, press **+** or **-** until Commands displays on the top line of the LCD screen. Press **Enter** to select.
2. Press **+** or **-** until Clean Drive displays on the LCD screen. Press **Enter** to select.
3. If the carousel is full, the LCD screen displays No slot free for transfer. Press **Cancel** repeatedly until the Main menu is displayed. Export a cartridge to make room for the cleaning cartridge. See "Exporting tape cartridges" on page 30 for instructions, then return to step 1 to clean the tape drive.

4. If the carousel is not full, the autoloader will select the first available slot and prompt you to insert a cleaning cartridge. Insert the cleaning cartridge into the autoloader mailslot. During the cleaning process, which can take several minutes, the LCD screen displays `Drive Cleaning`.

△ **CAUTION:** If the cartridge is not a valid cleaning cartridge, the LCD screen will display `Invalid Tape` and the cartridge will be exported.

5. When tape drive cleaning is complete, the Clean Drive LED turns off (if previously on) and the autoloader unloads and exports the cleaning cartridge. Remove the cleaning cartridge and press **Enter** when the LCD screen prompts you to do so.

📝 **NOTE:** If the Clean Drive LED, or the Media Attention LED (on export or import) occurs when inserting the same cartridge after you have cleaned the drive, there may be a problem with that cartridge (see "Troubleshooting" on page 16).

6. If you had to remove a data cartridge to import the cleaning cartridge, import the tape to its original slot. See "Importing tape cartridges" on page 29 for more information.

Updating cartridge inventory

This option will analyze the slots and drives in the autoloader. To update the inventory information:

1. **Ultrium 960 and Ultrium 448:** From the Home Screen, press **+** or **-** until `Go Offline` displays on the top line of the LCD screen. Press **Enter** to select. Press **+** or **-** until `Commands` displays on the top line of the LCD screen. Press **Enter** to select.
   All other models: From the Home Screen or Main menu, press **+** or **-** until `Commands` displays on the top line of the LCD screen. Press **Enter** to select.
2. Press **+** or **-** until `Re-inventory` displays on the LCD screen. Press **Enter** to select.

The autoloader will now check the drive and each slot for the presence of a tape in order to update the inventory information.

📝 **NOTE:** This command is only needed if the inventory in the autoloader is different than the inventory displayed on the front panel, which would not happen under normal conditions.

3 Autoloader administration

Configuring the autoloader

The Configuration menu provides access to the following autoloader configuration options:

- Resetting the autoloader
- Changing SCSI IDs
- Setting autoloader mode
- Updating firmware from tape

To access the Configuration menu:

1. **Ultrium 960 and Ultrium 448:** From the Home Screen press **+** or **-** until `Go Offline` displays on the top line of the LCD screen. Press **Enter** to select. Press **+** or **-** until `Configuration` displays on the top line of the LCD screen. Press **Enter** to select.
   All other models: From the Home Screen or Main menu, press **+** or **-** until `Configuration` displays on the top line of the LCD screen. Press **Enter** to select.
2. Press **Enter** and then **+** or **-** to access the available options.
3. Press **Enter** to execute the displayed menu option.

Resetting the autoloader

This option resets the autoloader robotics and the tape drive within the autoloader, forces a new cartridge inventory, and clears any current error condition.

📝 **NOTE:** This option interrupts any current backup or restore operation and may cause the operation to fail. It is primarily used if the autoloader is in an error state.

To access this option:

1. **Ultrium 960 and Ultrium 448:** From the Home Screen press **+** or **-** until `Go Offline` displays on the top line of the LCD screen. Press **Enter** to select. Press **+** or **-** until `Configuration` displays on the top line of the LCD screen. Press **Enter** to select.
   All other models: From the Home Screen or Main menu, press **+** or **-** until `Configuration` displays on the top line of the LCD screen. Press **Enter** to select.
2. Press **+** or **-** until `Reset` displays on the LCD screen. Press **Enter** to reset the autoloader.

After initialization, the autoloader returns to normal operation and displays the Home screen.

Changing the SCSI ID

This option changes the SCSI IDs that the autoloader uses.

- The HP StorageWorks 1/8 Ultrium 960 and Ultrium 448 Tape Autoloader models and the DLT VS80 Tape Autoloader models occupy one SCSI ID. The default SCSI ID is 5. Change a SCSI ID only if there is another device already assigned to this ID,
- All other Tape Autoloader models occupy two SCSI IDs, one ID is assigned to the autoloader's SCSI controller and the second ID is assigned to the tape drive. The default SCSI ID for the autoloader's SCSI controller is 0. The default SCSI ID for the tape drive is 5. Change a SCSI ID only if there is another device, or devices, already assigned to one of these IDs.

Changing the SCSI ID of the tape drive: all models

To change the SCSI ID of the tape drive:

1. **Ultrium 960 and Ultrium 448:** From the Home Screen press **+** or **-** until `Go Offline` displays on the top line of the LCD screen. Press **Enter** to select. Press **+** or **-** until `Configuration` displays on the top line of the LCD screen. Press **Enter** to select.
   All other models: From the Home Screen or Main menu, press **+** or **-** until `Configuration` displays on the top line of the LCD screen. Press **Enter** to select.
2. Press **+** or **-** until `Change SCSI ID` displays on the top line of the LCD screen. Press **Enter** to select.
3. Press **+** or **-** until `Drive` displays on the bottom line of the LCD screen. Press **Enter** to select.
4. Press **+** or **-** until the desired SCSI ID is displayed. Press **Enter**. The LCD screen displays `Cycle Power for New SCSI ID`.
5. Turn off the autoloader, then turn it back on again. The selected SCSI ID is now in effect.

📝 **NOTE:** If you changed the SCSI ID, you must also cycle power on the host server and reconfigure your backup software before you can use the autoloader. Consult your hardware and software manuals for more information.

Changing the SCSI ID of the tape autoloader: Ultrium 230, Ultrium 460 and SDLT 320 models only

To change the SCSI ID of the autoloader controller:

1. From the Home screen or Main menu, press **+** or **-** until `Configuration` displays on the top line of the LCD screen. Press **Enter** to select.
2. Press **+** or **-** until `Change SCSI ID` displays on the top line of the LCD screen. Press **Enter** to select.
3. Press **+** or **-** until `Loader` displays on the bottom line of the LCD screen. Press **Enter** to select.
4. Press **+** or **-** until the desired SCSI ID is displayed. Press **Enter**. The LCD screen displays `Cycle Power for New SCSI ID`.
5. Turn off the autoloader, then turn it back on again. The selected SCSI ID is now in effect.

📝 **NOTE:** If you changed the SCSI ID, you **must** also cycle power on the host server and reconfigure your backup software before you can use the autoloader. Consult your hardware and software manuals for more information.

Autoloader operating modes

Overview

The operating mode is set based on whether you have automation software controlling cartridges in the autoloader, when it is in Random mode, or if you are manually loading and unloading cartridges using the autoloader Operator's Panel controls, when it is in Stacker or Sequential mode. The autoloader normally automatically detects the required mode; however, you can also change the modes from the Configuration menu.

NOTE: With 1/8 Ultrium 960 and Ultrium 448 Tape Autoloader models you must go offline to run commands from the Operator's Panel, change configurations, and run diagnostics.

- **Automatic mode (Ultrium 960 and Ultrium 448):** The default setting is Automatic mode, which allows the autoloader to switch between Random and Sequential mode depending on the SCSI command received. This means it is in Sequential mode until it detects certain SCSI commands which put it in to Random mode. You can also configure the autoloader for Sequential or Random mode. If you do this, it will remain in Sequential or Random mode until you revert to Automatic mode on the Configuration menu, see page 40.
- **All other models:** The autoloader does not have a separate Automatic mode; it always operates in Autodetect mode. In Autodetect, the autoloader automatically assumes you are not using automation software to control cartridge or drive activity. This is Sequential mode. If the autoloader detects that the automation software is controlling tape drive activity, it will automatically switch to Random mode.

Random mode (all models)

Random mode is used when there is a full-featured or a robotics-aware backup application in use. This is the most common mode of operation. In Random mode, the autoloader will not automatically load tapes into the drive; it waits for commands from the software. Your backup software must support autoloaders, which may require the additional installation of an autoloader/library software module.

Sequential mode (all models)

Sequential mode is used when the backup software is NOT robotics-aware or was designed for standalone drives only. Sequential mode is useful when a software application is not available. In Sequential mode, the autoloader automatically loads and unloads tapes from the drive. The operator determines a tape to load by loading the desired tape into the tape drive using the autoloader front panel (see "Importing Tape Cartridges" on page 37 for instructions).

When the first tape is full or unloaded for any reason, the autoloader automatically removes the tape from the drive, puts it in its original slot, then loads the next available higher numbered slot.

To further determine how you want tapes loaded into the autoloader's tape drive while in Sequential mode, you can set Loop (1/8 Ultrium 960 and Ultrium 448) or Circular (all other models) and Autoload options from the autoloader front panel.

NOTE: SEQ may appear next to the front panel inventory when the autoloader is in Sequential mode. Nothing will appear when the autoloader is in Random mode.

Selecting automatic, random or sequential mode (Ultrium 960 and Ultrium 448 only)

To access this option:

1. From the Home Screen, press **+** or **-** until Go Offline displays on the top line of the LCD screen. Press **Enter** to select. Press **+** or **-** until Configuration displays on the top line of the LCD screen. Press **Enter** to select.
2. Press **+** or **-** until Change LDR Mode displays on the LCD screen. The second line on the LCD screen indicates the current status. Press **Enter**.
3. Press **+** or **-** until the required status displays on the LCD screen; Automatic, Random or Sequential. Press **Enter**.
4. The LCD screen indicates whether you are about to turn the displayed mode on or off.
5. Press **Enter** to accept the change to mode or **Cancel** to exit and not save the changes.

Loop/Circular mode on/off

This option turns Loop (Ultrium 960 and Ultrium 448) or Circular (all other models) mode on or off and is only used when in Sequential mode. When Loop or Circular mode is on, the original first cartridge in the sequence is reloaded after the autoloader has cycled through all available cartridges. If Loop or Circular mode is off and the last cartridge has been unloaded, the autoloader stops loading cartridges until you manually load another.

△ **CAUTION:** Use caution when choosing Loop or Circular mode as it makes it possible to overwrite data on previously written cartridges.

To access this option:

1. **Ultrium 960 and Ultrium 448:** From the Home Screen, press **+** or **-** until Go Offline displays on the top line of the LCD screen. Press **Enter** to select. Press **+** or **-** until Configuration displays on the top line of the LCD screen. Press **Enter** to select.
   All other models: From the Home Screen or Main menu, press **+** or **-** until Configuration displays on the top line of the LCD screen. Press **Enter** to select.
2. Press **+** or **-** until Loop Mode or Circular Mode displays on the LCD screen. The second line on the LCD screen indicates the current status, either On or Off. Press **Enter**. The LCD screen indicates whether you are about to turn Loop or Circular mode on or off.

3. Press **Enter** to accept the change to Loop or Circular mode or **Cancel** to exit and not save the changes.

Autoload mode on/off

This option turns Autoload mode on or off and is only used when in Sequential mode. When Autoload mode is on, the autoloader automatically loads the cartridge from the lowest numbered full slot into the tape drive. It then follows standard sequential operation.

To access this option:

1. **Ultrium 960 and Ultrium 448:** From the Home Screen, press **+** or **-** until `Go Offline` displays on the top line of the LCD screen. Press **Enter** to select. Press **+** or **-** until `Configuration` displays on the top line of the LCD screen. Press **Enter** to select:
   All other models: From the Home Screen or Main menu, press **+** or **-** until `Configuration` displays on the top line of the LCD screen. Press **Enter** to select.
2. Press **+** or **-** until `Autoload Mode` displays on the LCD screen. The second line on the LCD screen indicates the current status, `On` or `Off`. Press **Enter**. The LCD screen indicates whether you are about to turn Autoload mode on or off.
3. Press **Enter** to accept the change to Autoload mode or **Cancel** to exit and not save the changes.

Updating firmware

△ **CAUTION:**   Do not power cycle or reset the autoloader during the upgrade process. Doing so could cause the autoloader to become inoperable.

Using HP Library & Tape Tools

You can download autoloader and drive firmware using the HP Library & Tape Tools diagnostic utility. This utility may already be installed on your server. If not, download it from www.hp.com/support/TapeTools. Online help and instructions are included with HP Library & Tape Tools. The firmware download procedure involves these simple steps:

1. After downloading and installing Tape Tools, run the HP Library & Tape Tools utility.
2. If prompted to download new firmware from the website, select **Yes**, otherwise, select **Get Firmware from Web** under the **File** menu.
3. Click the desired firmware revisions for the autoloader that you would like to download firmware to, and then click **Download**. The firmware file is copied into the HP Library & Tape Tools firmware folder.
4. Close the firmware window.
5. Select the autoloader in the **By Product** device list tab, and then select **Firmware**. The latest revision available for the autoloader is automatically selected.
6. Select **Start Update** to update the firmware for the autoloader.

Using a firmware upgrade tape

This option performs a firmware code update to the drive only using a firmware upgrade cartridge.

📝 **NOTE:** The code update operation assumes the upgrade tape is imported as part of the procedure. Do not import the firmware update cartridge before starting this procedure.

📝 **NOTE:** To update the firmware for the autoloader robotics, a SCSI diagnostic utility is needed, such as HP Library & Tape Tools.

To use this option:

1. **Ultrium 960 and Ultrium 448:** From the Home Screen, press **+** or **-** until `Go Offline` displays on the top line of the LCD screen. Press **Enter** to select. Press **+** or **-** until `Configuration` displays on the top line of the LCD screen. Press **Enter** to select:
    All other models: From the Home Screen or Main menu, press **+** or **-** until `Configuration` displays on the top line of the LCD screen. Press **Enter** to select.
2. **Ultrium 960 and Ultrium 448:** Press **+** or **-** until `Drive FW Upgrade` displays on the LCD screen. Press **Enter**.
    All other models: Press **+** or **-** until `Code Update` displays on the LCD screen. Press **Enter**.
3. If the carousel is full, the LCD screen displays `No slot free for transfer`. Press **Cancel** repeatedly until the Main menu is displayed. Press **+** or **-** until `Commands` displays on the LCD screen. Press **Enter**. Export a cartridge to make room for the firmware update cartridge (see "Exporting Tape Cartridges" on page 38). Return to Step 1 to update the firmware.
4. If the carousel is not full, the autoloader will select the first available slot and prompt you to insert the code update cartridge. Select **Firmware**.
5. Insert the code update cartridge into the mailslot.
6. During the firmware update, which can take several minutes, the LCD screen displays `CODE UPDATE IN PROGRESS`. When complete, the autoloader resets, then unloads and exports the code update cartridge. Remove the code update cartridge and press **Enter** when the LCD screen prompts you to do so.
7. If you exported a data cartridge to make room for the code update cartridge, be sure to import the cartridge to its original slot. See "Importing Tape Cartridges" on page 37 for instructions.

📝 **NOTE:** After a firmware update, the firmware revision displayed on the LCD may not be updated until the autoloader is power cycled.

Running the autoloader system test

The System Test option cycles the autoloader through the process of loading, calibrating, and unloading all cartridges in the carousel. Running a System Test verifies the basic operational soundness of the autoloader and tape drive. In the DLT VS80 Tape Autoloader, the System Test continues indefinitely until you press **Cancel**. With all Ultrium Tape Autoloaders and the SDLT 320 Tape Autoloaders you have the option to Select Cycles: 270, 540, 1080 or endless.

All regular backup or restore operations are suspended while a System Test is in progress.

To run a System Test:

1. **Ultrium 960 and Ultrium 448:** From the Home Screen, press **+** or **-** until Go Offline displays on the top line of the LCD screen. Press **Enter** to select. Press **+** or **-** until Diagnostic displays on the top line of the LCD screen. Press **Enter** to select. System Test will now be displayed. **All other models:** From the Home Screen or Main menu, press **+** or **-** until Diagnostic displays on the top line of the LCD screen. Press **Enter** to select. System Test will now be displayed.
2. For the **DLT VS80 Tape Autoloader**, Press **Enter** to begin the test.
3. For the **Ultrium and SDLT Tape Autoloaders,** select the number of cycles by choosing: **Select Cycles: 270, 540, 1080** or **endless**.
4. The Test Cycles displays the number of load-calibrate-unload cycles that have been completed during the test.
5. Press **Cancel** to end the test.

NOTE: The Library Service menu option is for the use of service personnel only.

Retrieving information about the autoloader

The Information menu provides access to information about the autoloader, including the cycle count, event log, and firmware revision.

Cycle count

This option displays the total system cycle count, incrementing each time a tape is loaded into the drive or exported from the autoloader.

To use this option:

1. From the Home screen or Main menu, press **+** or **-** until Information displays on the top line of the LCD screen. Press **Enter** to access the available options.
2. Press **+** or **-** until Cycle Count displays on the LCD screen. The LCD screen displays the total cycle count.
3. Press **Cancel**.

View error log or event log

This option provides access to the most recent autoloader errors and events (see Table 15 on page 26 for a description of error codes). This information is stored in the error log (Ultrium 960 and Ultrium 448 models) or event log (all other models).

To use this option:

1. From the Home screen or Main menu, press **+** or **-** until `Information displays` on the top line of the LCD screen. Press **Enter** to access the available options.
2. Press **+** or **-** until `Error Log` (Ultrium 960 and Ultrium 448) or `View Event Log` (all other models) displays on the LCD screen. The LCD screen also displays the errors and events currently stored in the log. Press **Enter** to access the most recently logged event.

> **NOTE:** The event log with the Ultrium 960 and Ultrium 448 Tape Autoloaders also includes a datestamp for each event.

3. Press **+** or **-** to display each event in the log.
4. Press **Cancel**.

> **NOTE:** The most recent entry is number 0, older entries are negative numbers.

Product Revision

> **NOTE:** This option is not applicable to the DLT VS80 Tape Autoloader.

For all Ultrium Tape Autoloaders and SDLT 320 Tape Autoloader, the `Product Revision` option displays the drive and robotics firmware versions in decimal and hexadecimal format.

To use this option:

1. From the Home screen or Main menu, press **+** or **-** until `Information` displays on the top line of the LCD screen. Press **Enter** to access the available options.
2. Press **+** or **-** until `Product Rev` displays on the LCD screen. The LCD screen displays the version of the drive and robotics firmware currently installed in the autoloader.
3. Press **Cancel**.

Firmware revision

This option displays the version of the firmware currently installed in the autoloader.

There are three firmware images in the autoloader. The revision information for these images is displayed on the bottom line of the LCD display in this order: Ultrium Tape Drive Controller, Autoloader SCSI Controller, and Autoloader Robotics Controller.

To use this option:

1. From the Home screen or Main menu, press **+** or **-** until `Information` displays on the top line of the LCD screen. Press **Enter** to access the available options.
   Ultrium 960 and Ultrium 448 only: Press **+** or **-** until `Loader Info` displays on the top line of the LCD screen. Press **Enter** to select.
2. Press **+** or **-** until `Firmware Rev` displays on the LCD screen. The LCD screen displays the version of the firmware currently installed in the autoloader.
3. Press **Cancel**.

NOTE: The firmware revision displayed on the LCD may not be updated until the autoloader is power cycled.

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4 Diagnostics and troubleshooting

Using HP Library & Tape Tools to diagnose problems

With HP Library & Tape Tools installed on the host server

- Identify all SCSI devices connected to your system
- View detailed configuration, identification, inventory, and drive information for the autoloader
- Easily update autoloader and drive firmware
- Run advanced diagnostic tests, including connectivity, read/write, media validation, and testing the functionality of the autoloader
- View autoloader and drive error logs
- Generate a detailed support file that can be e-mailed or faxed to your support representative for analysis

The HP Library & Tape Tools diagnostic provides an intuitive graphical user interface with integrated context-sensitive help. It can be downloaded free of charge from www.hp.com/support/TapeTools.

Figure 17 HP Library & Tape Tool interface
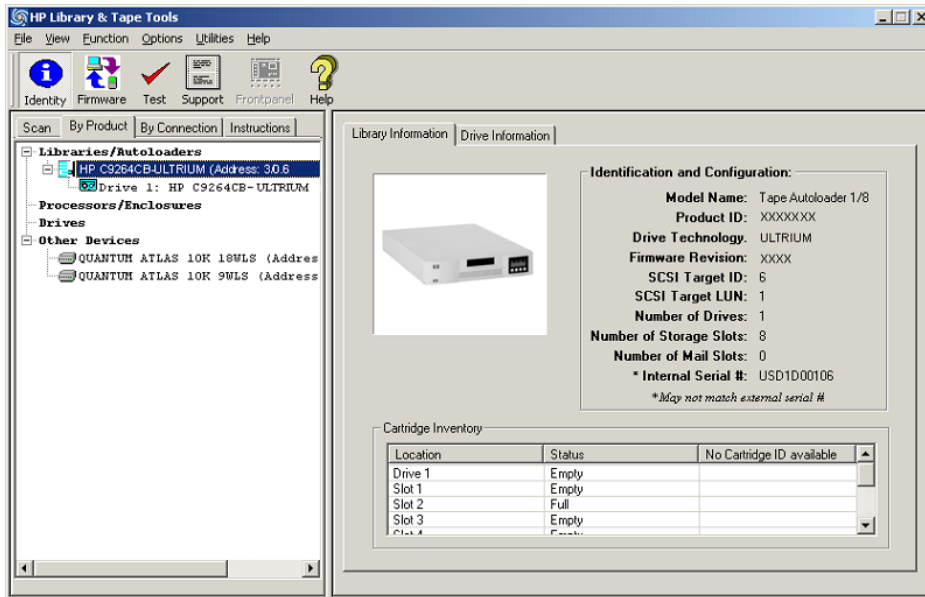
Troubleshooting

Installation problems

Problems encountered during the installation of the autoloader are usually caused by improper SCSI bus configuration, application software configuration errors, or an incorrectly configured operating system. If the application software that you are using is not communicating with the autoloader after installation, check the following:

- **SCSI ID:**
  Ultrium 230, Ultrium 460 and SDLT 320 models: The autoloader uses one SCSI ID for the tape drive and another SCSI ID for the autoloader robotics.
  DLT VS80, Ultrium 960 and Ultrium 448 models: The autoloader uses a single SCSI ID.
  Depending on other devices attached to the same SCSI bus and their SCSI IDs, you may need to change the SCSI ID of the autoloader or tape drive before you can use the autoloader. Review the manuals for the other devices on the SCSI bus or your operating system to determine which SCSI IDs are currently in use. See "Changing the SCSI ID" on page 49 for instructions.

- **LUN Scanning:** DLT VS80, Ultrium 960 and Ultrium 448 models use dual LUNs to control the tape drive (LUN 0) and autoloader robotic (LUN 1). These models require an HBA that supports LUN scanning and LUN scanning must be enabled, see also "LUN scanning" on page 19.

- **SCSI Cabling:** Verify that all SCSI cables are securely connected at both ends. Check the length and integrity of your SCSI cabling. Check the SCSI connector for bent pins. The length of the internal SCSI cabling inside the autoloader is 2 feet (60 cm). This length must be included in any calculations of cable length.

  - For LVD SCSI the maximum length for a single device is 82 feet (25 meters). For multiple devices, the maximum combined internal/external length is 40 feet (12 meters).

  - If you have a combination of LVD and SE devices on the bus, the maximum cable length reverts to the SE specification, which for Ultra devices is 10 feet (3 meters) for four or fewer devices, and 5 feet (1.5 meters) for more than four devices.

- **Termination:** If the autoloader is the only SCSI device — other than the SCSI host adapter — on the selected SCSI bus, it must be terminated. Likewise, if the autoloader is physically the last SCSI device on the SCSI bus, it must be terminated. Only the devices physically located at the beginning and end of the SCSI bus should be terminated. Refer to the manuals supplied with other devices on the SCSI bus for information on enabling or disabling termination on those devices.

  - To terminate the autoloader, locate the terminator in the accessories package and press it firmly into either of the two SCSI connectors on the rear panel of the autoloader. Secure the terminator by tightening the finger-screws until snug. The supplied terminator is "dual mode" and will work on both Low-Voltage Differential (LVD) and Single Ended (SE) SCSI buses. Check all SCSI and power connections and confirm that the unit is attached to a valid SCSI SE or LVDS bus.

- **Compatibility:** Ensure that the autoloader is compatible with the SCSI host adapter and backup application you plan to use. For a list of compatible SCSI adapters and application software, check with your SCSI host adapter manufacturer, backup application vendor, or the HP support website at www.hp.com/support.

NOTE: The host bus adapter for the 1/8 Ultrium 448, Ultrium 460, Ultrium 960 and SDLT 320 Tape Autoloaders should be SCSI-3 LVDS. A single-ended SCSI host bus adapter will severely degrade performance. Also, if there are any SE devices on the same SCSI bus, the entire SCSI bus will negotiate down to SE speed and severely degrade performance.

- **SCSI Host Adapter Installation:** Verify that your SCSI host adapter is installed correctly. Refer to the manual that came with your SCSI host adapter for installation and troubleshooting instructions. Pay particular attention to any steps describing the settings of various jumpers and/or switches on the host adapter, if applicable. Make sure that the host adapter is properly seated in the motherboard slot and the operating system correctly detects the host adapter. Make sure that the proper device driver is installed for the SCSI host adapter.
- **Backup Application Installation**: Refer to the documentation included with your backup application for instructions on how to verify proper installation. Some backup software packages require an additional module to communicate with the autoloader robotics.
- **Device Driver Installation:** Make sure that the proper device driver, if applicable, is installed for the autoloader. Contact your support representative for more information.

NOTE: Many backup applications use their own drivers for the autoloader and drive. Before installing a driver, make sure it will not conflict with the software.

Troubleshooting table

Table 17 Troubleshooting table

Problem	Solution
Power	
Autoloader does not power on.	• Check all power cord connections. • Make sure the power switch on the front panel is in the ON position. • Make sure there is power to the outlet. Try another working outlet. • Replace the power cord. • Contact your service representative.
No display messages appear.	• Make sure the power cord is connected. • Make sure the power switch is on. • Power cycle the autoloader. • Download autoloader firmware. • Contact your service representative.

Problem	Solution
Tape Movement	
Tape stuck in drive.	1. Power cycle the autoloader, allow it to complete initialization, which in rare cases can take as long as 10 minutes, and then retry unloading the tape using the autoloader operator's panel controls. 2. Allow the tape drive to complete all operations. This may take as long as ten minutes if you reset or cycle power on the autoloader while the cartridge is positioned at the physical end of the media. 3. Make sure that the backup software is not reserving the slot or preventing the tape drive from ejecting the cartridge. The backup software needs to cancel the reservation and any hold it has on the tape drive. Temporarily disconnecting the autoloader from the host server and power cycling eliminates the host and its software as a problem source. 4. Contact your service representative.
Tape stuck in storage slot.	See "Removing stuck tapes from slots" on page 54.
Media	
Cleaning or data cartridge incompatible with drive.	Make sure you are using data and cleaning cartridges that are compatible with the drive and model of your autoloader (see "Cartridge type" on page 28). The autoloader automatically unloads incompatible cartridges, the Media Attention LED flashes, and an exclamation point (!) displays in the inventory display for the indicated slot number. You will need to export the media in order to clear the state.

Problem	Solution
Cannot write to or read from tape.	• Make sure that the cartridge is write enabled (move the write-protect switch to the enabled position). • Make sure you have the appropriate data cartridge for your 1/8 Tape Autoloader model. • If you have the 1/8 Ultrium Tape Autoloader, make sure you are using an Ultrium cartridge that has not been degaussed. **Do not degauss Ultrium cartridges!** • Make sure that the cartridge has not been exposed to harsh environmental or electrical conditions and is not physically damaged in any way. • Many backup applications do not read or write to cartridges that were created using a different backup application. In this case, you may have to perform an erase, format, or label operation on the cartridge. • Make sure you understand any data protection or overwrite protection schemes that your backup application may be using, which could prevent you from writing to a given cartridge. • Retry the operation with a different, known good tape. • Clean the tape drive. See "Cleaning the Tape Drive" on page 43.
Device Not Detected on SCSI Bus	
Connected to a high voltage differential SCSI bus/host adapter	• Attach device to a LVDS SCSI host adapter/bus. • SCSI cable length exceeded, use shorter cable, or remove other devices from the bus. • Check for conflicting SCSI IDs. • DLT VS80, Ultrium 960 and Ultrium 448 models: check that the HBA supports LUN scanning and this feature is enabled. • Device not properly terminated. See "Installation problems" on page 48. • Power on device before powering on the host computer. • Check that the device has been powered on and is not in an error state. • Check the SCSI connector for bent pins.

Problem	Solution
SCSI ID	
Changed drive SCSI ID, but the host server does not recognize the new ID.	• Make sure that all SCSI devices on the same bus have unique ID numbers. • If the SCSI bus is narrow (50-pin) only SCSI IDs 0 through 7 are available. • Make sure that you cycle power on the autoloader after changing the SCSI ID. • Reboot the host server.
Autoloader Performance	
The autoloader is not efficiently backing up data.	• Check the network bandwidth from the host computer. If you are backing up data over a network, consider comparing to a local-only backup. • Make sure the autoloader and tape drive are on their own SCSI bus and not daisy-chained to another tape drive or to the hard drive being backed up. • Make sure the autoloader is connected to a LVDS SCSI bus and there are no SE devices on the same bus, because this will cause the entire bus to negotiate down to SE speed. • Use an Ultra320 SCSI bus and high-quality cabling with 1/8 Ultrium 960 Tape Autoloaders. • Do not connect the autoloader to a narrow SCSI bus. • Try a new cartridge. A marginal cartridge can cause performance problems due to bad spots on the tape requiring retries. • Backing up data that compresses poorly or is already compressed will lower performance. • Check the size of the files. Small file size can impact performance. • Confirm that the backup application is utilizing block sizes of at least 32KB, preferably 64KB. Refer to the backup application documentation for details. • Make sure the backup server has enough memory to handle the bandwidth of the backup or restore. • Clean the tape drive. See "Cleaning the Tape Drive" on page 43 for instructions.

Problem	Solution
Cleaning	
Cannot load the cleaning cartridge.	• For all 1/8 Ultrium Tape Autoloaders, make sure you are using an Ultrium universal cleaning cartridge. (See "Cleaning the Tape Drive" on page 43.) • For the 1/8 SDLT 320 Tape Autoloader, make sure you are using the Super DLTtape cleaning cartridge. (See "Cleaning the Tape Drive" on page 43.) • For the 1/8 DLT VS80 Tape Autoloader, make sure you are using the DLT VS cleaning cartridge. (See "Cleaning the Tape Drive" on page 43.) • Contact your service representative.
Media Attention LED Issues	
Contamination by loose debris.	Avoid contamination by ensuring that the autoloader is installed in a clean, contamination-free environment. Cartridges should be stored vertically in their plastic cases. Continue cleaning the tape drive as needed.
Non-acclimated media	A cartridge should be acclimated for at least 24 hours before being used, particularly if it has been stored at a substantially different temperature or level of humidity than the autoloader.
Cartridge is incompatible	Use only cartridges that are compatible with the drive type. • For all 1/8 Ultrium Tape Autoloaders, make sure you are using an Ultrium universal cleaning cartridge. (See "Cleaning the Tape Drive" on page 43.) • For the 1/8 SDLT 320 Tape Autoloader, make sure you are using the Super DLTtape cleaning cartridge. (See "Cleaning the Tape Drive" on page 43.) • For the 1/8 DLT VS80 Tape Autoloader, make sure you are using the DLT VS cleaning cartridge. (See "Cleaning the Tape Drive" on page 43.)
Expired cleaning cartridge	A cleaning cartridge is good for: • All 1/8 Ultrium Tape Autoloaders: 50 cleans • 1/8 SDLT 320 Tape Autoloader: 20 cleans • 1/8 DLT VS80 Tape Autoloader: 20 cleans

Problem	Solution
Bad/defective/contaminated media	If the Media Attention LED is cleared and the drive has been cleaned, and then immediately re-displays each time a particular cartridge is reloaded, that cartridge should be suspected as being defective, if it is not an invalid cleaning cartridge. • If this occurs, export the cartridge and load a known good cartridge. In some cases, a cartridge can be worn out, have a defective Cartridge Memory, or have been formatted as a Firmware Upgrade Cartridge. • Any cartridge that is suspected of being defective or contaminated should NOT be reused in any drive.
Errors Displayed on Front Panel	
"!" in autoloader operator panel inventory display	See "Operator's Panel Overview" on page 32 for more information.
There is an error code on the LCD display	Look up the error code, try to resolve the failure, and power cycle (see "Autoloader error codes" on page 56).

Removing stuck tapes from slots

📝 **NOTE:** Contact your HP support representative if a cartridge is stuck in the drive.

In the event of a severe mechanical problem with the autoloader or circumstances require you to remove cartridges:

1. Move the power switch on the front panel to the **OFF** position. You may need to use the tip of a pen or similar item to move the power switch.
2. Remove the power cable and SCSI cables from their connectors on the back panel of the autoloader.

⚠ **WARNING!** To prevent injury, disconnect the power and SCSI cables before removing the autoloader cover and keep fingers away from the fan.

3. Remove the autoloader from its rack slot, if applicable, and place it on a table or other clear work surface.
4. Use a Torxdriver #10 to remove the screws that secure the mounting brackets (if the autoloader is rackmounted) from both sides of the autoloader (see Figure 5 on page 22).
5. Remove the five screws on the back and the three screws on each side of the autoloader to remove the autoloader cover.
6. Remove the top cover by lifting it from the back and easing it from under the front panel display cover.

NOTE: Use caution and light force when removing the cartridge carrier as the tab is fragile and could be damaged in this procedure.

7. To remove a cartridge carrier, gently lift the cartridge carrier just above the belt and rotate it approximately 90 degrees counterclockwise to disengage the tab from the belt (see Figure 18 and Figure 19). Continue lifting the carrier straight up to remove it from the autoloader. If the carrier is directly in front of the mailslot, gently rotate the carousel counterclockwise by moving the belt or carriers until the carrier is no longer in front of the mailslot.
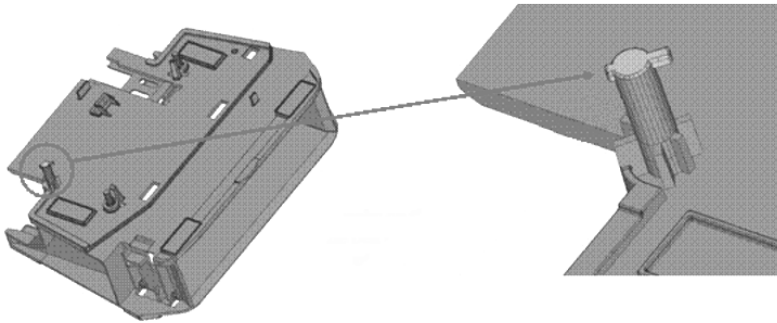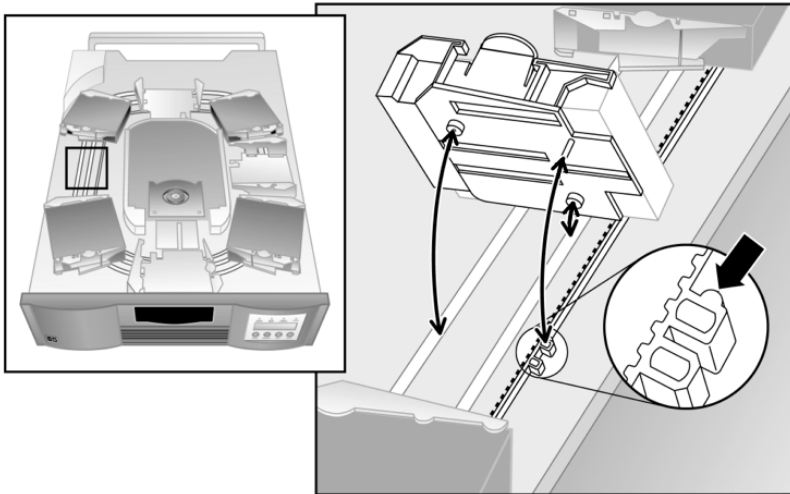
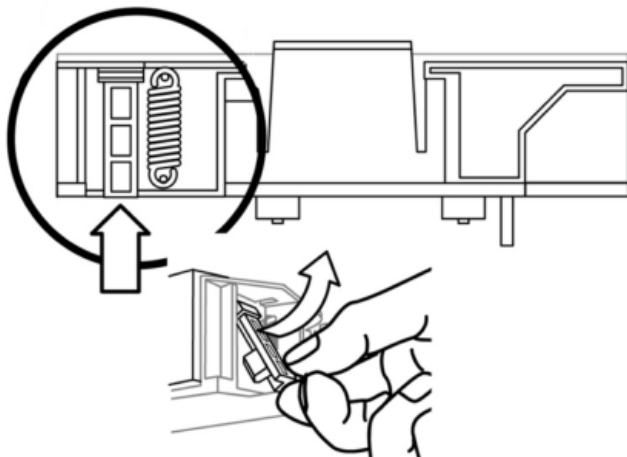**Figure 18** Cartridge carrier tab

Figure 19 Cartridge carrier placement in the autoloader

8. Carefully pull the cartridge lock release lever as shown in Figure 20 away from the cartridge carrier allowing the cartridge to slide out of the carrier.

Figure 20 Pull cartridge lock release lever

9. After removing the cartridges from the desired carriers, reinstall each carrier by placing it on the belt and rotating it clockwise until the tab engages with the belt.

  • Make sure that the rollers on the bottom of the carrier are aligned in the carrier tracks.

  • Make sure that the belt tab beneath each carrier is inserted into the proper autoloader belt loop.

> **NOTE:** There are unused loops on the belt. The proper belt loops have an extra bump on the outside of the loop (see Figure 19 on page 55).

10. Ensure the carrier is properly installed on the belt by gently pressing on the top of the carrier and sliding it back and forth. If it is properly attached to the belt, it should not move. If the carrier moves, reinstall the carrier.

11. Replace the top cover of the autoloader and reinstall the eleven cover screws and mounting brackets.

Autoloader error codes

If an error occurs during operation of the autoloader, the autoloader stops the current operation and displays an error code on the top line of the LCD screen. Unless otherwise noted in Table 18, try to resolve the error by cycling power on the autoloader and retrying the last operation. If the error persists, contact support personnel.

To view the error log:

1. From the Home screen or Main menu, press **+** or **-** until `Information displays` on the top line of the LCD screen. Press **Enter** to access the available options.

2. Press **+** or **-** until `Error Log` (Ultrium 960 and Ultrium 448) or `View Event Log` (all other models) displays on the LCD screen. Press **Enter** to access the most recently logged error message.

3. Press **+** or **-** to display each error in the log.

4. Press **Cancel** when done.

Example error code (Ultrium 960 and Ultrium 448)

```
EVENT -6
A5 F1
```

where:

- Sequence number –6 indicates the position in sequence list, 0 being the most recent.
- Log shows a load error (code A5 = fan error, subcode F1 = caused by the fan at the rear connector plate).

The event log with the Ultrium 960 and Ultrium 448 Tape Autoloaders also includes a datestamp for each event. Press **Enter** to display the associated timestamp in the following format:

```
ddd:hh:mm:ss:HH
```

where:

```
ddd: days
hh: hours
mm: minutes
ss: seconds
HH: 1/100 second
```

The timestamp is set to zero at system start.

NOTE: On all other models, error codes are listed in the format `3  0  xx`, where `xx` is the error code, and there is no subcode. The `3` indicates the entry is an error and the `0` is an unused byte. A fan error would be `3  0  A5`, and there would be no indication which fan had failed.

A description of each of the error codes is provided in the following table.

Table 18 Main Error codes

Error Code	Description	Details
81	Invalid command error	This error indicates that the autoloader received an undefined command or an invalid parameter to a command. This is most likely caused by software, a diagnostic or the driver. Retry and if the error recurs, contact your technical support representative.
82	Device status not suitable to execute this command	If the robotics are busy, some commands cannot be executed at the same time. This error indicates a probable violation. This is not an error condition, but does result in **busy** being reported to the host for the requested SCSI command. Retry and if the error recurs, contact your technical support representative.
83	Inventory not valid	The cartridge inventory is not valid because of manual changes or previous fatal errors. Update the inventory using the Re-inventory option in the Commands menu (see page 45) or power cycle.
84	Source empty	There is no cartridge in the location where a cartridge move was issued. Update the inventory using the Re-inventory option in the Commands menu (see page 45).
85	Destination full	The location where a cartridge move was issued already contains a cartridge. Update the inventory using the Re-inventory option in the Commands menu (see page 45).
86	Mailslot access rejected	User attempted to access the mailslot, but media removal was prevented by the host. This is usually caused by software restricting access to the unit. Try to export the cartridge using the software. If that fails, disconnect the SCSI cable, reboot, then try the operation again. Once successful, reconnect the SCSI cable and reboot the backup server.

Table 18 Main Error codes

Error Code	Description	Details
87	Operation time-out	A command did not complete in the required amount of time. Use the Reset option in the Configuration menu or cycle power on the autoloader and attempt the operation again. If the error recurs, contact your technical support representative.
88	Ultrium 960 and Ultrium 448: reserved	Contact your technical support representative.
	All other models: Communications error during loop-back	Cycle power on the autoloader and attempt the operation again. If the error recurs, contact your technical support representative.
89	System test time-out	There was a communication timeout between the drive and loader during the System Test. Using invalid media or getting a SCSI bus reset can cause this error. Use the Reset option in the Configuration menu and restart the System Test.
8A to 8E	Reserved	Contact your technical support representative.
8F	Recovered loader error	Loader error recovery successful. HP Library & Tape Tools can provide details of the original loader error. Retrys are often associated with bus resets since it takes longer to complete a command that was retried. It may also indicate parts that are marginal or wearing out.
90	Mechanical initialization failure	The robotics were not able to move to the safe mechanical initialization position. Manual intervention is necessary. Use the Reset option in the Configuration menu.
91	Inventory scan failure	Fatal robotic error occurred during the inventory scan. Power cycle the autoloader and see if the error repeats. Update the inventory using the Re-inventory option in the Commands menu (see page 45).
92	Preposition failed	Belt positioning error occurred during 'Preposition' command. Run the System Test from the Diagnostic menu. If the error recurs, contact your technical support representative.

Table 18 Main Error codes

Error Code	Description	Details
93	Cartridge load error	A failure occurred while trying to load a cartridge from its slot to the drive. Run the System Test from the Diagnostic menu. If the error recurs, contact your technical support representative.
94	Cartridge unload error	A failure occurred while trying to unload a cartridge from the drive to its slot. Run the System Test from the Diagnostic menu. If the error recurs, contact your technical support representative.
95	Import error	An error occurred while trying to import a data cartridge to a carousel slot. Run the System Test from the Diagnostic menu. If the error recurs, contact your technical support representative.
96	Export error	An error occurred while trying to export a data cartridge from its carousel slot. Can be caused by an empty slot that is expected to be full. Run the System Test from the Diagnostic menu. If the error recurs, contact your technical support representative.
97 to 9F	Reserved	Contact your technical support representative.
A0	Carousel motion failure	Error occurred during carousel movement (position not found). Could be caused by a missing or misaligned cartridge carrier, an obstruction, or an unexpected cartridge in the carousel path. Run the System Test from the Diagnostic menu. If the error recurs, contact your technical support representative.
A1	Cartridge transport position error	Cartridge transport element is unable to reach its desired position. Failure occurred while trying to place a cartridge into or remove a cartridge from the drive or a slot. Run the System Test from the Diagnostic menu. If the error recurs, contact your technical support representative. Run the System Test from the Diagnostic menu. If the error recurs, contact your technical support representative.

Table 18 Main Error codes

Error Code	Description	Details
A2	Gripper position error	Gripper unable to reach position. Run the System Test from the Diagnostic menu. If the error recurs, contact your technical support representative.
A3	Cartridge pick error	Error occurred while trying to pull a cartridge from the drive or a carousel slot. Run the System Test from the Diagnostic menu. If the error recurs, contact your technical support representative.
A4	Mailslot position error	The mailslot door was not in the requested position during device operation. Can be caused by manually opening the door or a cartridge or other obstruction is blocking the door. Try removing the cartridge or obstruction, then power cycle or use the Reset option in the Configuration menu.
A5	Fan Error **Ultrium 960 and Ultrium 448 subcodes:** F1: fan at rear connector plate was originator F2: fan at drive was originator F3: both fans are defective	Autoloader processor detected a fan error. Check that the rear fan is operational and not obstructed. If the error persists, contact your technical support representative.
B0	ROM error	Cycle power on the autoloader and attempt the operation again. If the error recurs, contact your technical support representative.
B1	RAM error	Cycle power on the autoloader and attempt the operation again. If the error recurs, contact your technical support representative.
B2	NVRAM error	Cycle power on the autoloader and attempt the operation again. If the error recurs, contact your technical support representative.
B3	Controller timer failure	An unrecoverable failure has occurred in the mail controller timer circuit. Contact your technical support representative.

Table 18 Main Error codes

Error Code	Description	Details
B4	Loader to drive communication IC error	Failure in IC handling loader to drive communication. Contact your technical support representative.
B5	Display error	Cycle power on the autoloader and attempt the operation again. If the error recurs, contact your technical support representative.
B6	Memory error	Cycle power on the autoloader and attempt the operation again. If the error recurs, contact your technical support representative.
B7	Timeout on autoloader command	Cycle power on the autoloader and attempt the operation again. If the error recurs, contact your technical support representative.
B9	Database error	Cycle power on the autoloader and attempt the operation again. If the error recurs, contact your technical support representative.
BA	Load time-out	Cycle power on the autoloader and attempt the operation again. If the error recurs, contact your technical support representative.
BB	Unload time-out	Cycle power on the autoloader and attempt the operation again. If the error recurs, contact your technical support representative.
BC	VS80: Drive bug-checked	Cycle power on the autoloader and attempt the operation again. If the error recurs, contact an HP support representative.
BC	Ultrium/SDLT: Drive has recorded an over-temperature condition	Make sure that the unit is in an environment with adequate ventilation and cooling, as stated in "Tape Drive Specifications" on page 80, then check that both the internal fan and the fan on the back of the unit are working.
BD	VS80: Autoloader has loaded a cartridge but drive is empty Ultrium/SDLT: No connection to drive	Cycle power on the autoloader and attempt the operation again. If the error recurs, contact your technical support representation.

Table 18 Main Error codes

Error Code	Description	Details
BE	VS80: Autoloader did not load cartridge currently in tape drive	Cycle power on the autoloader and attempt the operation again. If the error recurs, contact your technical support representative.
	Ultrium/SDLT: Generic Drive response error	
BF	Drive broken, needs repair	Cycle power on the autoloader and attempt the operation again. If the error recurs, contact your technical support representative.

Error subcode description

Table 19 Error subcodes

Error Subcode	Description
00	No error
01	Communication timeout
02	Length expired before getting expected character
03	Any other kind of driver error
10	Start pattern missing
11	Sequence enumeration error
12	Packet length error
13	Checksum mismatch
14	End pattern missing
15	Drive busy - command rejected
16	General drive error
17	Byte stuffing error
18	Command negative acknowledged.
19	Link not open.
21	Carrier state error.
22	Repetitions error. Number of repetitions reached.
23	Move to slot position repetitions error. Number of repetitions at move to slot reached.
24	Move to eject position repetitions error. Number of repetitions at move to eject position reached.
25	Belt start error. Start of belt motor unsuccessful.
26	Belt backward start error. Start of belt motor unsuccessful.
27	Belt home error. Home carrier at move to home position not found.
28	Unexpected belt home error. Unexpected home carrier detected at belt movement.
29	Belt door stop error. Belt stopped by door opening.
2A	Belt position error at move to carrier 1 (home slot).
2B	Belt position error at move to carrier 2.
2C	Belt position error at move to carrier 3.

Table 19 Error subcodes

Error Subcode	Description
2D	Belt position error at move to carrier 4.
2E	Belt position error at move to carrier 5.
2F	Belt position error at move to carrier 6.
30	Belt position error at move to carrier 7.
31	Belt position error at move to carrier 8.
32	Belt position error at move to carrier 9 (optional).
33	Belt position error at move to carrier 10 (optional).
35	Gripper start error. Start of gripper motor unsuccessful.
36	Gripper open error. Gripper open position not reached.
37	Gripper close error. Gripper close position not reached.
38	Gripper hold error. Gripper hold/closed position not reached.
39	Gripper unexpected closed error. Gripper closed although a cartridge should be there.
40	Slider start error. Start of slider motor unsuccessful.
41	Slider home error. Slider home position not reached.
42	Slider forward positioning error. Slider position in forward direction not reached.
43	Slider complex forward positioning error. Slider position in a complex forward movement not reached.
44	Slider backward positioning error. Slider position in backward direction not reached.
45	Slider complex backward positioning error. Slider position in a complex backward movement not reached.
46	Slider lost steps at forward movement.
47	Slider lost steps at complex forward movement.
48	Slider lost steps at backward movement.
49	Slider lost steps at complex backward movement.
4A	Wrong slider start position at forward movement.
4B	Wrong slider start position at complex forward movement.
4C	Wrong slider start position at backward movement.
4D	Wrong slider start position at complex backward movement.

Table 19 Error subcodes

Error Subcode	Description
4E	Error in slider adaption.
50	Door open error. Door open position not reached.
51	Door close error. Door close position not reached.
52	Door repetitions error. Door close repetitions reached.
60	Axis initialization error. Initialization of all axis not successful.
61	Carrier position error.
70	Unknown cartridge error.
71	Door close error at import/export.
72	Wrong source carrier state.
73	Wrong destination carrier state.
74	Multiple carrier state.
75	Expected cartridge in transit not found.
76	Unexpected cartridge in transit found.
79	Door Error (door not closed) after import, cartridge already imported.
81	Drive wakeup failed.
88	Error accessing the slot status in system database.
90	The robotic load operation could not reach the cartridge present position.
91	No drive activity after the load operation.
92	Timeout while loading cartridge.
93	No drive activity after the unload operation.
94	Timeout while unloading cartridge.
95	Drive unload operation terminated unsuccessfully.
96	Robotic could not detect an ejected cartridge at unload operation.
97	No slot was free at robotic unload operation.

A Technical specifications

Physical 1/8 autoloader specifications: all models

Table 20 1/8 Tape Autoloader physical specifications

Characteristics	Product alone	Packaged
Height	8.6 cm (3.4 in)	24 cm (9.4 in)
Width	42 cm (16.5 in)	60 cm (23.6 in)
Depth	61.7 cm (24.3 in)	79 cm (31.1 in)
Weight	11.3 kg (24.9 lb.)	12 kg (26 lb)

Autoloader operation specifications

Table 21 Operation specifications

Characteristic	Specification
1/8 Tape Autoloader Ultrium 960	
Maximum storage capacity 8 data cartridges	Native: 3.2 TB Compressed: 6.4 TB (2:1 compression)
Maximum data transfer rate	Native: 80 MB/s (288 GB/hour) Compressed:160 MB/s (576 GB/hour (2:1 compression)
Drive type	HP Ultrium 960 drive
Number of slots	8
MSBF	500,000 swaps
Interface	Ultra320 SCSI LVD
1/8 Tape Autoloader Ultrium 448	
Maximum storage capacity 8 data cartridges	Native: 1.6 TB Compressed: 3.2 TB (assuming 2:1 compression)
Maximum data transfer rate	Native: 24 MB/s (86 GB/hr.) Compressed: 48 MB/s (172 GB/hr.) (assuming 2:1 compression)
Drive type	HP Ultrium 448 drive
Number of slots	8

Characteristic	Specification
MSBF	500,000 swaps
Interface	Ultra160 SCSI LVD/SE
1/8 Tape Autoloader Ultrium 230	
Maximum storage capacity 8 data cartridges	Native: 800 GB
	Compressed: 1.6 TB (assuming 2:1 compression)
Maximum data transfer rate	Native: 15 MB/s (54 GB/hr.)
	Compressed: 30 MB/s (108 GB/hr.) (assuming 2:1 compression)
Drive type	HP Ultrium 230 drive
Number of slots	8
MSBF	250,000 swaps
Interface	Ultra2 SCSI LVD/SE
1/8 Tape Autoloader Ultrium 460	
Maximum storage capacity 8 data cartridges	Native: 1.6 TB
	Compressed: 3.2 TB (assuming 2:1 compression)
Maximum data transfer rate	Native: 30 MB/s (108 GB/hr.)
	Compressed: 60 MB/s (216 GB/hr.) (assuming 2:1 compression)
Drive type	HP Ultrium 460 drive
Number of slots	8
MSBF	250,000 swaps
Interface	Ultra160 SCSI LVD/SE
1/8 Tape Autoloader DLT VS80	
Maximum storage capacity 8 data cartridges	Native: 320 GB
	Compressed: 640 GB (assuming 2:1 compression)
Maximum data transfer rate	Native: 3 MB/s (10.8 GB/hr.)
	Compressed: 6 MB/s (21.6 GB/hr.) (assuming 2:1 compression)
Drive type	DLT VS80
Number of slots	8

Characteristic	Specification
MSBF	250,000 swaps
Interface	Ultra2 SCSI LVD/SE
1/8 Tape Autoloader SDLT 320	
Maximum storage capacity 8 data cartridges	Native: 1.28 TB Compressed: 2.56 TB (assuming 2:1 compression)
Maximum data transfer rate	Native: 16 MB/s (57.6 GB/hr.) Compressed: 32 MB/s (115.2 GB/hr.) (assuming 2:1 compression)
Drive type	SDLT 320
Number of slots	8
MSBF	250,000 swaps
Interface	Ultra2 SCSI LVD/SE

Environmental specifications

Table 22 Autoloader Environmental Specifications

Characteristic	Specification
Temperature	
Operating	10° to 35° C
Non-operating	-40° to 60° C
Recommended operating temperature	20° to 30° C
Temperature shock immunity - maximum rate of change	10° C per hour
Humidity	
Operating	20% to 80% RH non-condensing
Non-operating	20% to 80% RH non-condensing

B   Regulatory compliance notices

Regulatory compliance identification numbers

For the purpose of regulatory compliance certifications and identification, this product has been assigned a unique regulatory model number. The regulatory model number can be found on the product nameplate label, along with all required approval markings and information. When requesting compliance information for this product, always refer to this regulatory model number. The regulatory model number should not be confused with the marketing name or model number of the product.

Product specific information

Regulatory Model Number: **BRSLA-0203**

FCC and CISPR classification: **Class B**

Regulatory compliance label location

The Regulatory Compliance label for the HP StorageWorks 1/8 Tape Autoloader is located on the bottom of the autoloader. To view this information, carefully turn the autoloader until the regulatory compliance label is visible.

Federal Communications Commission notice

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment (for example, personal computers). The FCC requires devices in both classes to bear a label indicating the interference potential of the device as well as additional operating instructions for the user.

FCC rating label

The rating label on the device shows the classification (A or B) of the equipment. Class B devices have an FCC logo or FCC ID on the label. The HP StorageWorks 1/8 Tape Autoloader is a Class B device (see <cross-reference>Class B equipment).

Class B equipment

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. 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:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit that is different from that to which the receiver is connected
- Consult the dealer or an experienced radio or television technician for help

Declaration of conformity for products marked with the FCC Logo, United States only

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

For questions regarding this FCC declaration, contact us by mail or telephone:

Hewlett-Packard Company
P.O. Box 692000, Mail Stop 510101
Houston
Texas 77269-2000

1-281-514-3333

To identify this product, refer to the part, series, or model number found on the product.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may void the user's authority to operate the equipment.

Cables

When provided, connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

Power cords

⚠ **WARNING!**   This product can ONLY be used with an HP approved power cord for your specific geographic region. Use of a non-HP approved power cord may result in: 1) not meeting individual country specific safety requirements; 2) insufficient conductor ampacity that could result in overheating with potential personal injury and/or property damage; and
3) an unapproved power cord could fracture resulting in the internal contacts being exposed, which potentially could subject the user to a shock hazard. HP disclaims all liability in the event a non-HP approved power cord is used.

The power cord included with the HP StorageWorks 1/8 Tape Autoloader meets the requirements for use in the country where this product was purchased. If this tape library is to be used in another country, purchase an HP-approved power cord that is approved for use in that country.

The power cord must be rated for the product and for the voltage and current marked on the product electrical ratings label. The voltage and current rating of the cord should be greater than the voltage and current rating marked on the product. In addition, the diameter of the wire must be a minimum of 1.00 mm^2 or 18 AWG. If you have questions about the type of power cord to use, contact an HP authorized service provider.

NOTE: Route power cords so that they will not be walked on and cannot be pinched by items placed upon or against them. Pay particular attention to the plug, electrical outlet, and the point where the cords exit from the product.

Canadian notice (Avis Canadien)

Class B equipment

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

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

European Union notice

Products with the CE Marking comply with both the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European Norms (the equivalent international standards are in parenthesis):

• EN55022 (CISPR 22) - Electromagnetic Interference
• EN55024 (IEC61000-4-2, 3, 4, 5, 6, 8, 11) - Electromagnetic Immunity
• EN61000-3-2 (IEC61000-3-2) - Power Line Harmonics
• EN61000-3-3 (IEC61000-3-3) - Power Line Flicker
• EN60950 (IEC950) - Product Safety

Japanese notice

ご使用になっている装置にVCCIマークが付いていましたら、次の説明文を
お読み下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準
に基づくクラスB情報技術装置です。この装置は、家庭環境で使用すること
を目的としていますが、この装置がラジオやテレビジョン受信機に近接して
使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

VCCIマークが付いていない場合には、次の点にご注意下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に
基づくクラスA情報技術装置です　この装置を家庭環境で使用すると電波
妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ず
るよう要求されることがあります。

Japanese power cord statement

製品には、同梱された電源コードをお使い下さい。
同梱された電源コードは、他の製品では使用出来ません。

translation
Please use the attached power cord.
The attached power cord is not allowed to use with other product.

Korean notice for Class B equipment

B급 기기 (가정용 정보통신기기)

이 기기는 가정용으로 전자파적합등록을 한 기기로서
주거지역에서는 물론 모든지역에서 사용할 수 있습니다.

BSMI notice

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能
會造成射頻干擾，在這種情況下，使用者會被要求採
取某些適當的對策。

Taiwan Battery Recycle Statement

廢電池請回收
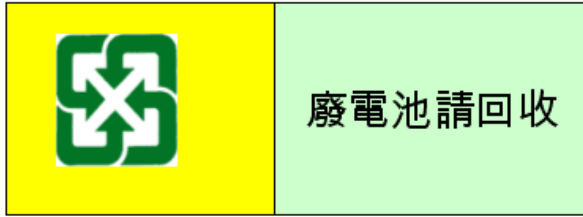
Disposal of Waste Equipment Notices for the Europe Union

Disposal of Waste Equipment by Users in Private Household in the European Union

This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment.   The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

Élimination des appareils mis au rebut par les ménages dans l'Union européenne

Le symbole apposé sur ce produit ou sur son emballage indique que ce produit ne doit pas être jeté avec les déchets ménagers ordinaires. Il est de votre responsabilité de mettre au rebut vos appareils en les déposant dans les centres de collecte publique désignés pour le recyclage des équipements électriques et électroniques. La collecte et le recyclage de vos appareils mis au rebut indépendamment du reste des déchets contribue à la préservation des ressources naturelles et garantit que ces appareils seront recyclés dans le respect de la santé humaine et de l'environnement. Pour obtenir plus d'informations sur les centres de collecte et de recyclage des appareils mis au rebut, veuillez contacter les autorités locales de votre région, les services de collecte des ordures ménagères ou le magasin dans lequel vous avez acheté ce produit.

Entsorgung von Altgeräten aus privaten Haushalten in der EU
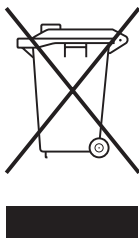
Das Symbol auf dem Produkt oder seiner Verpackung weist darauf hin, dass das Produkt nicht über den normalen Hausmüll entsorgt werden darf. Benutzer sind verpflichtet, die Altgeräte an einer Rücknahmestelle für Elektro- und Elektronik-Altgeräte abzugeben.   Die getrennte Sammlung und ordnungsgemäße Entsorgung Ihrer Altgeräte trägt zur Erhaltung der natürlichen Ressourcen bei und garantiert eine Wiederverwertung, die die Gesundheit des Menschen und die Umwelt schützt. Informationen dazu, wo Sie Rücknahmestellen für Ihre Altgeräte finden, erhalten Sie bei Ihrer Stadtverwaltung, den örtlichen Müllentsorgungsbetrieben oder im Geschäft, in dem Sie das Gerät erworben haben.

Smaltimento delle apparecchiature da parte di privati nel territorio dell'Unione Europea
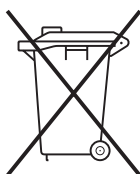
Questo simbolo presente sul prodotto o sulla sua confezione indica che il prodotto non può essere smaltito insieme ai rifiuti domestici. È responsabilità dell'utente smaltire le apparecchiature consegnandole presso un punto di raccolta designato al riciclo e allo smaltimento di apparecchiature elettriche ed elettroniche. La raccolta differenziata e il corretto riciclo delle apparecchiature da smaltire permette di proteggere la salute degli individui e l'ecosistema. Per ulteriori informazioni relative ai punti di raccolta delle apparecchiature, contattare l'ente locale per lo smaltimento dei rifiuti, oppure il negozio presso il quale è stato acquistato il prodotto.

Descarte de Lixo Elétrico na Comunidade Européia

Este símbolo encontrado no produto ou na embalagem indica que o produto não deve ser descartado no lixo doméstico comum. É responsabilidade do cliente descartar o material usado (lixo elétrico), encaminhando-o para um ponto de coleta para reciclagem. A coleta e a reciclagem seletivas desse tipo de lixo ajudarão a conservar as reservas naturais; sendo assim, a reciclagem será feita de uma forma segura, protegendo o ambiente e a saúde das pessoas. Para obter mais informações sobre locais que reciclam esse tipo de material, entre em contato com o escritório da HP em sua cidade, com o serviço de coleta de lixo ou com a loja em que o produto foi adquirido.

Eliminación de residuos de equipos eléctricos y electrónicos por parte de usuarios particulares en la Unión Europea

Este símbolo en el producto o en su envase indica que no debe eliminarse junto con los desperdicios generales de la casa. Es responsabilidad del usuario eliminar los residuos de este tipo depositándolos en un "punto limpio" para el reciclado de residuos eléctricos y electrónicos. La recogida y el reciclado selectivos de los residuos de aparatos eléctricos en el momento de su eliminación contribuirá a conservar los recursos naturales y a garantizar el reciclado de estos residuos de forma que se proteja el medio ambiente y la salud. Para obtener más información sobre los puntos de recogida de residuos eléctricos y electrónicos para reciclado, póngase en contacto con su ayuntamiento, con el servicio de eliminación de residuos domésticos o con el establecimiento en el que adquirió el producto.

Bortskaffande av avfallsprodukter från användare i privathushåll inom Europeiska Unionen

Om den här symbolen visas på produkten eller förpackningen betyder det att produkten inte får slängas på samma ställe som hushållssopor. I stället är det ditt ansvar att bortskaffa avfallet genom att överlämna det till ett uppsamlingsställe avsett för återvinning av avfall från elektriska och elektroniska produkter. Separat insamling och återvinning av avfallet hjälper till att spara på våra naturresurser och gör att avfallet återvinns på ett sätt som skyddar människors hälsa och miljön. Kontakta ditt lokala kommunkontor, din närmsta återvinningsstation för hushållsavfall eller affären där du köpte produkten för att få mer information om var du kan lämna ditt avfall för återvinning.

Verwijdering van afgedankte apparatuur door privé-gebruikers in de Europese Unie
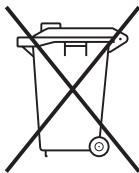
Dit symbool op het product of de verpakking geeft aan dat dit product niet mag worden gedeponeerd bij het normale huishoudelijke afval. U bent zelf verantwoordelijk voor het inleveren van uw afgedankte apparatuur bij een inzamelingspunt voor het recyclen van oude elektrische en elektronische apparatuur. Door uw oude apparatuur apart aan te bieden en te recyclen, kunnen natuurlijke bronnen worden behouden en kan het materiaal worden hergebruikt op een manier waarmee de volksgezondheid en het milieu worden beschermd. Neem contact op met uw gemeente, het afvalinzamelingsbedrijf of de winkel waar u het product hebt gekocht voor meer informatie over inzamelingspunten waar u oude apparatuur kunt aanbieden voor recycling.

Laitteiden hävittäminen kotitalouksissa Euroopan unionin alueella
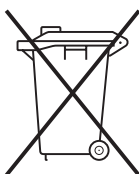
Jos tuotteessa tai sen pakkauksessa on tämä merkki, tuotetta ei saa hävittää kotitalousjätteiden mukana. Tällöin hävitettävä laite on toimitettava sähkölaitteiden ja elektronisten laitteiden kierrätyspisteeseen. Hävitettävien laitteiden erillinen käsittely ja kierrätys auttavat säästämään luonnonvaroja ja varmistamaan, että laite kierrätetään tavalla, joka estää terveyshaitat ja suojelee luontoa. Lisätietoja paikoista, joihin hävitettävät laitteet voi toimittaa kierrätettäväksi, saa ottamalla yhteyttä jätehuoltoon tai liikkeeseen, josta tuote on ostettu.

Bortskaffelse af affald fra husstande i den Europæiske Union
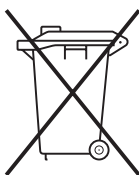
Hvis produktet eller dets emballage er forsynet med dette symbol, angiver det, at produktet ikke må bortskaffes med andet almindeligt husholdningsaffald. I stedet er det dit ansvar at bortskaffe kasseret udstyr ved at aflevere det på den kommunale genbrugsstation, der forestår genvinding af kasseret elektrisk og elektronisk udstyr. Den centrale modtagelse og genvinding af kasseret udstyr i forbindelse med bortskaffelsen bidrager til bevarelse af naturlige ressourcer og sikrer, at udstyret genvindes på en måde, der beskytter både mennesker og miljø. Yderligere oplysninger om, hvor du kan aflevere kasseret udstyr til genvinding, kan du få hos kommunen, den lokale genbrugsstation eller i den butik, hvor du købte produktet.

Likvidácia vyradených zariadení v domácnostiach v Európskej únii

Symbol na výrobku alebo jeho balení označuje, že daný výrobok sa nesmie likvidovať s domovým odpadom. Povinnosťou spotrebiteľa je odovzdať vyradené zariadenie v zbernom mieste, ktoré je určené na recykláciu vyradených elektrických a elektronických zariadení. Separovaný zber a recyklácia vyradených zariadení prispieva k ochrane prírodných zdrojov a zabezpečuje, že recyklácia sa vykonáva spôsobom chrániacim ľudské zdravie a životné prostredie. Informácie o zberných miestach na recykláciu vyradených zariadení vám poskytne miestne zastupiteľstvo, spoločnosť zabezpečujúca odvoz domového odpadu alebo obchod, v ktorom ste si výrobok zakúpili.

Odstranjevanje odslužene opreme uporabnikov v zasebnih gospodinjstvih v Evropski uniji

Ta znak na izdelku ali njegovi embalaži pomeni, da izdelka ne smete odvreči med gospodinjske odpadke. Nasprotno, odsluženo opremo morate predati na zbirališče, pooblaščeno za recikliranje odslužene električne in elektronske opreme. Ločeno zbiranje in recikliranje odslužene opreme prispeva k ohranjanju naravnih virov in zagotavlja recikliranje te opreme na zdravju in okolju neškodljiv način. Za podrobnejše informacije o tem, kam lahko odpeljete odsluženo opremo na recikliranje, se obrnite na pristojni organ, komunalno službo ali trgovino, kjer ste izdelek kupili.

Seadmete jäätmete kõrvaldamine eramajapidamistes Euroopa Liidus

See tootel või selle pakendil olev sümbol näitab, et kõnealust toodet ei tohi koos teiste majapidamisjäätmetega kõrvaldada. Teie kohus on oma seadmete jäätmed kõrvaldada, viies need elektri- ja elektroonikaseadmete jäätmete ringlussevõtmiseks selleks ettenähtud kogumispunkti. Seadmete jäätmete eraldi kogumine ja ringlussevõtmine kõrvaldamise ajal aitab kaitsta loodusvarasid ning tagada, et ringlussevõtmine toimub viisil, mis kaitseb inimeste tervist ning keskkonda. Lisateabe saamiseks selle kohta, kuhu oma seadmete jäätmed ringlussevõtmiseks viia, võtke palun ühendust oma kohaliku linnakantselei, majapidamisjäätmete kõrvaldamise teenistuse või kauplusega, kust Te toote ostsite.

Pozbywanie się zużytego sprzętu przez użytkowników w prywatnych gospodarstwach domowych w Unii Europejskiej

Ten symbol na produkcie lub jego opakowaniu oznacza, że produktu nie wolno wyrzucać do zwykłych pojemników na śmieci. Obowiązkiem użytkownika jest przekazanie zużytego sprzętu do wyznaczonego punktu zbiórki w celu recyklingu odpadów powstałych ze sprzętu elektrycznego i elektronicznego. Osobna zbiórka oraz recykling zużytego sprzętu pomogą w ochronie zasobów naturalnych i zapewnią ponowne wprowadzenie go do obiegu w sposób chroniący zdrowie człowieka i środowisko. Aby uzyskać więcej informacji o tym, gdzie można przekazać zużyty sprzęt do recyklingu, należy się skontaktować z urzędem miasta, zakładem gospodarki odpadami lub sklepem, w którym zakupiono produkt.

Nolietotu iekārtu iznīcināšanas noteikumi lietotājiem Eiropas Savienības privātajās mājsaimniecībās

Šāds simbols uz izstrādājuma vai uz tā iesaiņojuma norāda, ka šo izstrādājumu nedrīkst izmest kopā ar citiem sadzīves atkritumiem. Jūs atbildat par to, lai nolietotās iekārtas tiktu nodotas speciāli iekārtotos punktos, kas paredzēti izmantoto elektrisko un elektronisko iekārtu savākšanai otrreizējai pārstrādei. Atsevišķa nolietoto iekārtu savākšana un otrreizējā pārstrāde palīdzēs saglabāt dabas resursus un garantēs, ka šīs iekārtas tiks otrreizēji pārstrādātas tādā veidā, lai pasargātu vidi un cilvēku veselību. Lai uzzinātu, kur nolietotās iekārtas var izmest otrreizējai pārstrādei, jāvēršas savas dzīves vietas pašvaldībā, sadzīves atkritumu savākšanas dienestā vai veikalā, kurā izstrādājums tika nopirkts.

Készülékek magánháztartásban történő selejtezése az Európai Unió területén

A készüléken, illetve a készülék csomagolásán látható azonos szimbólum annak jelzésére szolgál, hogy a készülék a selejtezés során az egyéb háztartási hulladéktól eltérő módon kezelendő. A vásárló a hulladékká vált készüléket köteles a kijelölt gyűjtőhelyre szállítani az elektromos és elektronikai készülékek újrahasznosítása céljából. A hulladékká vált készülékek selejtezéskori begyűjtése és újrahasznosítása hozzájárul a természeti erőforrások megőrzéséhez, valamint biztosítja a selejtezett termékek környezetre és emberi egészségre nézve biztonságos feldolgozását. A begyűjtés pontos helyéről bővebb tájékoztatást a lakhelye szerint illetékes önkormányzattól, az illetékes szemételtakarító vállalattól, illetve a terméket elárusító helyen kaphat.

Vartotojų iš privačių namų ūkių įrangos atliekų šalinimas Europos Sąjungoje

Šis simbolis ant gaminio arba jo pakuotės rodo, kad šio gaminio šalinti kartu su kitomis namų ūkio atliekomis negalima. Šalintinas įrangos atliekas privalote pristatyti į specialią surinkimo vietą elektros ir elektroninės įrangos atliekoms perdirbti. Atskirai surenkamos ir perdirbamos šalintinos įrangos atliekos padės saugoti gamtinius išteklius ir užtikrinti, kad jos bus perdirbtos tokiu būdu, kuris nekenkia žmonių sveikatai ir aplinkai. Jeigu norite sužinoti daugiau apie tai, kur galima pristatyti perdirbtinas įrangos atliekas, kreipkitės į savo seniūniją, namų ūkio atliekų šalinimo tarnybą arba parduotuvę, kurioje įsigijote gaminį.

Likvidace zařízení soukromými domácími uživateli v Evropské unii

Tento symbol na produktu nebo balení označuje výrobek, který nesmí být vyhozen spolu s ostatním domácím odpadem. Povinností uživatele je předat takto označený odpad na předem určené sběrné místo pro recyklaci elektrických a elektronických zařízení. Okamžité třídění a recyklace odpadu pomůže uchovat přírodní prostředí a zajistí takový způsob recyklace, který ochrání zdraví a životní prostředí člověka. Další informace o možnostech odevzdání odpadu k recyklaci získáte na příslušném obecním nebo městském úřadě, od firmy zabývající se sběrem a svozem odpadu nebo v obchodě, kde jste produkt zakoupili.

Απόρριψη άχρηστου εξοπλισμού από χρήστες σε ιδιωτικά νοικοκυριά στην Ευρωπαϊκή Ένωση

Το σύμβολο αυτό στο προϊόν ή τη συσκευασία του υποδεικνύει ότι το συγκεκριμένο προϊόν δεν πρέπει να διατίθεται μαζί με τα άλλα οικιακά σας απορρίμματα. Αντίθετα, είναι δική σας ευθύνη να απορρίψετε τον άχρηστο εξοπλισμό σας παραδίδοντάς τον σε καθορισμένο σημείο συλλογής για την ανακύκλωση άχρηστου ηλεκτρικού και ηλεκτρονικού εξοπλισμού.

Η ξεχωριστή συλλογή και ανακύκλωση του άχρηστου εξοπλισμού σας κατά την απόρριψη θα συμβάλει στη διατήρηση των φυσικών πόρων και θα διασφαλίσει ότι η ανακύκλωση γίνεται με τρόπο που προστατεύει την ανθρώπινη υγεία και το περιβάλλον. Για περισσότερες πληροφορίες σχετικά με το πού μπορείτε να παραδώσετε τον άχρηστο εξοπλισμό σας για ανακύκλωση, επικοινωνήστε με το αρμόδιο τοπικό γραφείο, την τοπική υπηρεσία διάθεσης οικιακών απορριμμάτων ή το κατάστημα όπου αγοράσατε το προϊόν.

C Electrostatic discharge

To prevent damaging the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

Topics covered in this appendix include:

- Preventing electrostatic damage, page 83
- Grounding methods, page 83

Preventing electrostatic damage

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly. See the next section.

Grounding methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm (±10 percent) resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an HP authorized reseller install the part.

NOTE: For more information on static electricity, or assistance with product installation, contact your HP authorized reseller.

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