HP StorageWorks 1/8 G2 Tape Autoloader User and service guide

Abstract

This guide provides information on installing, configuring, upgrading, and troubleshooting the Tape Autoloader. This guide is intended for system administrators and other users who need physical and functional knowledge of the Tape Autoloader.

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Warranty

WARRANTY STATEMENT: To obtain a copy of the warranty for this product, see the warranty information website:

http://www.hp.com/go/storagewarranty

Contents

1 Features and overview

The Autoloader provides a compact, high-capacity, low-cost solution for simple, unattended data backup. This unique design houses up to eight tape cartridges in a compact 1U form factor with easy access to tape cartridges via two removable magazines and a configurable mailslot. Each magazine can hold up to four cartridges.

The Autoloader can support Ultrium half-height tape drives. To see the tape drives currently available for the 1/8 G2 Tape Autoloader, see the MSL QuickSpecs at www.hp.com/go/tape. For a list of all supported configurations, go to www.hp.com/go/ebs.

The Autoloader is compatible with most operating systems and environments that support the SAS, parallel SCSI, or Fibre Channel interfaces. However, the Autoloader requires either direct support from the operating system or a compatible backup application to take full advantage of its many features. To verify compatibility, go to www.hp.com/go/ebs.

The Autoloader uses the interface types described in Table 1 (page 8). The parallel SCSI Tape Autoloader uses a single SCSI ID with two logical unit numbers (LUNs) — one for the tape drive and the other for the robotic.

Table 1 Model and interface type

LTO generation	Interface	SCSI ID
LTO-2	Ultra 160 SCSI LVD/SE	4
LTO-3, LTO-4	Ultra 320 SCSI LVD, SAS	4
LTO-5	Fibre Channel, SAS	NA

Maximum storage capacity, maximum data transfer rates, and tape cartridges are specified in Ultrium 448 1/8 G2 Tape Autoloader specifications (page 8), Ultrium 920 1/8 G2 Tape Autoloader specifications (page 8), Ultrium 1760 1/8 G2 Tape Autoloader specifications (page 9), and Ultrium 3000 1/8 G2 Tape Autoloader specifications (page 9).

Table 2 Ultrium 448 1/8 G2 Tape Autoloader specifications

Characteristic	Specification
Maximum storage capacity, 8 data cartridges	Native: 1.6 TB (8 x 200 GB) Compressed (2:1): 3.2 TB
Maximum data transfer rate	Native: 24 MB/s (86 GB/hr) Compressed (2:1): 48 MB/s (172 GB/hr)
Data cartridges	HP LTO2 Ultrium 400 GB Data Cartridge, red, part number C7972A
Cleaning cartridge	HP Ultrium universal cleaning cartridge, (50 cleans), orange, part number C7978A

Table 3 Ultrium 920 1/8 G2 Tape Autoloader specifications

Characteristic	Specification
Maximum storage capacity, 8 data cartridges	Native: 3.2 TB (8 x 400 GB) Compressed (2:1): 6.4 TB
Maximum data transfer rate	Native: 60 MB/s (215 GB/hr) Compressed (2:1): 120 MB/s (430 GB/hr)
Data cartridges	HP LTO3 Ultrium 800 GB RW Data Cartridge , yellow, part number C7973A HP LTO3 Ultrium 800 GB WORM Data Cartridge , two-tone (yellow and white), part number C7973W
Cleaning cartridge	HP Ultrium universal cleaning cartridge, (50 cleans), orange, part number C7978A

Table 4 Ultrium 1760 1/8 G2 Tape Autoloader specifications

Characteristic	Specification
Maximum storage capacity, 8 data cartridges	Native: 6.4 TB (8 x 800 GB) Compressed (2:1): 12.8 TB
Maximum data transfer rate	Native: 80 MB/s (288 GB/hr) Compressed (2:1): 160 MB/s (576 GB/hr)
Data cartridges	HP LTO4 Ultrium 1.6 TB RW Data Cartridge, green, part number C7974A HP LTO4 Ultrium 1.6 TB WORM Data Cartridge, two-tone (green and gray), part number C7974W
Cleaning cartridge	HP Ultrium universal cleaning cartridge, (50 cleans), orange, part number C7978A

Table 5 Ultrium 3000 1/8 G2 Tape Autoloader specifications

Characteristic	Specification
Maximum storage capacity, 8 data cartridges	Native: 12 TB (8 x 1.5 TB) Compressed (2:1): 24 TB
Maximum data transfer rate	Native: 140 MB/s (504 GB/hr) Compressed (2:1): 280 MB/s (1,008 GB/hr)
Data cartridges	HP LTO5 Ultrium 3 TB RW Data Tape, blue, part number C7975A HP LTO5 Ultrium 3 TB WORM Data Tape, two-tone (blue and gray), part number C7975W
Cleaning cartridge	HP Ultrium universal cleaning cartridge, (50 cleans), orange, part number C7978A

Autoloader options

HP StorageWorks 1/8 G2 & MSL Encryption Kit

The Encryption Kit provides secure generation and storage of encryption keys. The Encryption Kit may be used with any HP StorageWorks 1/8 G2 Tape Autoloader or the MSL2024, MSL4048, MSL8048 and MSL8096 Tape Library with at least one LTO-4 or later generation tape drive. The Encryption Kit cannot be used with the MSL6000.

The Encryption Kit includes two USB key server tokens. One key server token is available for use as backup for the other.

To use the Encryption Kit, a key server token is inserted in the USB port on the back of the Autoloader, and encryption is enabled and configured from the RMI.

The Encryption Kit supports your manual security policies and procedures by providing secure storage for encryption keys. Access to the key server tokens and their backup files is protected with user-specified passwords. You will need to create processes to protect the tokens and secure the passwords.

IMPORTANT: When encryption is enabled with the Encryption Kit, the Autoloader will not use encryption keys from other sources, such as a key management system or application software. Disable encryption in applications writing to the Autoloader when encryption is enabled with the Encryption Kit. Applications that attempt to control encryption while encryption is enabled with the Encryption Kit will not be able to do so, which can cause backups or other write operations to fail.

Command View TL TapeAssure

HP StorageWorks Command View TL software provides a browser-based GUI for remote management and monitoring of most HP libraries through a LAN. With Command View TL, you can view and analyze the performance and health of the LTO-4 and LTO-5 tape drives and media in multiple HP MSL2024, MSL4048, MSL8048, and MSL8096 Tape Libraries and 1/8 G2 Tape

Autoloaders at the same time. In addition, the information shown in TapeAssure is more extensive than that shown in the RMI.

Command View TL software is installed on a management station. The management can also be used to manage HP StorageWorks EML and ESL Tape Libraries. For best performance, the management station should be in the same physical location and on the same IP subnet as the Autoloader. Command View TL software is available for download without charge from the HP website at http://www.hp.com/support/cvtl.

For information on installing and using Command View TL, see the *HP StorageWorks Interface Manager and Command View TL User Guide*, available from the HP website at http://www.hp.com/support/cvtl.

Command View TL support is included in all Autoloader firmware that supports LTO-5 tape drives. To find and download the most up-to-date firmware revision, visit the HP website at http://www.hp.com/support.

Interface specifications and requirements for parallel SCSI drives

The parallel SCSI Autoloaders use the SCSI interface types described in Table 6 (page 10). The Autoloaders use a separate SCSI ID for each tape drive, with dual LUNs on the master drive's SCSI ID to control the tape drive (LUN 0) and Autoloader robotic (LUN 1). HP recommends that each Ultrium tape drive be put on its own bus when possible.

Table 6 Parallel SCSI interface types

LTO generation	SCSI Interface
LTO-2	Ultra 160 SCSI LVD/SE
LTO-3, LTO-4	Ultra 320 SCSI LVD

The parallel SCSI Autoloader incorporates a wide SCSI-2 or SCSI-3 Low-Voltage Differential (LVD) SCSI bus. Make sure your SCSI host adapter or controller supports these standards.

IMPORTANT: The Tape Autoloader is NOT compatible with a high-voltage differential (HVD) SCSI bus. Do not put the Autoloader on a narrow (50-pin) parallel SCSI bus because doing so will severely degrade performance.

Parallel SCSI host bus adapters (HBAs)

For optimum performance, place the Autoloader on its own SCSI bus with a host bus adapter that can transfer data as fast as the Autoloader can read and write. The HBA must also be supported by your operating system. Refer to the EBS matrix at http://www.hp.com/go/ebs for current HBA compatibility information.

- For LTO-3 or LTO-4 tape drives, use an Ultra 320 HBA.
- For LTO-2 tape drives, use an Ultra 320 or Ultra 160 HBA.

IMPORTANT: Do not connect an Ultrium tape drive to an SE SCSI bus, as it severely degrades Autoloader performance. A single-ended SCSI host bus adapter severely degrades Autoloader performance and limits cable length. Also, if any SE devices are on the SCSI bus, all of the devices on the bus slow down to SE speed, severely degrading performance.

Multiple LUN support

The Autoloader uses a single SCSI ID and two logical unit numbers (LUN). LUN 0 controls the tape drive and LUN 1 controls the robotic. The Autoloader requires an HBA that supports multiple LUNs. If multiple LUN support is not enabled, the host computer cannot scan beyond LUN 0 to discover the Autoloader. It just sees the tape drive.

Parallel SCSI HP Smart Array controllers, RAID controllers, and most on-board HBAs do not support multiple LUNs. Refer to the EBS matrix at http://www.hp.com/go/ebs for current HBA compatibility information.

IMPORTANT: The Autoloader requires an HBA that supports multiple LUNs, which is also called "LUN scanning."

Interface specifications and requirements for Fibre Channel drives

The Fibre Channel tape drive can be connected directly to the server with a host bus adapter (HBA) or through a storage area network (SAN).

Table 7 FC drive interface speeds

LTO generation	Supported speeds
LTO-5	2 Gb, 4 Gb, 8 Gb

If you plan to connect the Autoloader directly to the server, you will need a 2 Gb, 4 Gb, or 8 Gb Fibre Channel HBA. An 8 Gb HBA is recommended for LTO-5 tape drives for optimal performance. Check the EBS matrix at www.hp. com/go/ebs to verify that your HBA is supported on your server and qualified for the Autoloader.

In a SAN installation, all switches between the host and the Autoloader must be of the appropriate type. For example, a 2 Gb switch in the path may result in performance degradation when backing up highly compressible data to a 4 Gb tape drive. Configure zoning so only the backup servers may access the Autoloader.

Interface specifications and requirements for SAS drives

The server must have an HP or third party SAS host bus adapter with an external connector.

Table 8 SAS drive interface speeds

LTO generation	Supported speeds
LTO-3, LTO-4	1.5 Gb, 3 Gb
LTO-5	1.5 Gb, 3 Gb, 6 Gb

The device uses multiple LUNs to communicate with the Autoloader. Most SAS RAID controllers do not support multiple LUNs. Check the EBS matrix at www.hp.com/go/ebs to find a SAS HBA that is supported on your server and qualified with the Autoloader.

Most SAS HBA ports provide four SAS channels. The Autoloader only uses one channel. The HP cable supplied with the Autoloader has one connector on each end, using only one of the four channels. To use the other channels, you can purchase a SAS fanout cable, which will connect up to four SAS tape drives to a single HBA port. When using a different cable, verify that the mini-SAS connector for the tape drive end is keyed for location 4.

CAUTION: High quality SAS cables rated at the transfer rate of the SAS components are required. Always verify that the SAS cable you are using is rated for the data transfer speed of the interface of your components. SAS cables described as "equalized" may not support 6 Gb/s data rates and should not be used with LTO-5 tape drives unless these cables are verified for 6 Gb/s data rates. For optimum performance, only use HP cables of the length specified as qualified for your products.

See About SAS (page 19) for more information about SAS.

LTO-4 and later generation tape drives and encryption

The LTO-4 and later generation tape drives include hardware capable of encrypting data while writing data, and decrypting data when reading. Hardware encryption can be used with or without compression while maintaining the full speed and capacity of the tape drive and media.

Encryption is the process of changing data into a form that cannot be read until it is deciphered with the key used to encrypt the data, protecting the data from unauthorized access and use. LTO tape drives use the 256-bit version of the industry-standard AES encrypting algorithm to protect your data.

To make use of this feature you need:

- The HP StorageWorks 1/8 G2 & MSL Encryption Kit or a backup application that supports hardware encryption.
- LTO-4 or LTO-5 media; no encryption will be performed when writing LTO-3 and earlier generations of tape.

Table 9 Backward read compatibility

	LTO-4 drive	LTO-5 drive
LTO-1 media	Incompatible	Incompatible
LTO-2 media	Read only	Incompatible
LTO-3 media	Read/Write (no encryption)	Read only
LTO-4 media — unencrypted	Read/Write	Read/Write
LTO-4 media — encrypted	Read/Write with encryption key	Read/Write with encryption key
LTO-5 media — unencrypted	Incompatible	Read/Write
LTO-5 media — encrypted	Incompatible	Read/Write with encryption key

Your company policy will determine when you need to use encryption. For example, it may be mandatory for company confidential and financial data, but not for personal data. Company policy will also define how encryption keys should be generated and managed. Backup applications that support encryption will generate a key for you or allow you to enter a key manually.

Using the Encryption Kit

The Encryption Kit includes two USB key server tokens. One key server token is available for use as a backup for the other. Alternatively, you can save the encryption keys to a file and store that file in a safe location.

To use the Encryption Kit, a key server token is inserted in the USB port on the back of the Autoloader, and encryption is enabled and configured from the RMI.

The Encryption Kit supports your manual security policies and procedures by providing secure storage for encryption keys. Access to the key server tokens and their backup files is protected with user-specified passwords. You will need to create processes to protect the tokens and secure the passwords.

IMPORTANT: When encryption is enabled with the Encryption Kit, the Autoloader will not use encryption keys from other sources, such as a key management system or application software. Disable encryption in applications writing to the Autoloader when encryption is enabled with the Encryption Kit. Applications that attempt to control encryption while encryption is enabled with the Encryption Kit will not be able to do so, which can cause backups or other write operations to fail.

See the Encryption Kit user guide for additional information on using the Encryption Kit.

Using application-managed encryption

Hardware encryption is turned off by default and is switched on by settings in your backup application, where you also generate and supply the encryption key. Your backup application must support hardware encryption for this feature to work. See http://www.hp.com/go/ebs for an up-to-date list of other suitable backup software.

NOTE: The Autoloader can only obtain encryption keys from one source. Using the Encryption Kit will prevent application-managed encryption.

Encryption is primarily designed to protect the media once it is offline and to prevent it being accessed from another machine. You will be able to read and append the encrypted media without being prompted for a key as long as it is being accessed by the machine and application that first encrypted it.

There are two main instances when you will need to know the key:

- If you try to import the media to another machine or another instance of the backup application
- If you are recovering your system after a disaster

NOTE: Encryption with keys that are generated directly from passwords or passphrases may be less secure than encryption using truly random keys. Your application should explain the options and methods that are available. Please refer to your application's user documentation for more information.

If you are unable to supply the key when requested to do so, neither you nor HP Support will be able to access the encrypted data.

This guarantees the security of your data, but also means that you must be careful in the management of the encryption key used to generate the tape.

△ **CAUTION:** You should keep a record or backup of your encryption keys and store them in a secure place separate from the computer running the backup software.

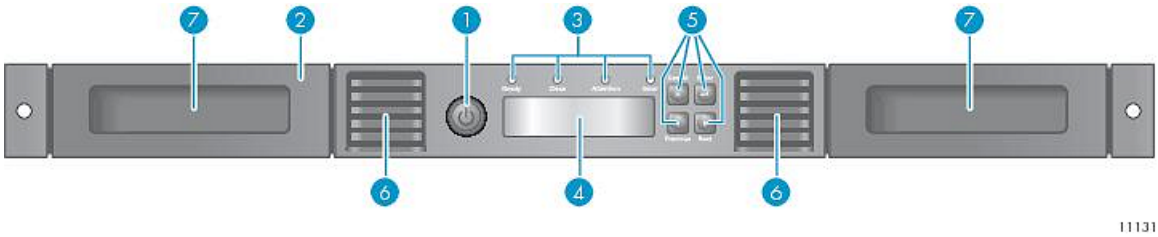
For more information about AES encryption, encryption keys, and using hardware encryption with your HP Ultrium tape drive, see the White Papers on http://h18006.www1.hp.com/storage/tapewhitepapers.html.

For detailed instructions about enabling encryption please refer to the documentation supplied with your backup application or with the HP StorageWorks 1/8 G2 and MSL Encryption Kit. This will also highlight any default states, for example when copying tapes, that may need changing if using encrypted tapes.

Front panel overview

The front panel provides access to the power button, operator control panel, left and right magazines, LEDs, and the mailslot as shown in Figure 1 (page 14). See Operator control panel (OCP) (page 63) for OCP functions.

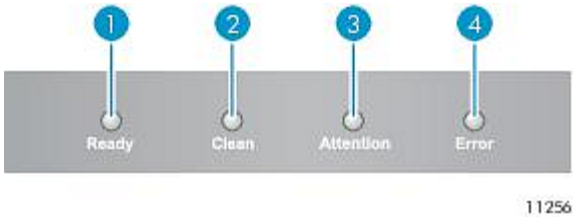
Figure 1 Front panel overview



1. Power button
2. Mailslot
3. Front panel LEDs
4. Front panel LCD screen
5. Control buttons
6. Air vents
7. Magazine

The operator control panel includes four LEDs that indicate system status information as shown in Figure 2 (page 14).

Figure 2 Operator control panel LEDs

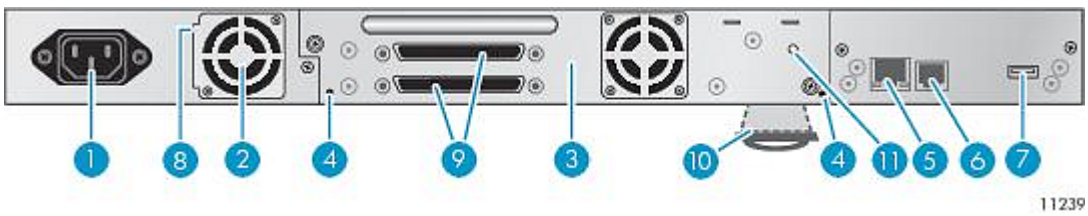


1.	Green	**Ready**. Illuminated when power is on. Blinking when there is tape drive or robotics activity.
2.	Amber	**Clean**. Illuminated when the tape drive has determined that a cleaning cartridge should be used. Cleaning is only necessary when the device directs you to do so. Additional cleaning is not necessary.
3.	Amber	**Attention**. Illuminated if the device has detected a condition that requires attention by the operator.
4.	Amber	**Error**. Illuminated if an unrecoverable error occurs. A corresponding error message displays on the LCD screen (see Troubleshooting (page 84) for more information).

Back panel overview

The back panel provides access to the drive interface connectors, the tape drive, the power connector, the Ethernet, serial and USB ports, and the magazine release holes as shown in Figure 3 (page 14), Figure 4 (page 15), and Figure 5 (page 15).

Figure 3 Back panel overview with parallel SCSI tape drive



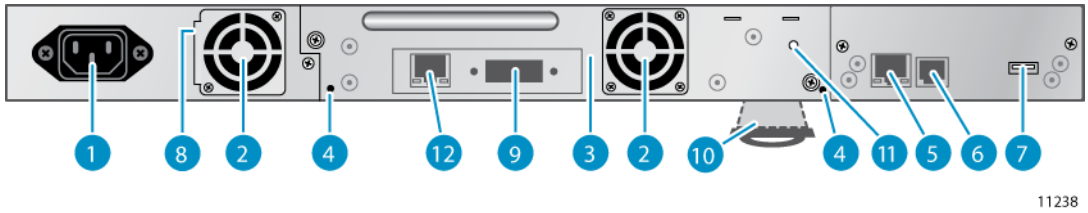
1. Power connector
2. Fan vent
3. Tape drive
4. Magazine release hole
5. Ethernet port
6. Serial port (Factory use only)
7. USB port
8. Shipping lock storage location

9. 68–pin parallel SCSI connector

10. Pull-out tab containing the serial number and other product information.

11. Tape drive LED

Figure 4 Back panel overview with SAS tape drive



1. Power connector

2. Fan vent

3. Tape drive

4. Magazine release hole

5. Ethernet port

6. Serial port (Factory use only)

7. USB port

8. Shipping lock storage location

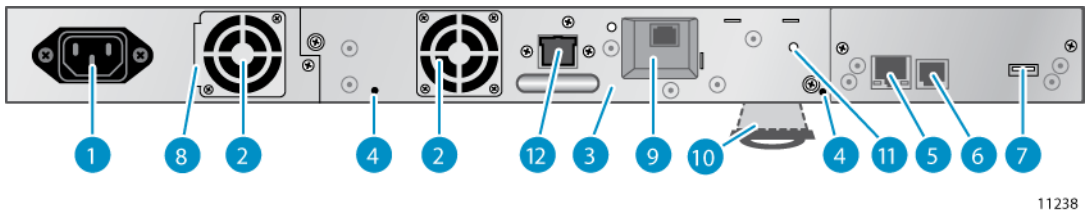
9. SAS port

10. Pull-out tab containing the serial number and other product information.

11. Tape drive LED

12. Tape drive Ethernet port (LTO-5 only)

Figure 5 Back panel overview with FC tape drive



1. Power connector

2. Fan vent

3. Tape drive

4. Magazine release hole

5. Ethernet port

6. Serial port (Factory use only)

7. USB port

8. Shipping lock storage location

9. FC port

10. Pull-out tab containing the serial number and other product information.

11. Tape drive LED

12. Tape drive Ethernet port (LTO-5 only)

The device requires a 110/220 volt AC power connection.

Tape drive LED

Each tape drive has a green LED, which indicates that the tape drive is powered on (see Figure 6 (page 15)).

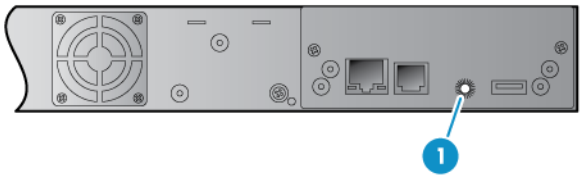
Figure 6 Tape drive LED

1. Tape drive LED

Controller health status indicator

The controller health status indicator is a green LED that pulses on and off in approximately one second cycles during normal operation. The LED is located on the back of the device in the lower left corner, as shown in Controller health status indicator location (page 16).

Figure 7 Controller health status indicator location



1. Controller health status LED

2 Installing the Tape Autoloader

This chapter contains the information you need to install and configure your Tape Autoloader. The installation steps are:

- Preparing the host
- Planning the SCSI configuration, Planning the SAS configuration, or Planning the Fibre Channel configuration
- Choosing a location
- Unpacking the shipping container
- Identifying product components
- Attaching the feet
- Removing the shipping lock
- Mounting the device in a rack
- Installing the Tabletop Conversion Kit
- Changing the SCSI address
- Connecting the SCSI cable (parallel SCSI devices only)
- Connecting the Fibre Channel cables (Fibre Channel devices only)
- Connecting the SAS cable (SAS devices only)
- Powering on the device
- Configuring the device
- Verifying the connection
- Labeling and loading the tape cartridges
- Verifying the installation
- Configuring additional features

Preparing the host

IMPORTANT: Use proper procedures to prevent electrostatic discharge (ESD) (see Appendix: Electrostatic discharge (page 155)). Use wrist-grounding straps and anti-static mats when handling internal components.

Follow these general steps:

- If the host server is connected to a network, check with the system administrator before powering off the computer.
- For parallel SCSI Autoloaders, install a parallel SCSI host bus adapter (HBA) that supports multiple LUNs. Refer to the manuals for the host computer and the HBA for installation information. See Parallel SCSI host bus adapters (HBAs) (page 10) for HBA requirements.
- For SAS Autoloaders, install a SAS host bus adapter (HBA) with an external SAS connector that supports multiple LUNs. Refer to the manuals for the host computer and the HBA for installation information. See Planning the SAS configuration (page 19) for configuration requirements.
- For Fibre Channel Tape Autoloaders, install an FC host bus adapter (HBA) or verify that you have sufficient ports available on a compatible Fibre Channel switch. See Planning the Fibre Channel configuration (page 20) for configuration requirements.

- Install application software and compatible drivers on the host computer. See the application software manuals for installation and configuration information.
- Make sure multiple LUN support is enabled on the host computer. See Multiple LUN support (page 10).

Planning the parallel SCSI configuration

If the host computer will have multiple parallel SCSI devices, you must decide how they will be configured into one or more parallel SCSI busses.

About parallel SCSI busses

A parallel SCSI bus consists of the host bus adapter (HBA), the parallel SCSI devices, the parallel SCSI cables, and the terminators. The HBA and devices are connected in a chain, with each device connected to the next. The last device must have a SCSI terminator. Each device in the chain must have a unique SCSI address (SCSI ID).

Complex devices, such as the Autoloader, assign sub-addresses, called logical unit numbers (LUNs), to different parts of the device. The HBA and operating system must support multiple LUNs, also called LUN scanning, for the application software to operate the Autoloader. HP Smart Array controllers, most third-party RAID controllers, and many on-board SCSI controllers do not support multiple LUNs.

An HBA might have one or two channels, with each channel supporting one parallel SCSI bus. Check to see how many channels the HBA has and what devices are already connected to the HBA. Some devices, such as parallel SCSI disk drives, could be inside the server.

The devices on a parallel SCSI bus share bandwidth so be careful about which devices you put together on a bus. Also, putting a single-ended (SE) SCSI device on the bus will slow all of the devices on the bus down to SE speed. Check each device's interface specifications to see what kind of parallel SCSI interface it has.

Optimizing throughput

If possible, put the Autoloader on its own parallel SCSI bus. This will give you the best performance and easiest installation.

If a tape drive must share a parallel SCSI bus with one or more other devices, follow these guidelines to plan your parallel SCSI busses for the highest performance:

- Do not put a tape drive on the same parallel SCSI bus as a disk drive because the system and backup performance will be slow when data is written from the hard drive to tape or from tape to the hard drive.
- Do not put a tape drive on the same parallel SCSI bus as a disk array because the disk and the tape drive performance will be affected, most RAID controllers do not support multiple LUNs, and the data on the disk array could become corrupted.
- Avoid putting an SE SCSI device on the same bus as a tape drive because the SE device will slow the tape drive to SE speed and reduce the allowable cable length.

SCSI addresses

Verify that each device on the bus has a unique SCSI address (SCSI ID). The pre-configured SCSI address for the Autoloader is 4. If 4 is already used for another device, you will need to change the SCSI address of the Autoloader during the installation process.

NOTE: The HBA also has a SCSI address, which is typically 7.

NOTE: Use the HP Library & Tape Tools to check your server's parallel SCSI configuration. The HP Library & Tape Tools utility is available without cost at www.hp.com/support/TapeTools.

Planning the SAS configuration

The key steps in planning the SAS configuration are obtaining a suitable HBA and cable.

The Autoloader uses two SCSI logical unit numbers (LUNs) and requires an HBA with multiple LUN support. Most HP SAS RAID controllers support Tape Libraries; many non-HP SAS RAID controllers to not support Tape Libraries. To verify the specifications of your HBA or find a list of compatible HBAs, review the compatibility matrix on the Enterprise Backup Solutions web site at: http://www.hp.com/go/ebs.

CAUTION: Do not connect the Autoloader to a SAS RAID controller unless the EBS matrix shows that the controller is qualified with the Autoloader. The server might not be able to boot when the Autoloader is connected to a non-supported SAS RAID controller.

About SAS

Serial Attached SCSI (SAS) is a computer bus technology mainly used to transfer data to and from storage devices, including disk drives and tape drives. SAS-1 (LTO-4) is designed to transfer data at 3 Gb/sec, which is comparable to the speed attained by Ultra320 SCSI. SAS-2 (LTO-5) is designed to transfer data at 6 Gb/sec.

SAS cables and connectors

SAS uses serial connections, with a direct connection between the host server and each of the storage devices. This eliminates the need to configure SCSI busses and assign SCSI IDs, as is required for parallel SCSI devices.

Most SAS HBA ports have four SAS channels. A tape drive uses one channel, so each HBA port can support up to four tape drives. You can use a cable with one connector on each end, but only one channel will be used. To use the other channels, you can purchase a SAS fanout cable with a connector for each tape drive, as shown in Example SAS fanout cable (page 19).

Figure 8 Example SAS fanout cable

The Autoloader has a mini-SAS connector on the tape drive. The connector is keyed in location 4, which is the standard location for end devices. If you use a cable other than the one supplied with the product, verify that it is keyed in location 4.

CAUTION: Mini-SAS connectors are keyed. Do not force a SAS cable's mini-SAS connector into the tape drive mini-SAS connector because it might be keyed differently.

SAS signal rates require clean connections and a minimum number of connections between the HBA and the device. Do not use adapters or converters between the HBA and the device. HP recommends a maximum SAS cable length of six meters.

⚠ **CAUTION:** High quality SAS cables rated at the transfer rate of the SAS components are required. Always verify that the SAS cable you are using is rated for the data transfer speed of the interface of your components. SAS cables described as "equalized" may not support 6 Gb/s data rates and should not be used with LTO-5 tape drives unless these cables are verified for 6 Gb/s data rates. For optimum performance, only use HP cables of the length specified as qualified for your products.

World Wide identifiers

A SAS tape drive is identified by a unique identifier called a World Wide Name (WWN) or World Wide Identifier (WWID). The Autoloader assigns the World Wide identifier to the drive bay. When a tape drive is replaced, the World Wide identifier is re-assigned to the new tape drive.

Planning the Fibre Channel configuration

You can connect the Autoloader directly to the server with a host bus adapter (HBA) or indirectly through a storage area network (SAN) with a switch.

Direct connection

If you plan to connect the Autoloader directly to the server, you will need a 2 Gb, 4 Gb, or 8 Gb Fibre Channel HBA. An 8 Gb HBA is recommended for LTO-5 tape drives for optimal performance. Check the EBS matrix at www.hp. com/go/ebs to verify that your HBA is supported on your server and qualified for the Autoloader.

A server that uses Fibre Channel disks needs at least two FC ports. Using the same port for disk and tape access will cause performance degradation.

SAN connection

All switches between the host and the Autoloader must be of the appropriate type. A 2 Gb switch in the path may result in performance degradation when backing up highly compressible data.

Configure zoning on the Fibre switch so only the backup servers may access the Autoloader. See the switch manual for information on zoning.

Choosing a location

If you plan to mount the device in a rack, select an open rack location, ideally near the center of the rack or higher, with access to the host server and a power outlet. You may also set the Autoloader on a shelf in the rack. In this case you must attach the feet during the installation process.

If you plan to set the Autoloader on a table, select a level area large enough to support both edges of the Autoloader with access to the host server and a power outlet.

Choose a location that meets the criteria shown in Location criteria (page 20):

Table 10 Location criteria

Criteria	Definition
Tabletop requirements	The Autoloader can only be placed on a flat surface if the support feet have been properly applied or the Autoloader is mounted in the optional tabletop conversion cover. Select a location that is flat, sturdy, and close to the host server. Ensure that all of the feet on the Autoloader or tabletop conversion cover will be supported. Do not place the device on the floor or other carpeted surface.

Table 10 Location criteria *(continued)*

Criteria	Definition
	Do not place the Autoloader on its sides or upside down. Do not put anything on top of the Autoloader unless the optional tabletop conversion cover is installed. The tabletop conversion cover can support up to 15 kg (33 lb).
Rack requirements	HP Rack 5000, 10000 Series, HP Rack System/E
Rack space requirements	1U when mounted in the optional rack rails
Room temperature	10-35° C (50-95° F)
Power source	AC power voltage: 100-127 VAC; 200-240 VAC Line frequency: 50-60 Hz Place the device near an AC outlet. The AC power cord is the product's main AC disconnect device and must be easily accessible at all times.
Weight without media	11.5 kg (25.4 lb)
Weight with media	13.1 kg (28.9 lb)
Air quality	The device should be placed in an area with 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 percent relative humidity 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 shipping container

Before you begin, clear a level work surface near where you will place the Autoloader.

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

Unpacking the Tape Autoloader:

1. Inspect the container for shipping damage. If you notice any damage, report it to the shipping company immediately.
2. Open the shipping container and remove the packaging foam and accessories that cover the device.
3. Lift the device out of the carton, place it on the work surface.

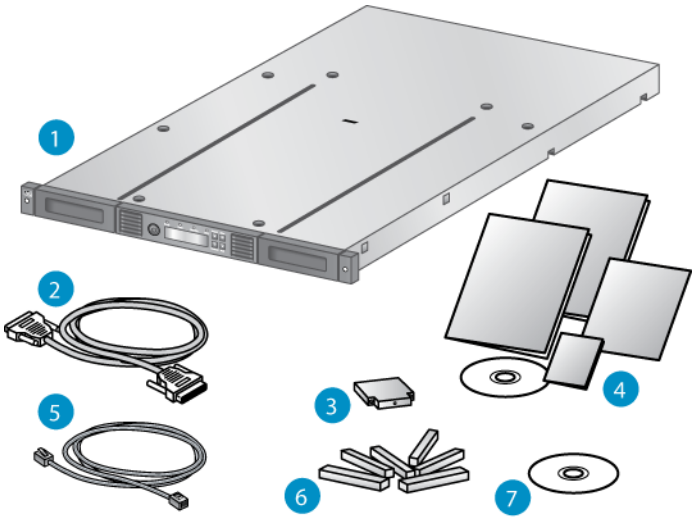
CAUTION: Do not place the Autoloader on either end or its sides as this may damage it.

4. Remove any other accessories from the shipping container. Save the packaging materials for future use.

Identifying product components

Confirm that you received the product components shown in Product components (page 22).

Figure 9 Product components



1. Autoloader
2. Parallel SCSI or SAS interface cable (parallel SCSI and SAS Autoloaders only)
3. SCSI terminator (parallel SCSI Autoloaders only)
4. Product documentation
5. Ethernet cable
6. Six support feet
7. HP OpenView Data Protector Express Single Server Edition CD

Attaching the feet

If you plan to mount the Autoloader in a rack or in the optional Tabletop Conversion Cover, skip this step and continue with Removing the shipping lock (page 23).

CAUTION: The Autoloader must be supported under both side edges to operate properly. If the Autoloader is not mounted in a rack or in the tabletop conversion kit, you must apply the feet.

Do not put anything on top of the Autoloader. Weight on top of the Autoloader can prevent the robotic inside from moving properly. If you must place items on top of the Autoloader, install it in the optional tabletop conversion cover, which can support up to 15 kg (33 lb).

You need the six support feet from the accessory package for this procedure.

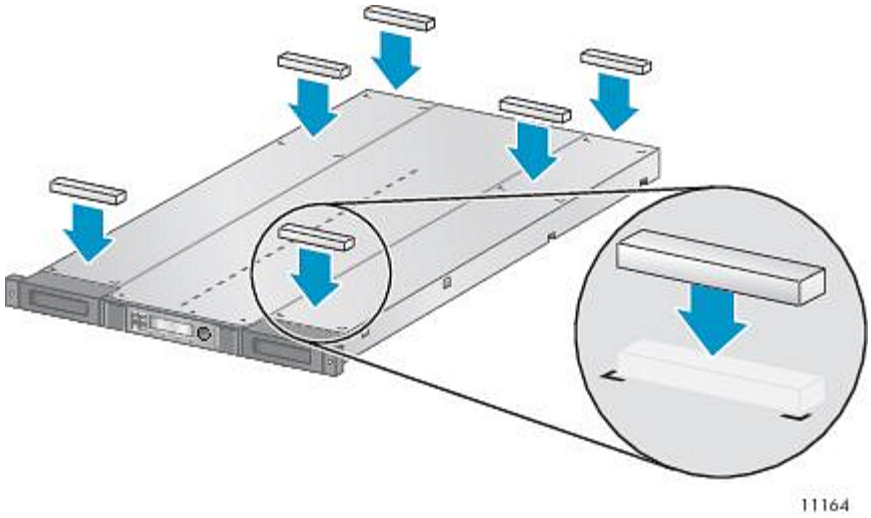
To attach the feet:

1. Verify that there are no tape cartridges in the Autoloader.

IMPORTANT: The Autoloader may be damaged if it is turned over with tape cartridges in the magazines or robot. If the Autoloader has been used before, use the manual magazine release to remove the cartridges from the magazines (see Using the manual release (page 132).

2. With another person, gently turn the Autoloader over and set it on its back.
3. Locate the six inscribed foot location lines on the bottom of the Autoloader.
4. If the Autoloader is not new, clean the foot locations with a damp paper towel.
5. Peel the backing paper off each foot and apply it within a set of foot location lines (see Attaching the feet to the bottom of the Autoloader (page 23)).
6. With another person, gently turn the Autoloader over and set it on its feet.

Figure 10 Attaching the feet to the bottom of the Autoloader



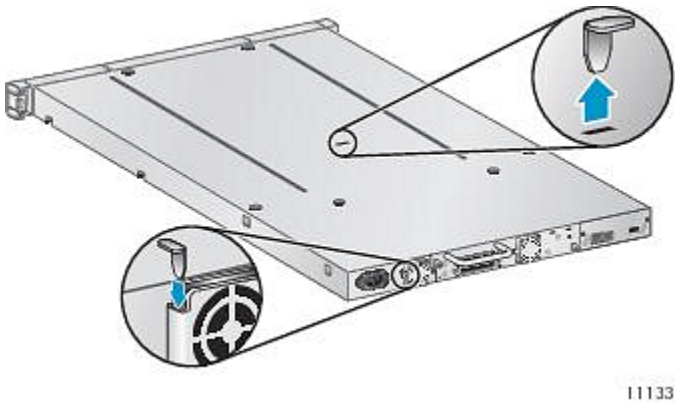
Removing the shipping lock

The shipping lock prevents the robotic transport mechanism from moving during shipment. You must remove the shipping lock before powering on the device. The shipping lock is held in place with a piece of tape and is located in the top center of the device. After the shipping lock is removed, it should be stored on the back panel of the device for future use.

To remove and store the shipping lock:

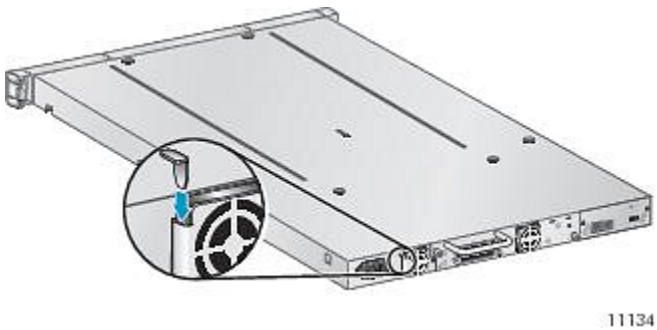
1. Locate the tape and lock at the top of the device (see Shipping lock location (page 23)) .

Figure 11 Shipping lock location



2. Remove the tape, then remove the lock.
3. Store the lock on the back panel of the device (see Figure 12 (page 23)).

Figure 12 Shipping lock storage location



Mounting the device in a rack

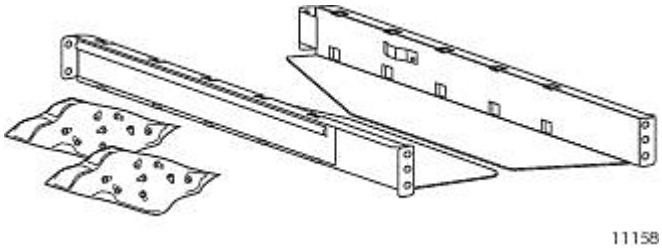
If you plan to set the Autoloader on a table or rack shelf, skip this step and continue with Installing the Tabletop Conversion Kit (page 25).

⚠ **WARNING!** The HP StorageWorks 1/8 G2 Tape Autoloader weighs 11.5 kg (25.4 lb) without media and 13.1 kg (28.9 lb) with media (8 cartridges). When moving the Autoloader, to reduce the risk of personal injury or damage to the Autoloader: 1) observe local health and safety requirements and guidelines for manual material handing, 2) always remove all tapes to reduce the overall weight of the Autoloader, and 3) obtain adequate assistance to lift and stabilize the Autoloader during installation or removal.

The device easily installs into the HP Rack System/E, or the HP Rack 5000 or HP Rack 10000 series. You need a #2 and a #3 Phillips screwdriver for this procedure.

Unpack the rack kit and verify that it includes the following:

Figure 13 Rack kit



- Two rails
- Two bags of eight M6 screws.

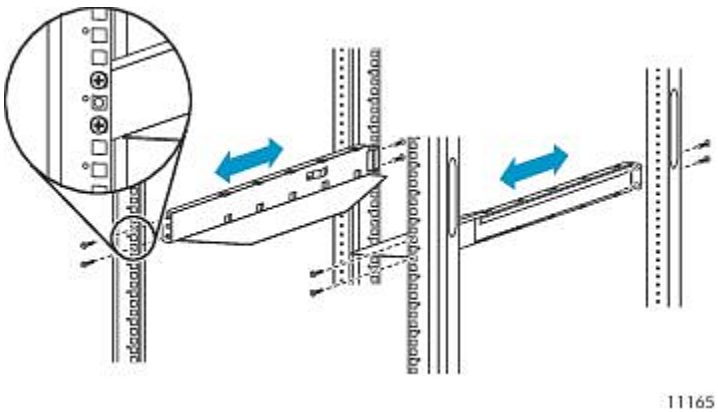
Select the bag of screws appropriate for your type of rack.

- The HP Rack System/E rack has 7.1 mm round holes in the rack column. The packet for this rack type is labeled **HP Rack System/E**.
- The HP Rack 5000 and 10000 series have 9.5 mm square holes in the rack column. The packet for these rack types is labeled **HP Rack 5000, 10000 Series.**

To install the rails into the rack:

1. Using the screws for your rack type and a #3 Phillips screwdriver, secure one rail to each side of the rack in your chosen rack location.
2. Secure the front of one rail to the front of the rack. Extend the rail to the depth of the rack and secure the rail to the back of the rack. The front of the rails are straight and the back are angled, as shown in Installing the rails into the rack (page 24).

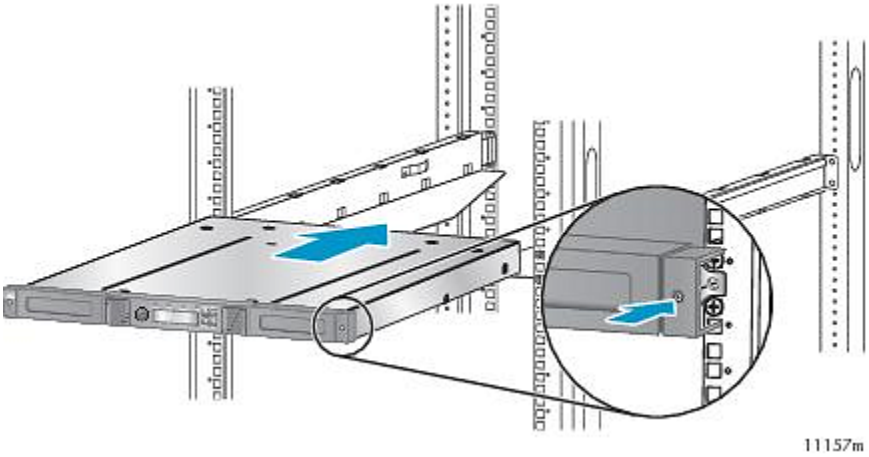
Figure 14 Installing the rails into the rack



To install the device on the rails and into the rack:

1. Locate the captive screws on the front bezel (see Figure 15 (page 25)).
2. Slide the device onto the rails.
3. From the front of the device, secure the front bezel to the rack using a #2 Phillips screw driver placed through the small holes in the mounting bracket to tighten the captive screws on each side of the device.

Figure 15 Securing the Autoloader to the rack



Installing the Tabletop Conversion Kit

If you do not have the optional Tabletop Conversion Kit, skip this step and continue with Connecting the SCSI cable (parallel SCSI devices only). The Rack to Tabletop Conversion Kit supports the edges of the Tape Autoloader and is capable of holding 15 kg (33 lb).

To install the cover:

1. Place the cover on a flat, level surface behind the device.
2. Slide the device into the cover until the front panel of the device is aligned with the cover (see Figure 16 (page 25)).

Figure 16 Installing the tabletop conversion cover

3. Tighten the captive screws on the front panel until the cover is secure.

Changing the SCSI address (parallel SCSI drives only)

If you have multiple parallel SCSI devices on the SCSI bus and another device is already using SCSI ID 4, you must change the SCSI ID of the Autoloader.

To change the SCSI ID:

1. Plug the power cord into the power connector on the back panel and then plug the cord into the power outlet.
2. From the front panel, push the round power button to power on the device.
3. From the front panel, set the new SCSI ID (see Changing the SCSI address — parallel SCSI devices (Configuration > Change Drive) (page 72)).
4. Power off the device by depressing the power button on the front panel.

TIP: The SCSI ID can also be changed from the RMI **Configure: Drive** screen once the RMI is configured. See Changing the drive configuration (page 48).

Connecting the parallel SCSI cable (parallel SCSI devices only)

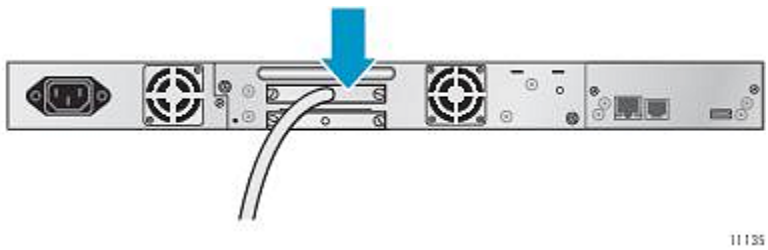
NOTE: LTO-3 and LTO-4 tape drives are Ultra 320 SCSI LVD devices. Use only cables and terminators specified for Ultra 320 or labeled as MultiMode. LTO-2 tape drives are Ultra 160 SCSI LVD/SE devices; use only cables and terminators specified for Ultra 160 or Ultra 320, or labeled as MultiMode.

NOTE: For optimal performance, a parallel SCSI tape drive should be the only device on the bus.

To connect the parallel SCSI cable to the device:

1. HP recommends that the host server be powered off before attaching new devices.
2. Attach one end of the parallel SCSI cable (included in the accessory package) to one of the connectors on the back panel of the tape drive (see Figure 17 (page 26)).

Figure 17 Attaching the parallel SCSI cable to the tape drive



3. Attach the other end of the parallel SCSI cable to the connector on the parallel SCSI host bus adapter or to the connector on the previous device on the parallel SCSI bus.

   NOTE: The host bus adapter should be Low Voltage Differential Signaling (LVDS). A Single-Ended (SE) SCSI host bus adapter works, but severely degrades performance and limits cable length. If any SE devices are on the same parallel SCSI bus, all of the devices on the parallel SCSI bus slow to SE speed, which severely degrades performance. Never attach an LTO-3 or LTO-4 tape drive to an SE SCSI bus.

4. Attach the terminator to the remaining parallel SCSI connector on the back panel of the tape drive if the Autoloader is the last or only device on the parallel SCSI bus. Otherwise, attach one end of a parallel SCSI cable to the remaining port and the other end to the next device on the parallel SCSI bus. Make sure the last device on the parallel SCSI bus is properly terminated.

Connecting the Fibre Channel cables (Fibre Channel devices only)

To connect the Fibre Channel cable to the Autoloader:

1. Remove the FC port cap if necessary. Attach one end of the Fibre Channel cable to the Fibre Channel port on the tape drive.

2. Attach the other end of the FC cable to a switch or HBA.

Connecting the SAS cable (SAS devices only)

To connect the SAS cable to the device:

1. Attach the HBA end of the SAS cable into the connector on the HBA.
2. Attach the other end of the cable into the connector on the tape drive.

TIP: Mini-SAS connectors are keyed. Do not force a SAS cable's mini-SAS connector into the tape drive mini-SAS connector because it might be keyed differently.

NOTE: SAS signal rates require clean connections between the HBA and tape drive. Do not use adapters or converters between the HBA and the tape drive. For reliable operation, use a maximum SAS cable length of six meters.

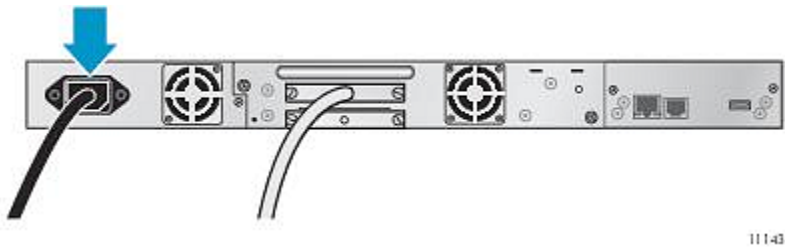
Powering on the device

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 power on the Autoloader:

1. To use the web-based management interface, connect an Ethernet cable to a working LAN connection and to the Ethernet connector on the back of the Autoloader.
2. Attach the power cable to the power connector on the back panel of the Autoloader (see Figure 18 (page 27)).

Figure 18 Attaching the power cord



3. Plug the power cable into the nearest properly grounded power outlet.
4. Power on the device by pressing the power button located on the front panel. Check the LCD screen to make sure it has power. If 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** LED. When the initialization sequence is complete, the Home screen is displayed.
5. Plug in the host server and all attached devices.
6. Power on any other devices you powered off earlier.
7. Power on the server.

Configuring the device

Now that the Autoloader is connected to the host and powered on, configure it for your environment.

To configure the Autoloader:

1. Set the administrator password. Setting an administrator password provides access to the administrator functions with the RMI or OCP, and restricts access to administrator functions to only those who know the administrator password. The Autoloader comes with a null administrator password, which until set allows unrestricted access to all administrative functions through the OCP but not the RMI. Once the administrator password has been set from the OCP, it can be changed from either the OCP or RMI.
2. Set the date and time. The date and time are used by the Autoloader to record events and should be set during the initial installation process. (See Setting the date and time (Configuration > Autoloader Date/Time) (page 73).)
3. Configure the Autoloader network settings. Configuring the Autoloader network settings enables you to monitor, configure, and control most Autoloader functions from the RMI. By default, the device will obtain an IP address from an IPv4 DHCP server. Optionally, you can configure the device to use a static IP address. Once logged into the RMI, you can administer further network changes through the RMI. (See Configuring network settings (Configuration > Configure Network Settings) (page 74).)

   The device supports IPv4 and IPv6 Internet Protocols. By default, the device is configured to use IPv4, the most common version. You can enable IPv6 or both Internet Protocols from the OCP or RMI. You must finish configuring IPv6 from the RMI. (See Changing the network configuration (page 49).)

Verifying the connection

To verify the connection between the host computer and the Autoloader:

1. Install the application software and/or drivers that are compatible with the Autoloader. Software compatibility information is available at www.hp.com/go/automated. Backup software packages may require additional software or licensing to communicate with the robotics.
2. Verify the connection between the Autoloader and the host:
   - Install the HP Library & Tape Tools Diagnostic/Installation Check Utility, available at www.hp.com/support/TapeTools, onto the host server. This utility verifies that the unit is connected and communicating with the host server. It also verifies that the device is functioning and provides diagnostic information. Run the HP Library & Tape Tools **Installation Check** from the programs menu to verify your connections.

     NOTE: L&TT may also be run from a CD, Compact Flash drive, or remote directory after installation on another computer. See the *HP StorageWorks Library and Tape Tool User guide* for instructions for installing L&TT on a computer other than the server.

   - Confirm that the host server's operating system recognized the device in Microsoft® Windows® XP, 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 parallel SCSI devices, consult the operating system documentation.

Labeling and loading the tape cartridges

Before using your new Autoloader you must load tape cartridges into the magazines.

To prepare your tape cartridges and load them into the Autoloader:

1. Obtain tape cartridges compatible with your Autoloader. (See Tape cartridges (page 30).)
2. Label any unlabeled tape cartridges to improve inventory time. (See Labeling tape cartridges (page 31).)

3. Remove one of the magazines from the Autoloader with the RMI or OCP:
   - RMI: see Releasing and replacing the magazines (page 58).
   - OCP: see Unlocking, removing, and replacing magazines (Operations > Unlock Left or Right Magazine) (page 77)

   The Autoloader will not perform any other action while a magazine is out of the device.
4. Insert the tape cartridges into the magazine. (See Magazines (page 33).)
5. Slide the magazine into the Autoloader.
6. Remove the other magazine, insert the tape cartridges, and replace the magazine.

Verifying the installation

Verify that the device has the current firmware revision.

To see the firmware revision on the front panel:

1. From the Home screen, press **Next** until the display shows **Status/Information**. Press **Enter**.
2. Press **Next** until the display shows **Autoloader Information**. Press **Enter**.
3. Press **Next** until the display shows the **Firmware Rev**.

To find the current firmware revision, visit the HP Support website: www.hp.com/support.

If necessary, update the device firmware:

- From the RMI, see Determining and updating firmware (page 60).
- From the OCP, see Upgrading firmware (Support > Autoloader FW Upgrade, Support > Drive FW Upgrade) (page 81).
- Using HP Library and Tape Tools (L&TT), which can be downloaded free of charge from www.hp.com/support/TapeTools.

After configuring the Autoloader, you can save the configuration settings to a USB flash drive from the OCP or to a file from the RMI **Configuration: Save/Restore** screen. Having a backup of the Autoloader configuration is helpful when recovering from a configuration error, setting up multiple devices with similar configurations, or if the Autoloader needs service. See Saving and restoring the device configuration and restoring factory defaults (page 56).

Configuring additional features

The Autoloader has many features to customize it for your organization.

- Enabling and configuring SNMP network management or Command View TL TapeAssure. See Configuration: Network Management (page 51).
- Setting up email event notification. See Setting event notification parameters (page 55).
- Naming the Autoloader, which is done from the RMI Configuration: Network screen. See Changing the network configuration (page 49).
- To use the RMI and OCP in Japanese, enable the Japanese language option through the RMI. See Changing the system configuration (page 46).

3 Tape cartridges and magazines

This chapter explains which media to use with your Autoloader, and how to label and write-protect your tape cartridges. Careful labeling and handling of the tape cartridges will prolong the life of the tape cartridges and the Tape Autoloader.

Tape cartridges

Use the Ultrium data and cleaning tape cartridges designed for your model of Tape Autoloader. You can order data and cleaning cartridges at www.hp.com/go/storagemedia.

Table 11 Ultrium 448 tape drive

Cartridge type	Part number
HP LTO2 Ultrium 400 GB Data Cartridge, red	C7972A
HP Ultrium universal cleaning cartridge, (50 cleans), orange	C7978A

Table 12 Ultrium 920 tape drive

Cartridge type	Part number
HP LTO3 Ultrium 800 GB RW Data Cartridge, yellow	C7973A
HP LTO3 Ultrium 800 GB WORM Data Cartridge, two-tone (yellow and white)	C7973W
HP Ultrium universal cleaning cartridge, (50 cleans), orange	C7978A

Table 13 Ultrium 1760 tape drive

Cartridge type	Part number
HP LTO4 Ultrium 1.6 TB RW Data Cartridge, green	C7974A
HP LTO4 Ultrium 1.6 TB WORM Data Cartridge, two-tone (green and gray)	C7974W
HP Ultrium universal cleaning cartridge, (50 cleans), orange	C7978A

Table 14 Ultrium 3000 tape drive

Cartridge type	Part number
HP LTO5 Ultrium 3 TB RW Data Cartridge, blue	C7975A
HP LTO5 Ultrium 3 TB WORM Data Cartridge, two-tone (blue and gray)	C7975W
HP Ultrium universal cleaning cartridge, (50 cleans), orange	C7978A

NOTE: The LTO-3 and later tape drives support 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 you 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, see the following website: www.hp.com/go/storagemedia.

Using and maintaining tape cartridges

CAUTION: **Do not degauss Ultrium data cartridges!** These data cartridges are pre-recorded with a magnetic servo signal. This signal is required to use the cartridge with the Ultrium tape drive. Keep magnetically charged objects away from the cartridge.

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

- Use only the data cartridges designated for your device.
- Clean the tape drive when the **Clean** drive LED is illuminated.

CAUTION: Use only Ultrium Universal cleaning cartridges.

- Do not drop a cartridge. Excessive shock can damage the internal contents of the cartridge or the cartridge case itself, making the cartridge unusable.
- Do not expose data cartridges to direct sunlight or sources of heat, including portable heaters and heating ducts.
- The operating temperature range for data cartridges is 10 to 35° C. The storage temperature range is -40 to +60° C in a dust-free environment in which relative humidity is always between 20 percent and 80 percent (non-condensing).
- If the data cartridge has been exposed to temperatures outside the specified ranges, stabilize the cartridge at room temperature for the same length 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.

Labeling tape cartridges

The device contains a bar code reader that reads the tape labels and stores the inventory data in memory. The device then provides the inventory information to the host application, OCP, and RMI. Having a bar code label on each tape cartridge enables the bar code reader to identify the cartridge quickly, thereby speeding up inventory time. Make it a practice to use bar code labels on your tape cartridges.

TIP: The bar code scanner must scan each tape or the back of the storage slot until it reads the bar code label for the cartridge or storage slot, or determines that the slot is empty. The bar code scanner can identify a properly labeled cartridge on the first scan. It can identify an empty slot on the second scan. It will try several more scans and then tap on the cartridge before determining that an unlabeled cartridge is in the slot, which takes about four times as long as identifying a properly labeled cartridge. Even if you do not need the bar code information, use bar code labels to speed up inventory time.

Though not recommended, checking Ignore Barcode Media ID in the RMI Configuration: System screen will keep the Autoloader from interpreting bar code Media IDs.

Your host software may need to keep track of the following information via the associated bar code:

- Date of format or initialization
- Tape's media pool
- Data residing on the tape

- Age of the backup
- Errors encountered while using the tape (to determine if the tape is faulty)

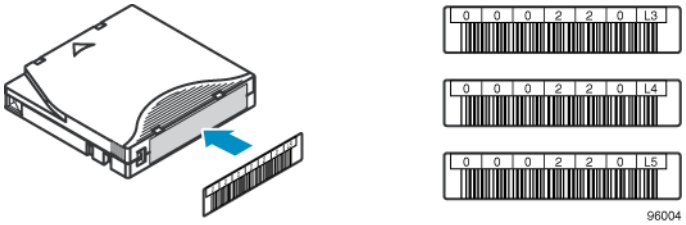
IMPORTANT: Misusing and misunderstanding bar code technology can result in backup and restore failures. To ensure that your bar code labels meet HP's quality standards, always purchase them from an approved supplier and never print bar code labels yourself.
To order bar code labels from an HP-authorized reseller:

- In the United States, call 1-800-345-1518.
- Elsewhere, see the HP website: www.hp.com, then click **Contact HP** to find locations and telephone numbers.

For more information, see the *Bar Code Label Requirements, Compatibility and Usage* white paper available from www.hp.com/support.

Ultrium tape cartridges have a recessed area located on the face of the cartridge next to the write-protect switch. Use this area for attaching the adhesive-backed bar code label. Only apply labels as shown:

Figure 19 Apply the label within the recessed area



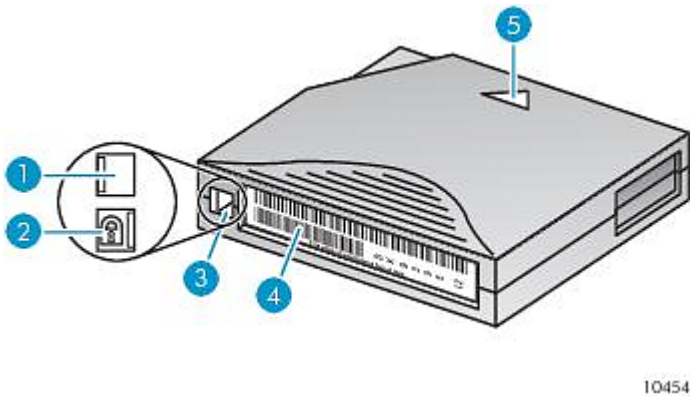
IMPORTANT: The bar code label should only be applied as shown, with the alphanumeric portion facing the hub side of the tape cartridge. Never apply multiple labels onto a cartridge because extra labels can cause the cartridge to jam in a tape drive.

Write-protecting tape cartridges

All rewriteable data cartridges have a write-protect switch to prevent accidental erasure or overwriting of data. Before loading a cartridge into the device, make sure the write-protect switch on the front of the cartridge is in the desired position.

- Slide the switch to the **left** to allow the device to write data to the cartridge (see Figure 20 (page 33), 1).
- Slide the switch to the **right** to write-protect the cartridge. An indicator, such as a red mark or small padlock, is visible showing that the cartridge is write-protected (see Figure 20 (page 33), 2).

Figure 20 Write-protecting the data cartridge



1. Write-enabled
2. Write-protected
3. Write-protect switch
4. Bar code label
5. Insertion arrow

Read and write compatibility

HP Ultrium data cartridges are fully supported and compatible with HP StorageWorks Ultrium tape products (see Backward read compatibility). Because HP Ultrium media is Ultrium logo compliant, it may be used with any other non-HP device that bears the Ultrium logo.

Table 15 Read and write compatibility

	LTO-1 drive	LTO-2 drive	LTO-3 drive	LTO-4 drive	LTO-5 drive
LTO-1 media	Read/Write	Read/Write	Read only	Incompatible	Incompatible
LTO-2 media	Incompatible	Read/Write	Read/Write	Read only	Incompatible
LTO-3 media	Incompatible	Incompatible	Read/Write	Read/Write (no encryption)	Read only
LTO-4 media — unencrypted	Incompatible	Incompatible	Incompatible	Read/Write	Read/Write
LTO-4 media — encrypted	Incompatible	Incompatible	Incompatible	Read/Write with encryption key	Read/Write with encryption key
LTO-5 media — unencrypted	Incompatible	Incompatible	Incompatible	Incompatible	Read/Write
LTO-5 media — encrypted	Incompatible	Incompatible	Incompatible	Incompatible	Read/Write with encryption key

△ **CAUTION:** Ultrium 2 and Ultrium 3 tape drives require the most recent firmware to immediately identify Ultrium 4 media. Without the most recent firmware, loading an Ultrium 4 cartridge into an earlier generation drive may result in a long media identification and unload time. The drive may not identify the media and return a load error before the application software times out waiting for the load. HP strongly recommends keeping your tape drives updated to the most recent firmware.

Magazines

The device has removable magazines. Magazine access is password protected. For safety reasons, the robotic motion is stopped when a magazine is removed.

The magazines can be released using the operator control panel (OCP), the remote management interface (RMI), or by a manual release. HP recommends that you release the magazine using the

OCP or RMI. The magazine must only be removed manually when the OCP or RMI process has failed, or the device no longer has power.

IMPORTANT: To manually release a magazine, see Releasing the magazines manually (page 102). However, this manual process should only be used if the magazine cannot be released using the operator control panel or the remote management interface.

The slot numbering scheme is shown in Figure 21 (page 34) for the left magazine, and Figure 22 (page 34) for the right magazine.

Figure 21 Left magazine—slot numbering with mailslot enabled

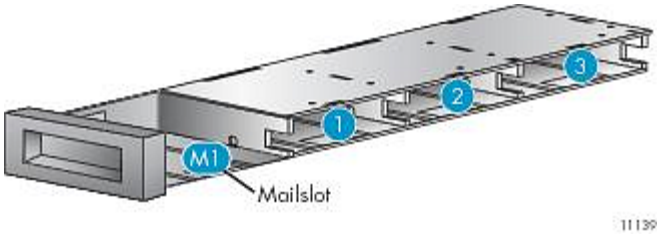
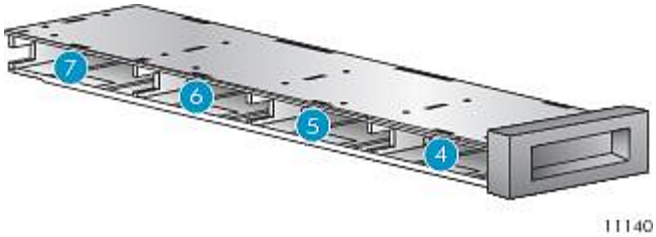


Figure 22 Right magazine—slot numbering with mailslot enabled



When the mailslot is disabled, the mailslot (M1) becomes Slot 1 and all other slots are re-numbered accordingly.

4 Operating the Tape Autoloader

The Tape Autoloader can be operated by the following methods:

- **Remote management interface (RMI)** — this interface lets you monitor and control the Autoloader from a web page. You can access most Autoloader functions from the RMI.
- **Operator control panel (OCP)** — this interface lets you operate the device from the front panel.
- **Host backup software** — You can perform any functions provided by the backup software.

NOTE: The device's network settings must be configured and the administrator password set to use the RMI.

Remote management interface (RMI)

Overview

The remote management interface (RMI) lets you monitor and control your device through the World Wide Web (WWW). The RMI hosts a dedicated, protected Internet site that displays a graphical representation of your device.

Before using the RMI, you must configure the device network settings and set the administrator password with the OCP. (See Configuring network settings (Configuration > Configure Network Settings) (page 74) and Changing the administrator password (Configuration > Change Admin Password) (page 71).)

To start the RMI, open any HTML browser and enter the IP address of the device in the browser's address bar.

TIP: Check the **Help** screens in the RMI for additional information. The help pages are updated with most firmware updates and often contain technical details that are not contained in this document. To access RMI help, click **Help** on the right side of the Web page banner, as shown in Getting help (page 38).

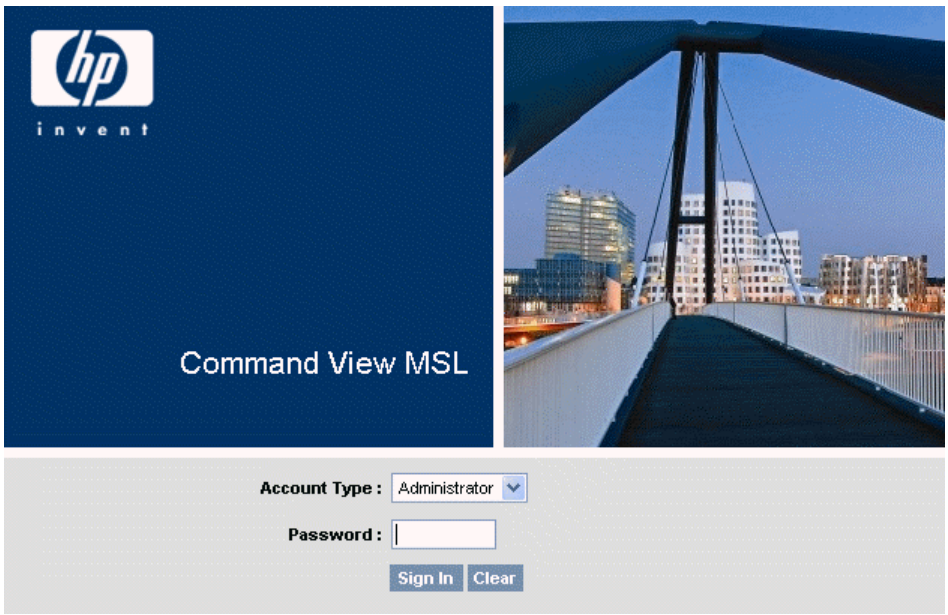
The following functions are available through the RMI:

- Identity (page 38)
  - Viewing static device information (page 38)
  - Viewing static drive information (page 39)
  - Viewing network information (page 41)
- Status (page 42)
  - Viewing dynamic device information (page 42)
  - Viewing dynamic drive information (page 43)
  - Viewing the tape cartridge inventory (page 45)
- Configuration (page 46)
  - Changing the system configuration (page 46)
  - Changing the drive configuration (page 48)
  - Changing the network configuration (page 49)
  - Configuration: Network Management (page 51)
  - Changing the administrative password (page 53)
  - Setting date/time (page 54)

Login

To login, select the **Account Type**, enter a password if required, and then click **Sign In**. See Figure 23 (page 36).

Figure 23 RMI login page



The Account Types are:

- User — no password is required (leave the password box blank).
- Administrator — the administrator password is required. The same administrator password is used for the RMI and OCP. There is not a default administrator password; the administrator password must be set with the OCP before it can be used with the RMI. If the administrator

password is lost, contact HP to generate a temporary password that will grant administrator access.

- Service —**access to this level is by HP Service personnel only.** The service password is set at the factory. The same service password is used for the RMI and OCP.

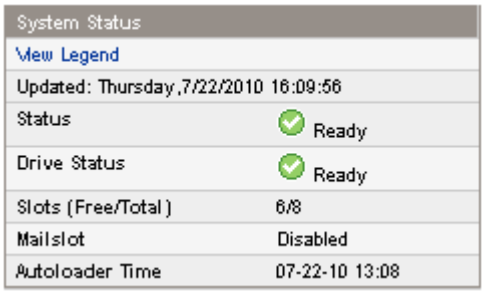
The user login provides access to the Identity and Status options, but not the Configuration, Operations, and Support options. Administrator level provides access to all screens except for the Log configuration and HP Service screens.

TIP: By default, the administrator password is unset; all of the digits are null. You must set the administrator password from the OCP to protect the administrator functions on the OCP and enable the administrator functions in the RMI.

Status pane

The System Status pane (see Figure 24 (page 37)) shows the current device and drive status.

Figure 24 System Status pane



The System Status pane displays the following:

- Updated — the day, date, and time of the most recent status view. This timestamp comes from your computer and may be different from the Autoloader Time at the bottom of the pane. Click your browser's reload button to refresh the system status.
- Status of the Autoloader and tape drive

  The green **Status Ok** icon indicates that the device is fully operational and that no user intervention is required.

  The blue exclamation point **Status Warning** icon indicates that user attentionis necessary, but that the device can still perform most operations.

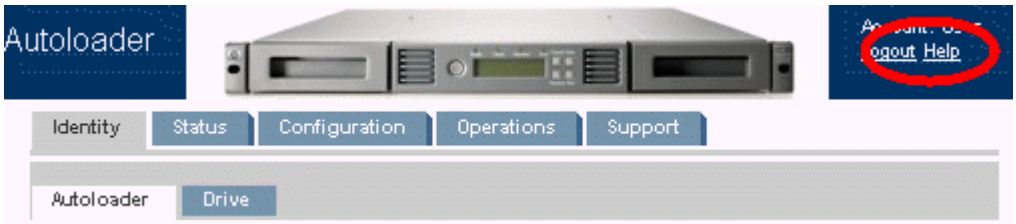
  The red X **Status Error** icon indicates that user intervention is required and that the device is not capable of performing some operations.

- Slots (Free/Total) — **Free** is the number of empty storage slots. **Total** is the number of storage slots available to the host software, which does *NOT* include reserved slots.
- Mailslot — shows whether the mailslot is open, closed, or disabled.
- Autoloader Time — the date and time from the Autoloader, which can be set from the OCP or RMI. The Autoloader Time is updated when the system status is refreshed. The time of the most recent refresh is the Updated time at the top of the pane. If you call HP Service to request a temporary administrator password, refresh the system status with your browser reload button and then give the service engineer this Autoloader Time.

Getting help

For additional information about fields on the RMI screens, click on **Help** in the upper right corner (see Figure 25 (page 38)). The help pages are updated with most firmware updates and often contain technical details that are not contained in this document.

Figure 25 Help button

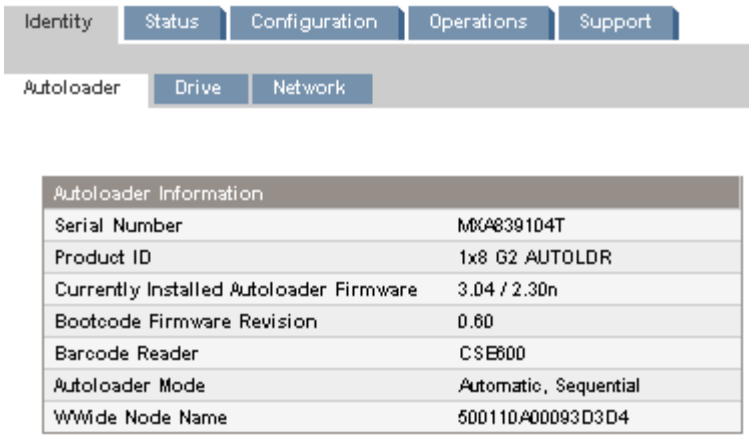


Identity

Viewing static device information

The Identity: Autoloader page provides static information about the device.

Figure 26 Identity: Autoloader page



You can see, but not modify, the following:

- Serial Number — the electronic serial number for the device. It should match the serial number printed on the device's label, located on the pull out tab under the drive on the back of the device.
- Product ID — how the device identifies itself to the host computer.
- Currently Installed Autoloader Firmware x.xx / y.yy
  - x.xx is the version of the Autoloader controller firmware
  - y.yy is the version of the robotics firmware.
- Bootcode Firmware Revision
- Barcode Reader — version of barcode reader in the device.
- Autoloader Mode
  - Automatic — the device will switch from Sequential to Random mode if it receives media changer SCSI commands.
  - Manual — the device will stay in the current mode until another mode is configured by a user.

- Random — the device will not automatically load and unload tapes. Instead, it will wait for commands from the backup software or the OCP to load and unload tapes.
- Sequential — the device will automatically unload the tape in the drive when the host software sends an unload command to the drive and then automatically load the tape from the next highest sequentially numbered full slot.
- Loop — in Loop mode, the Autoloader will load the tape from the lowest numbered full slot after the tape from the highest numbered full slot is unloaded. If Loop is not listed, the Autoloader will stop automatically loading and unloading tapes after the tape from the last full slot is unloaded.

△ **CAUTION:** Since loop mode will endlessly cycle through the tapes, it is possible to overwrite old data. Make sure that there are enough tapes in the Autoloader or that the tapes are regularly rotated in and out to ensure that data you want to save is not overwritten.

- Autoload — the device will automatically load the tape from the lowest numbered full slot on power up.

- WWide Node Name — a world wide unique identifier that the Autoloader reports over SCSI and may be used by operating systems or software applications to identify and track the Autoloader.

Viewing static drive information

The Identity: Drive page, Identity: Drive page (Fibre Channel), and Identity: Drive page (SAS) provide detailed information about the tape drive.

Figure 27 Identity: Drive page (Fibre Channel)

Drive Information	(LUN)
Vendor ID	HP
Product ID	Ultrium 5-SCSI
Serial Number	HU1022AJA0
Firmware Revision	Y23W
Physical Drive Slot Number	1
Element Address	1
Autoloader LUN Hosted By Drive	Yes
Data Compression	Yes
Interface Type	Fibre Channel
WWide Node Name	500110A00093D3D5
Port A	
WWide Port Name	500110A00093D3D6
Port Type	Automatic
Speed	Automatic
Port B	

Figure 28 Identity: Drive page (parallel SCSI)

Drive Information	1 (LUN)
Vendor ID	HP
Product ID	Ultrium 3-SCSI
Serial Number	HU10650KDN
Firmware Revision	G63W
SCSI ID	4
Physical Drive Slot Number	1
SCSI Element Address	1
Autoloader LUN Hosted By Drive	Yes
Data Compression	Yes
Interface Type	SCSI

Figure 29 Identity: Drive page (SAS)

Drive Information	(LUN)
Vendor ID	HP
Product ID	Ultrium 4-SCSI
Serial Number	HU17420HTC
Firmware Revision	U26W
World Wide ID - Port A	500110A00102DFE4
Physical Drive Slot Number	1
Element Address	1
Autoloader LUN Hosted By Drive	Yes
Data Compression	Yes
Interface Type	SAS

You can see, but not modify, the following:

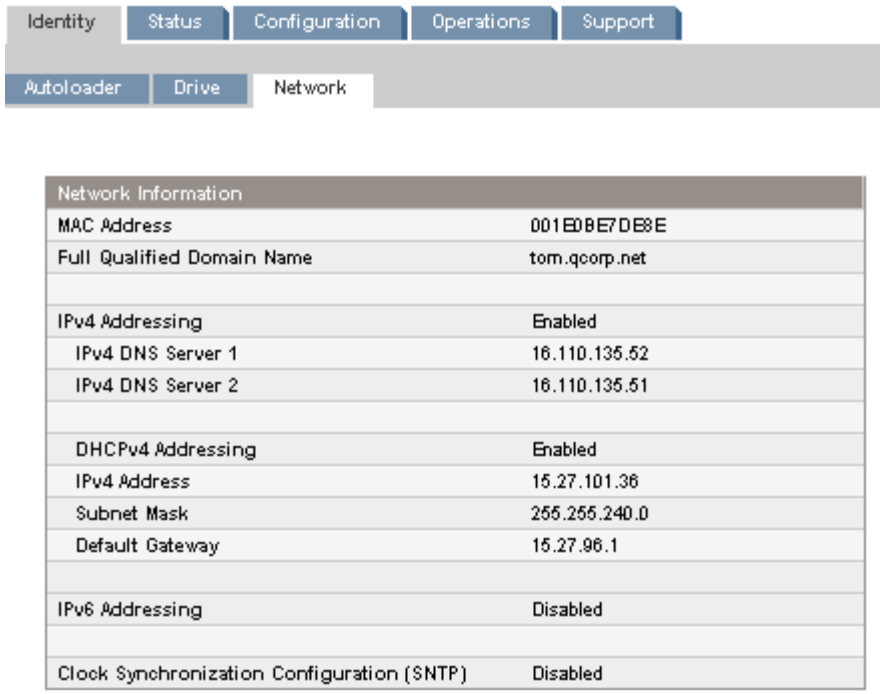
- Vendor ID — will always be HP.
- Product ID — product identification information that is given by the drive.
- Serial Number — electronic serial number of the drive. It should match the physical serial number of the drive.
- Firmware Revision — version of the currently installed drive firmware.
- SCSI ID (parallel SCSI drive only) — SCSI address of the drive. The LUN for the tape drive is 0.
- World Wide ID (SAS drive only) — world wide unique name for the drive. The World Wide ID is assigned by the autoloader controller to the drive bay and cannot be changed by the user. When a tape drive is replaced, the World Wide ID is re-assigned to the replacement drive.
- Physical Drive Slot Number — the physical location of the drive. Will always be 1.
- SCSI Element Address — element address. The SCSI Element Address is set at the factory and can only be configured by a host application.

- Autoloader LUN Hosted by Drive — Yes, if this drive is hosting the Autoloader at LUN 1. Will always be Yes for the 1/8 G2 Tape Autoloader.
- Data Compression — Yes, if the host has hardware compression turned on for the drive.
- Interface Type — SCSI, Fibre Channel, or SAS
- WWide Node Name (FC drive only) — world wide unique number for the drive. The Autoloader assigns WWNames to the drive bays. When a tape drive is replaced, the WWName is re-assigned to the replacement drive.
- Port information (FC drive only)
  - WWide Port Name — world wide unique identifier for the port. The WW Node and Port Name will be slightly different.
  - Port Type — the current setting of the drive port. Direct connected devices are typically Loop. Devices connected to a switch are typically Fabric.
  - Speed

Viewing network information

The Identity: Network page displays information about the network configuration.

Figure 30 Identity: Network page



You can see, but not modify:

- MAC Address — a unique identifier for the autoloader controller network interface
- Full Qualified Domain Name — the fully qualified domain name for the device
- Clock Synchronization Configuration (SNTP) — When Enabled, the device will obtain the current time and date from the configured SNTP server.

When IPv4 Addressing is Enabled, you can see, but not modify:

- IPv4 DNS Server 1 and IPv4 DNS Server 2 — addresses of the configured DNS servers used when DHCP Addressing is not Enabled.
- DHCPv4 Addressing — When Enabled, the device will request an IP address from a DHCP server each time the device is booted.

- IPv4 Address — the Autoloader network address
- Subnet Mask — The network mask of the autoloader controller used when DHCP Addressing is not Enabled.
- Default Gateway — the gateway used when DHCP Addressing is not Enabled.

When IPv6 Addressing is Enabled, you can see, but not modify:

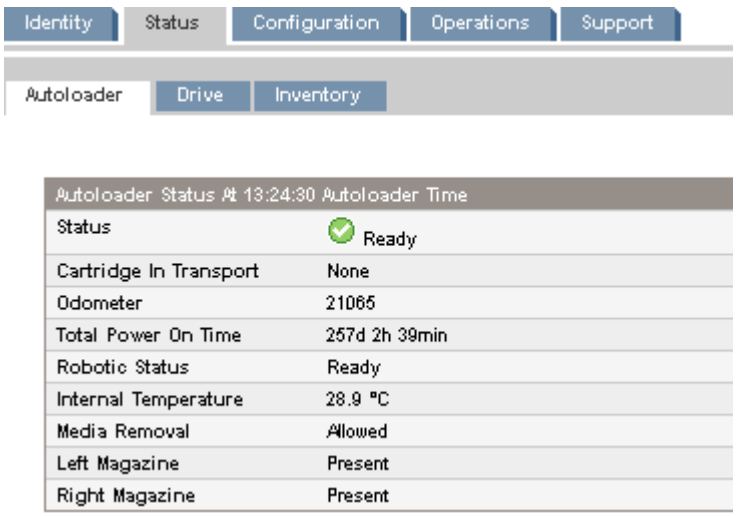
- Stateless Addressing — when Enabled, the device will generate an address for itself based on the routing information obtained from a router advertisement and the MAC address. The device can manage up to five global addresses at the same time, which can be assigned from different routers.
- DHCPv6 Addressing — when Enabled, the Autoloader will request an IP address from a DHCP server each time the device is booted.
- Static Addressing — when Enabled, the device will use a statically-configured address.
- Static Assigned Address — the IPv6 address when Static Addressing Enabled is On.

Status

Viewing dynamic device information

The Status: Autoloader page displays dynamic information about the device. When you click **Refresh**, the status is updated immediately.

Figure 31 Status: Autoloader page



You can see, but not modify, the following:

- Status — the overall status of the device

	The device is fully operational and no user interaction is required.
	User attention is necessary, but the device can still perform most operations.
	User intervention is required and the device is not capable of performing some operations.

- Cartridge in Transport — the slot number where the tape currently in the robot originated. None if there is not a tape in the robotic.
- Odometer — the total number of moves the device has performed since its manufacture.

- Total Power On Time — the number of days, hours, and minutes that the device has been powered on since its manufacture.
- Robotic Status — the current status of the robotics and a description of the operation the robot is currently performing.
- Internal Temperature — the internal temperature reported by the device.
- Media Removal — Prevented, if the backup software is preventing media removal from the device. When media removal is prevented, the mailslot and magazine functionality is disabled.
- Left Magazine — Present, if the device senses the presence of the left magazine.
- Right Magazine — Present, if the device senses the presence of the right magazine.

Viewing dynamic drive information

The Status: Drive page (parallel SCSI), Figure 33 (page 43), and ??? provide detailed information about the tape drive in the Autoloader. When you click **Refresh**, the status is updated immediately.

Figure 32 Status: Drive page (parallel SCSI)

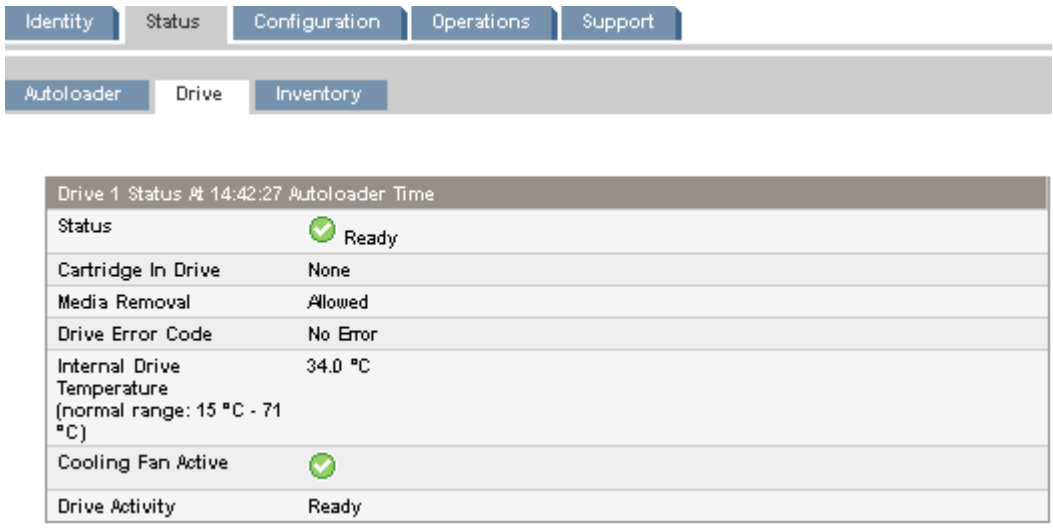


Figure 33 Status: Drive page (FC)

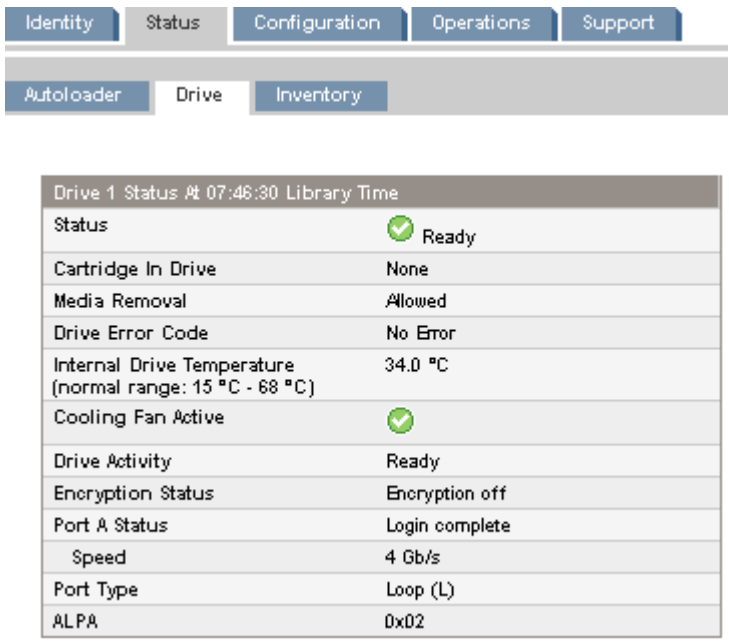
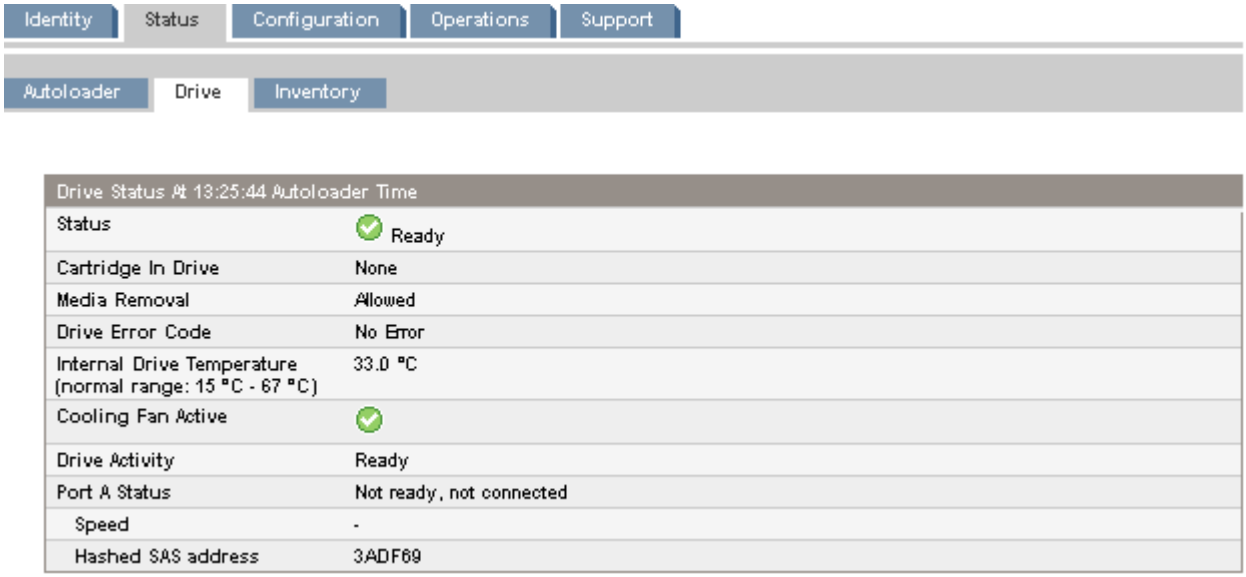


Figure 34 Status: Drive page (SAS)



You can see, but not modify, the following:

- Status of the drive

  The drive is operating normally.

  The device is functional, but might have an issue that should be addressed.

  The drive is in a failed state.

- Cartridge in Drive — information about the cartridge, if any, currently in the drive.
- Drive Error Code — the current drive error code if the drive is in a failed state. See Drive error codes (page 120) for a list of drive error codes.
- Internal Drive Temperature — internal temperature reported by the drive. The normal temperature range is provided for reference and varies depending on the type of tape drive. The tape drive will send out errors if there is any possibility of error due to temperature.

  NOTE: The Internal Drive Temperature is not the temperature of the tape path in the drive nor is this the operating environment temperature.

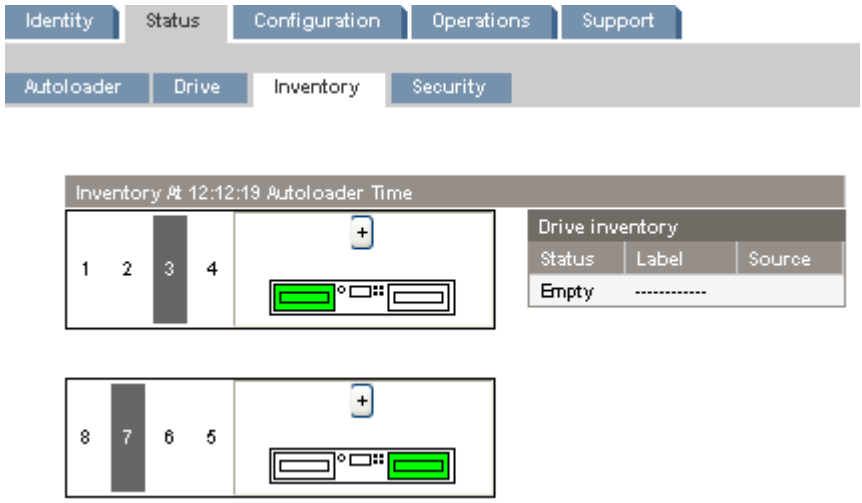
- Cooling Fan Active — On if the cooling fan is on
- Drive Activity — the current drive activity
- Encryption status — The current status of encryption on the drive.
- Port A Status (Fibre Channel and SAS tape drives) — current status of the port
- Speed (Fibre Channel and SAS drives) — the current speed setting of the drive port
- Port Type (Fibre Channel drives only) — the current setting of the drive port. Direct connected devices are typically Loop. Devices connected to a switch are typically Fabric.
- N-Port ID (Fibre Channel drives only) — Fabric address. Only relevant when in Fabric mode.

- ALPA (Fibre Channel drives only) — Loop address. Only relevant when in Loop mode.
- Hashed SAS address — A short version of the SAS World Wide Identifier (WWI) that is generated using a well-defined hash algorithm and is suitable for device identification in most systems. Some management software may report this value.

Viewing the tape cartridge inventory

The Status: Inventory page provides detailed information about the tape in the tape drive, with a summary of tapes in magazine slots.

Figure 35 Status: Inventory page



A dark rectangle indicates a full slot, a red rectangle indicates a cartridge with a problem, and a white rectangle indicates an empty slot.

To see detailed information about the tapes in a magazine, click on the + button to expand the display for the magazine (see Figure 36 (page 45)).

Figure 36 Status: Inventory: Media details pane

Media Details

Slot #	Attn	Status	In Drive	Label	Media Loads	Comment
1		Empty		----------		
2		Empty		----------		
3		Full, Gen. 4		TT1563L4		
4		Empty		----------		

In the media details pane,

- Slot # — lists “Mailslot” or the index number of each slot in the magazine from lowest to highest.
- Attn — indicates an attention state for storage slots or provides information on the mailslot state.
- Status — Full or Empty.
- In Drive — shows when the tape from this slot is in a drive.
- Label — the bar code label data for the tape in the slot.

- Media Loads — the number of times this tape has been loaded into a drive in its lifetime. This field may be blank if the tape has not been loaded into a drive in this device or if the inventory has changed.
- Comment — any additional information about the tape in the slot (for example, Clean Tape if the cartridge is a cleaning tape).

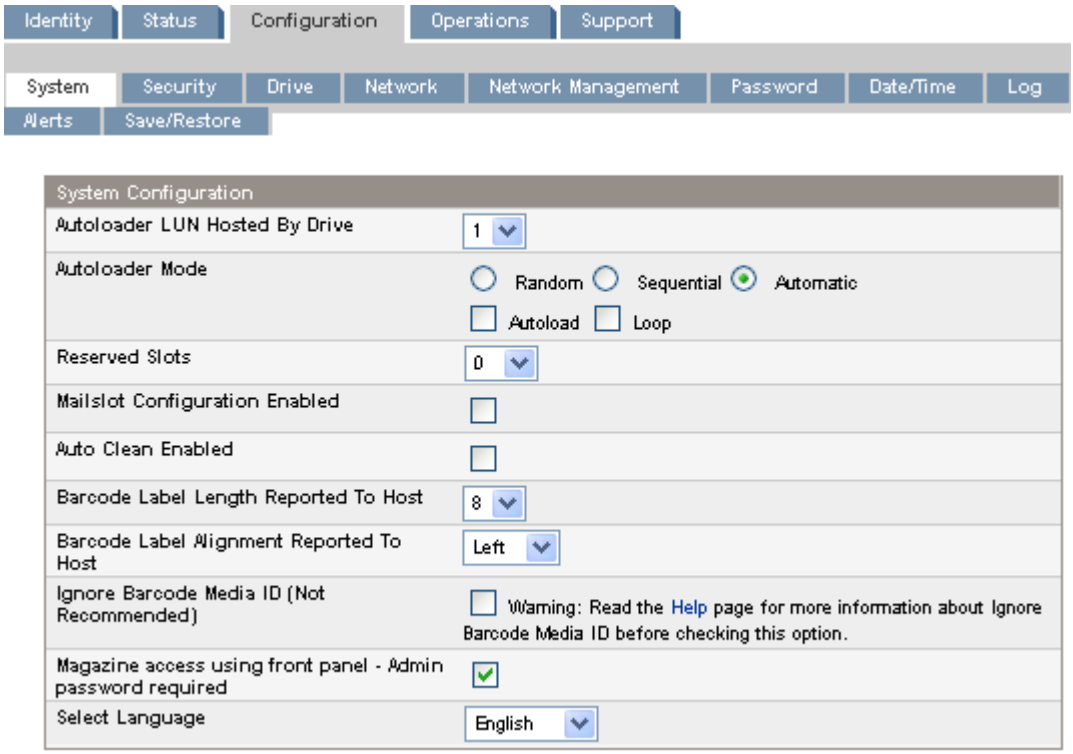
Configuration

Changing the system configuration

Use the Configuration: System page (page 46) to modify the system configuration.

System configuration changes are only applied after the **Apply Selections** or the **Submit** button is selected. After making the selection, a warning page informs you of the impact of the proposed change. In some cases a pop-up screen asks you to confirm the change. Many changes also require the device to reboot. You may need to click **Refresh** to see the changes.

Figure 37 Configuration: System page



- Mailslot Configuration Enabled — configures the first slot as a mailslot or storage slot. Enabling the mailslot will reduce the total number of storage slots. The default is disabled.

△ **CAUTION:** Since the mailslot is located where the lowest numbered storage slot would be, enabling and disabling the mailslot will re-number all of the other storage slots. After enabling or disabling the mailslot, update the backup software inventory. You might also need to re-configure the backup software to adjust the number of storage slots and presence of the mailslot.

- Auto Clean Enabled — When auto clean is enabled, the device automatically loads a cleaning cartridge when a tape drive needs to be cleaned. The device identifies a tape cartridge as a

cleaning cartridge if it has a bar code label that starts with CLN or after an unlabeled cleaning tape has been loaded into the tape drive.

The device can use a cleaning cartridge from any slot, even if the slot is not active. The device keeps track of the usage count for each of the cleaning cartridges. When multiple cleaning cartridges are available, the device will first choose an unknown cleaning cartridge so the device can start tracking the cartridge's usage count. If the device knows the usage count for all of the cleaning cartridges, the device will choose the one with the highest usage count.

Auto cleaning is disabled by default. You can enable automatic cleaning even if there are no cleaning cartridges in the device. In this case, the device will display a warning message.

CAUTION: Only enable automatic cleaning in either the backup application or the device, not both.

- Barcode Label Length Reported to Host — the number of bar code characters reported to the host application. This option provides interchange compatibility with libraries with more limited bar code reading capabilities. The default is 8.
- Barcode Label Alignment Reported to Host — configures the end of the bar code label characters to report to the host application when reporting fewer than the maximum number of characters. For example, when reporting only six characters of the bar code label `12345678`, if alignment is left, the device will report `123456`. If alignment is right, the device will report `345678`. The default is left.
- Ignore Barcode Media ID — when disabled, the barcode Media ID on the tape cartridges will be checked by the device. The device will only allow appropriate tape cartridges to be loaded into tape drives. The barcode Media ID is the last two characters of the barcode. For example, an LTO-4 labeled cartridge will not be allowed to move into an LTO-3 tape drive. See Backward read compatibility (page 33). When Ignore Barcode Media ID is enabled, the device will move any tape to any tape drive. If the cartridge is incompatible with the tape drive, a message will be displayed. HP strongly recommends that all tape cartridges have barcodes with the correct Media ID.
- Magazine access using front panel - Admin password required — when enabled, the Administrator password is required to remove the magazines from the front panel. When disabled, the magazines may be removed using the operator control panel without entering a password. The default is to require the Administrator password.
- Select Language — The language option affects the text on the RMI, the error messages, and the help pages. It does not affect the OCP menus, which will always be in English.
- Autoloader LUN Hosted by Drive — will always be 1 because the Autoloader only has one tape drive.
- Autoloader Mode — Random, Sequential, Automatic, Autoload, Loop

  The device supports three behavior modes: Random, Sequential, and Automatic. The device automatically detects the required mode from the series of SCSI commands it receives; however, you can also change the mode. Choose the operating mode based on the capabilities of the software controlling the tape cartridges.

  Random mode — In Random mode, the device does not automatically load tapes into the tape drives; it waits for commands from the software or operator to load and unload tapes. Random mode is used with a full featured or a robotics-aware backup application and is the most common mode of operation. Your backup software must support robotics, which may require an additional software module.

  Sequential mode — In Sequential mode, the device automatically loads and unloads tapes from the drive. Sequential mode is used when the backup software is NOT robotics-aware or was designed for standalone drives only.

The operator begins the sequence by loading the desired tape into the tape drive. When a tape is unloaded for any reason, the device automatically removes the tape from the drive, returns it to its original slot, then loads the tape from the next available higher numbered slot.

To further determine how you want tapes loaded into the tape drive while in Sequential mode, you can set the **Loop** and **Autoload** options.

- When **Autoload** mode is set, the device automatically loads the cartridge from the lowest-numbered full slot into the tape drive. It then follows standard sequential operation. After configuring Autoload mode, you must do one of the following for Autoload mode to take effect:
  - Power cycle the device from the front panel.
  - Reboot the device from the RMI Support: Reboot screen.
  - Move the lowest-numbered cartridge to the drive before starting the backup application. If the mailslot is enabled, the lowest cartridge location will be in the mailslot.
- When **Loop** mode is on, the original first cartridge in the sequence is reloaded after the device has cycled through all available cartridges. If Loop mode is off and the last cartridge has been unloaded, the device stops loading cartridges until you load another manually.

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

Automatic mode — In Automatic mode, the device switches from Sequential mode into Random mode when it receives certain SCSI commands. Automatic mode is the default setting.

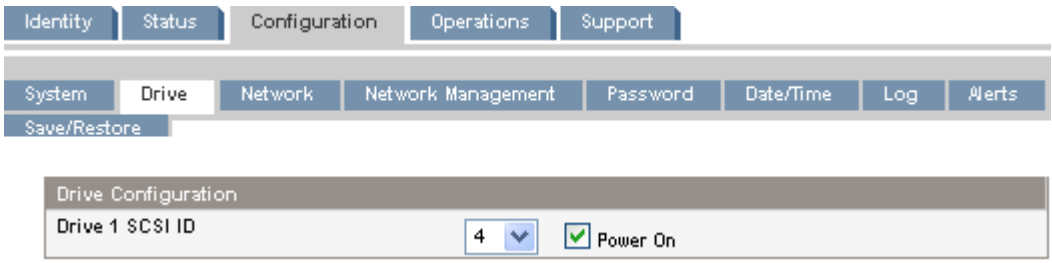
- Reserved Slots — The number of slots that are not available to the backup software. You can store cleaning or data tapes in the reserved slots. The slots are reserved from the highest slot number down. The default is to have no reserved slots.

  You can reserve up to six slots. If the mailslot is enabled, the maximum number of active slots is reduced by one.

Changing the drive configuration

Use the Configuration: Drive page (parallel SCSI) to change the tape drive's SCSI ID and power the tape drive off or on. Use the Configuration: Drive page (SAS) to power a SAS drive on or off. No configuration is needed for SAS drives. Use the Configuration: Drive page (Fibre Channel) to configure the FC port and power the tape drive off or on.

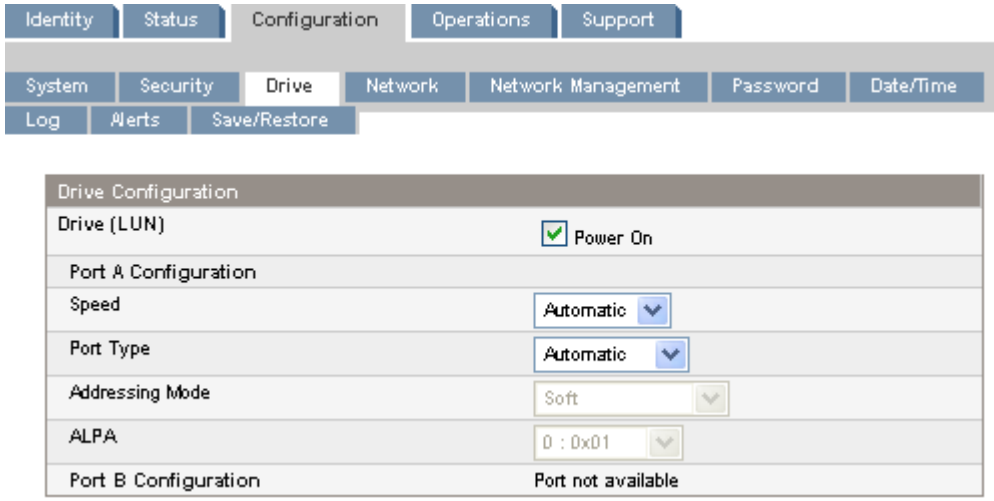
Figure 38 Configuration: Drive page (parallel SCSI)



For a parallel SCSI drive, you may change the

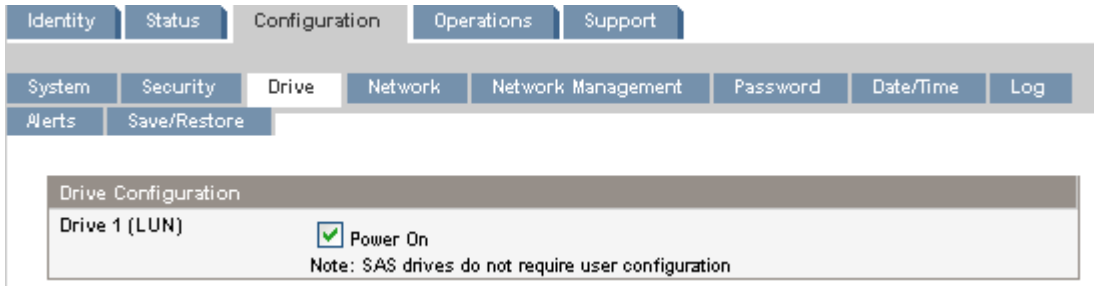
- SCSI ID — the SCSI address for a parallel SCSI tape drive.
- Power On — power the tape drive on or off.

Figure 39 Configuration: Drive page (Fibre Channel)



- Speed — Automatic, 1 Gb/s, 2 Gb/s, 4 Gb/s, or 8 Gb/s. Only speeds supported by the drive are listed. The default is Automatic.
- Port Type — Automatic, Fabric (N), or Loop (NL). Direct connected devices are typically Loop. Devices connected to a switch are typically Fabric. The default is Automatic.
- Addressing Mode — addressing mode when the port type is Loop: Hard, Soft, or Hard auto-select. If the Addressing Mode is Hard, you must configure a fixed ALPA address that is unique on the loop. If the Addressing Mode is Soft, the system will assign an ALPA during fabric login. If the Addressing mode is Hard auto-select, the device will acquire an ALPA at the initial system setup and then fix that as a hard address from then on.
- ALPA — Arbitrated Loop Port Address

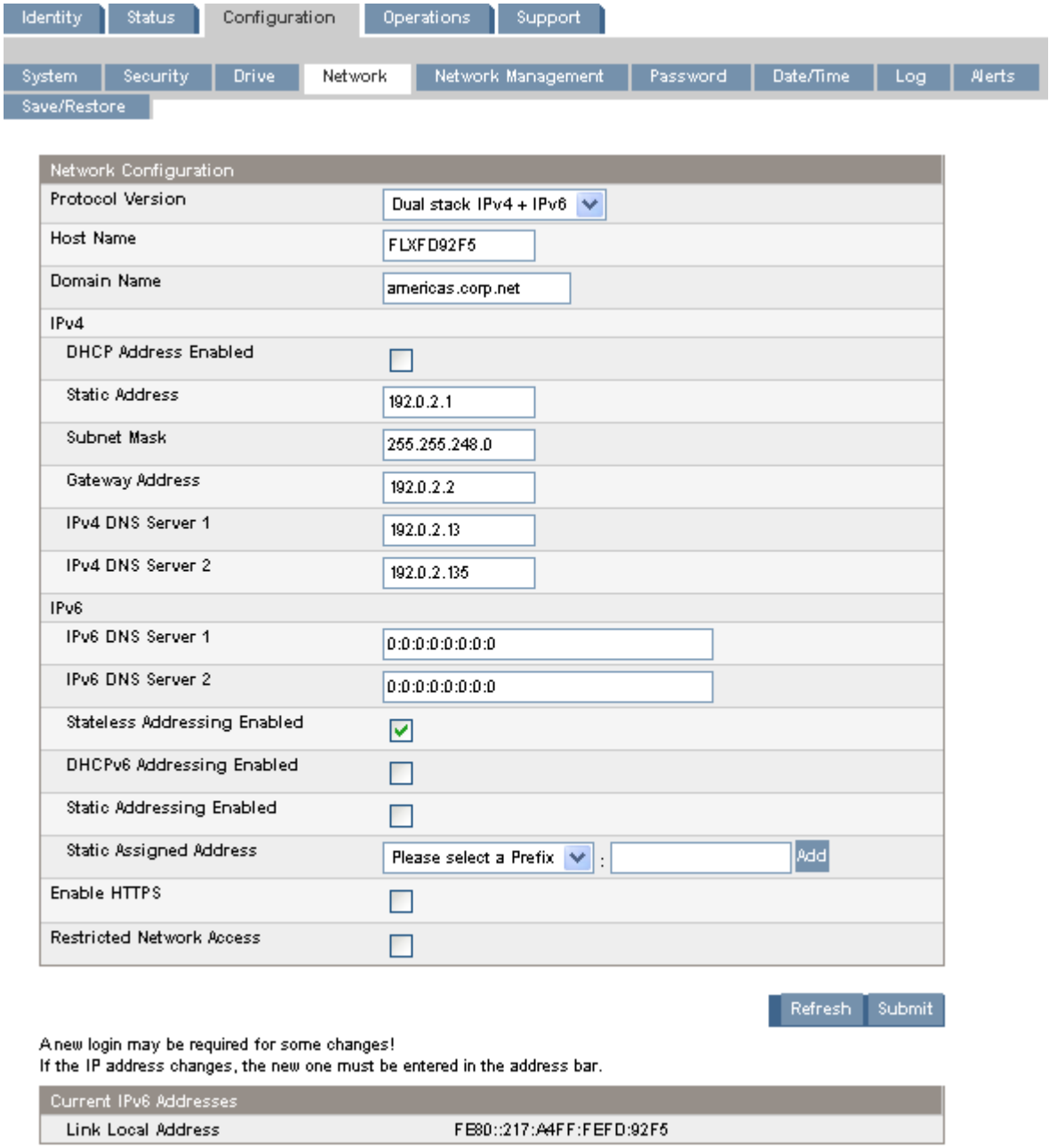
Figure 40 Configuration: Drive page (SAS)



Changing the network configuration

Use the Configuration: Network page to modify the current network configuration. When you request a change, a pop-up box will ask you to confirm the changes.

Figure 41 Configuration: Network page



You may change the:

- Protocol version — selects the Internet Protocols that will be enabled. Select IPv4 only, IPv6 only, or both IPv4 and IPv6 protocols. The default is the IPv4 protocol only.
- Host Name — enter the host name provided by your network administrator for the Autoloader.
- Domain name — enter the domain name provided by your network administrator for the Autoloader.
- Enable HTTPS — when On, the RMI can only be accessed through an HTTPS connection.
- Restricted Network Access — when On, disables all non-essential network functionality that is not required for normal product operation. In most circumstances leave this On.

For IPv4, you may change the:

- DHCP Address — when On, the Autoloader will request an IP address from a DHCP server each time the device is booted. The default is On.
- Static Address — configures the IP address if DHCP is not enabled.
- Subnet Mask — configures the network mask of the autoloader controller if DHCP Address is not On.
- Gateway Address — configures the gateway address if DHCP Address is not On.
- IPv4 DNS Server 1 and IPv4 DNS Server 2 — configures the addresses of up to two DNS servers if DHCP Address is not On.

For IPv6, you may change the:

- IPv6 DNS Server 1 and IPv6 DNS Server 2 — configures the addresses of up to two DNS servers if DHCPv6 is not enabled.
- Stateless Addressing Enabled — when On, the Autoloader will generate an address for itself based on the routing information obtained from a router advertisement and the MAC address. The Autoloader can manage up to five global addresses at the same time, which can be assigned from different routers. The default is On.
- DHCPv6 Addressing Enabled — when On, the Autoloader will request an IP address from a DHCP server each time the device is booted. The default is Off.
- Static Addressing Enabled — when On, the Autoloader will use a statically-configured address. The default is Off.
- Static Assigned Address — configures the address when Static Addressing Enabled is On. You can select the standard prefix, `FE80:`, or the prefix of a nearby router. Enter the remainder of the address and click **Add**.

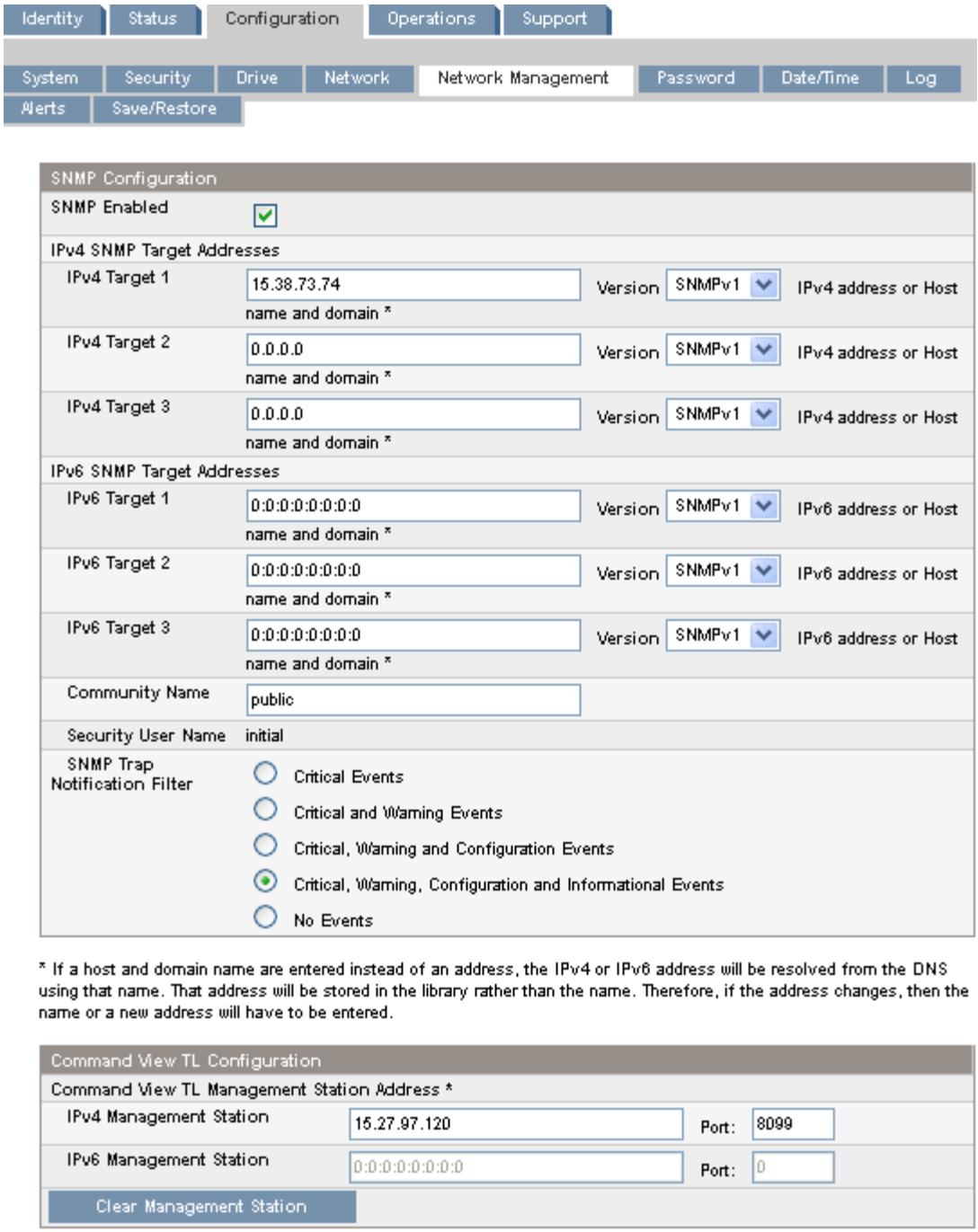
To remove an IPv6 static IP address, click **Delete** next to the address in the **Current IPv6 Addresses** pane.

Configuration: Network Management

Use the Configuration: Network Management page to enable and configure SNMP (Simple Network Management Protocol), which allows applications such as HP Systems Insight Manager (http://www.hp.com/products/SystemInsightManager) to manage the device. The device supports both SNMP configuration and SNMP traps. SNMP can only be configured with the RMI; it cannot be configured with the OCP.

Command View TL TapeAssure provides comprehensive summaries and detailed information about the properties, performance, utilization, and health of all tape drives and media for all monitored HP libraries. This data can be exported on demand or at scheduled times to a comma-separated values (.csv) file for analysis with spreadsheet programs or custom scripts.

Figure 42 Configuration: Network Management page



You may change the:

- SNMP Enabled — When checked, the device can be managed by computers listed in the SNMP Target IP Addresses field.
- SNMP Target IP Addresses — the IP addresses for up to three computers running IPv4 SNMP management software and up to three computers running IPv6 SNMP management software. IP addresses will not be cleared if SNMP is disabled, but those targets will no longer be able to manage the Autoloader and will not receive traps from the Autoloader. You can select the SNMP version for each target address.

- Community Name — a string used to match the SNMP management station and device. It must be set to the same name on both the management station and the Autoloader. The default community name is *public*.
- SNMP Trap Notification Filter — the types of events for which the device should send SNMP traps.
- IPv4 or IPv6 Management Station — IP address of the Command View TL management station. Only one management station can be configured. If both IPv4 and IPv6 IP addresses are provided, only the IPv4 address will be used

Configuring HP Systems Insight Manager for the Tape Autoloader

The Autoloader uses the HP NetCitizen MIB, which is supported by HP Systems Insight Manager (SIM) and many other applications. To detect the Tape Autoloader using a remote management application, such as HP SIM, you must first add the IP address for the management system as an SNMP target using the network configuration. SNMP queries are only accepted from configured targets.

To configure the Autoloader for use with HP SIM:

1. From the RMI, add the HP SIM management station as an SNMP target.
2. If the Autoloader IP address is in an HP SIM automatic discovery IP address list, the SIM management station will detect the Autoloader at the next scheduled scan.

To configure HP SIM for manual discovery:

1. In the HP SIM toolbar, click **Options > Discovery**.
2. Click the **Manual** tab.
3. Enter the Autoloader's IP address or system name.

SIM 5.1 will automatically detect the system type and product name.

To manually identify the Autoloader with SIM 5.0 and older:

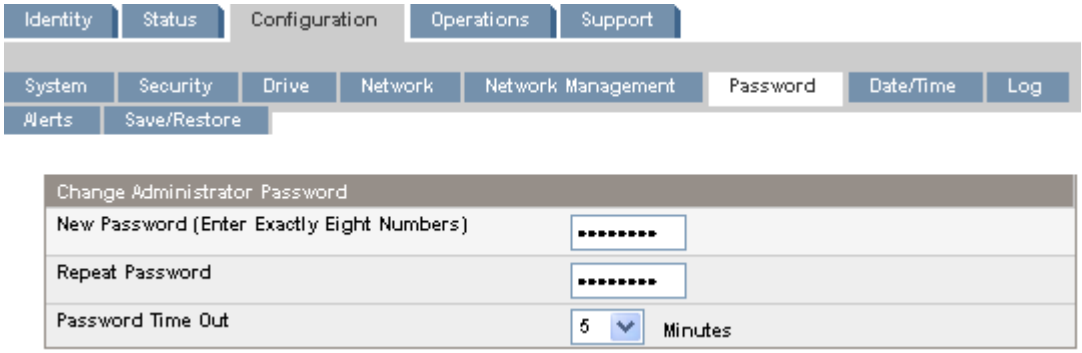
1. In the HP SIM **System and Event Collections** pane, click **Systems by Type**.
2. In the **Systems by Type** pane, click **All systems**.
3. Click the link with the IP address or name of the Tape Autoloader.
4. Click the **Tools & Links** tab.
5. Click **Edit System Properties**.
6. Set **System Type** to **Tape Library**.
7. Enter the **Product Model** of your Tape Autoloader.
8. Click **OK**.

Changing the administrator password

Use the Configuration: Password page to change the administrator password for the RMI and OCP.

NOTE: You must set the administrator password with the OCP before you can access administrator functionality in the RMI. See Changing the administrator password (Configuration > Change Admin Password) (page 71).

Figure 43 Configuration: Password page



You may change the:

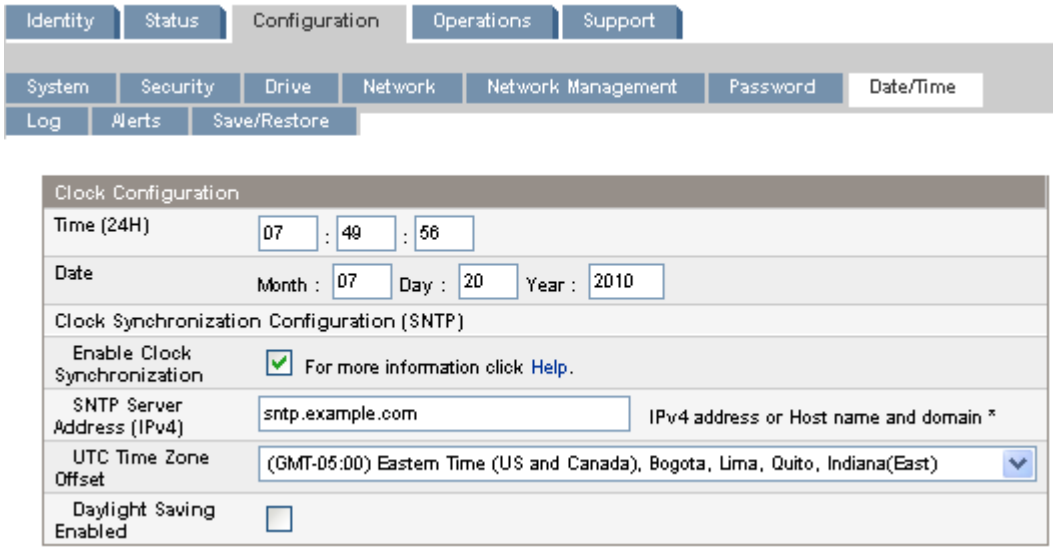
- Password — The password is exactly eight numbers, each from 0 to 9.
- Password Time Out — The number of minutes that the current administrator login session will remain logged in without user interaction.

Setting the date and time

Use the Configuration: Date/Time page to set the date and time.

NOTE: The device does not adjust its time to daylight saving time; the time must be adjusted manually.

Figure 44 Configuration: Date/Time page



You may change the:

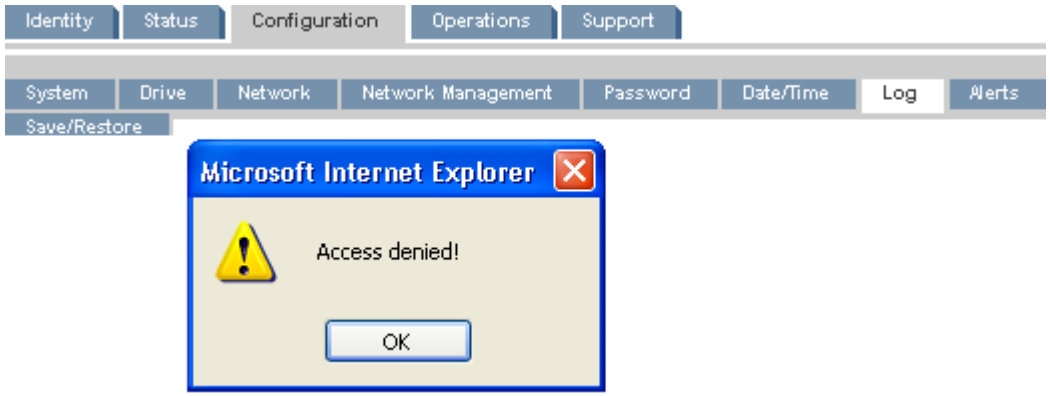
- Time — configures the hours, minutes, and seconds for the internal clock. The time is based on a 24-hour clock, where 1:00 pm is 13:00.
- Date — configures the current month, day, and year for the internal clock.
- Enable Clock Synchronization — When enabled, the device will use the configured Simplified Network Time Protocol (SNTP) service to obtain the current date and time.
- SNTP Server Address — the IP address of an SNTP server. The SNTP server may be configured with either an IPv4 or IPv6 address, or with a host and domain name. If a host and domain name are entered, the IP address will be resolved from the DNS using that name. The device will store the resulting address, rather than the name. If the address changes, enter the name or a new address so the device can find the server again.

- UTC Time Zone Offset — Select the time zone for your area.
- Enable Daylight Savings Adjustment — Enabling daylight saving time will advance the local time by one hour. This setting does NOT automatically adjust the device time for daylight saving time based on the calendar. You must manually enable this setting when daylight saving time starts in your area and disable it when daylight saving time ends.

Setting error log mode

The Configuration: Log page can only be accessed by HP Service personnel.

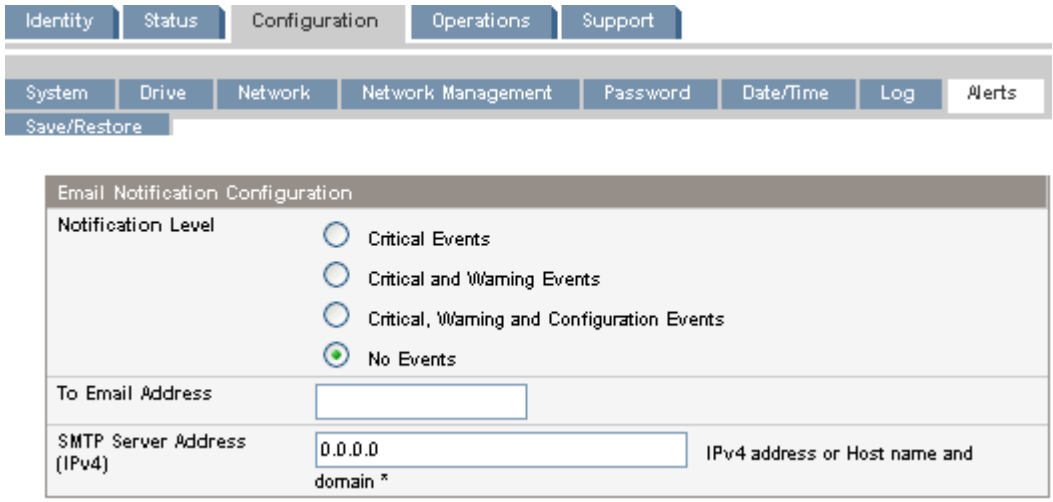
Figure 45 Configuration: Log page



Setting event notification parameters

The Configuration: Alerts page lets you configure e-mail notification of device events.

Figure 46 Configuration: Alerts page



You may change the:

- Notification Level — the types of events for which the device should send e-mail
- To Email Address — the address to which to send the reported events (e.g. firstname.lastname@example.com). Only one email address can be configured.
- Email Domain — domain of the return e-mail address (e.g. example.com)
- SMTP Server Address — IP address of the SMTP server

Saving and restoring the device configuration and restoring factory defaults

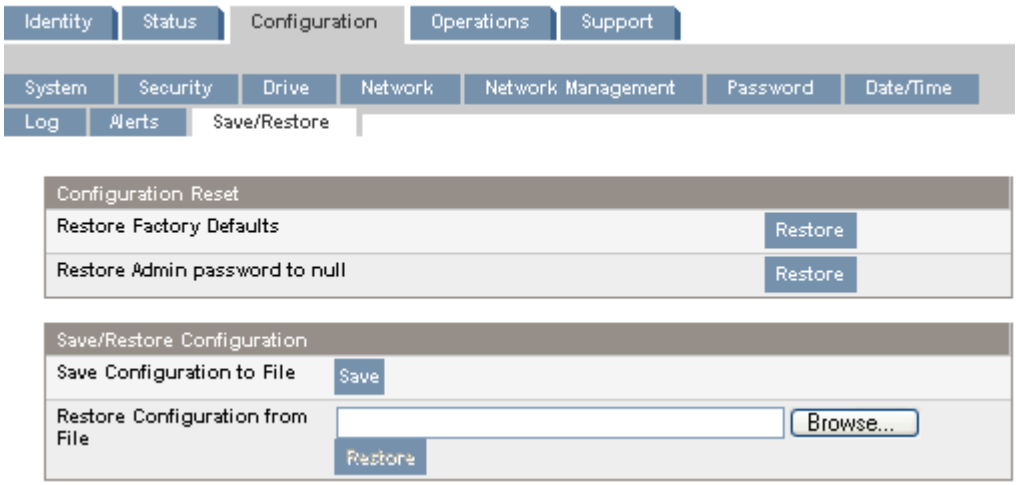
Use the Configuration: Restore defaults page to restore the factory defaults, reset the administrator password to null, or save the device configuration database to a file. The device will perform an inventory after the defaults are restored.

IMPORTANT: Once you reset the administrator password to null, you will not be able to access the administrator functions in the RMI until you set an administrator password through the OCP. To *change* the administrator password, use Configuration: Password page (page 54).

The saved configuration database will make it easier to recover the device configuration if you need to replace the chassis. This feature is also useful when installing multiple devices. Either save the configuration before configuring the network or ensure that only one device with the same network configuration is on the network at a time until they have unique network identities.

NOTE: You can save the device configuration to a USB flash drive from the OCP. For the , see Saving and restoring the Autoloader configuration (Configuration > Save/Restore Configuration) (page 76).

Figure 47 Configuration: Save/Restore page



The restored factory default settings are:

- SCSI address: 4
- Drive power: drive powered on
- Active slots: maximum possible
- Autoloader mode: Automatic
- Loop: No
- Event log levels and filter: continuous trace and all levels and filters active (for HP Service use only)
- Barcode reader label length: 8
- Barcode reader alignment: Left
- Error recovery: On
- Mailslot configuration: mailslot disabled
- Auto clean: disabled

- SNMP: disabled, but saved addresses do not change
- E-mail notification: disabled, but configurations retained

The following settings are not reset:

- Administrator password
- Network settings (network is always enabled and the network addresses are retained)
- Date and time

To save the device configuration to a file, click **Save** and follow the instructions on the RMI to specify a file location.

To restore the device configuration from a file, browse to the location of the saved configuration file and click **Restore**.

The configuration settings that are saved to file are:

- Administrator password
- Mailslot configuration
- All network settings, including DHCP, DNS, IPv4 and IPv6 addresses
- Barcode reader label length and barcode reader alignment
- Reserved slots
- Autoloader mode
- All drive configuration settings
- Auto clean
- SNMP addresses and configurations
- Log tracing configuration
- Email notification configuration (SMTP address, email address, filter level)
- Option to allow the magazine access without the administrator password
- Option to ignore the barcode media ID
- Encryption and security settings

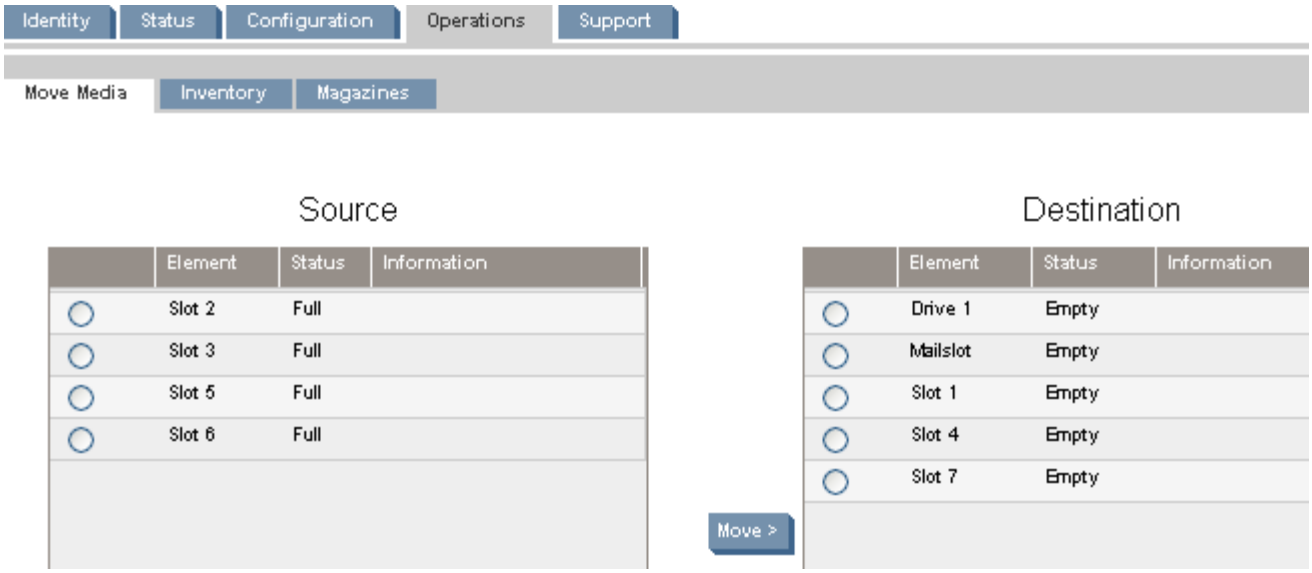
Operations

Moving media

Use the Operations: Move Media page to move tape cartridges within the device.

IMPORTANT: Moving media manually can interfere with backup software operations. Ensure backups are complete before moving media.

Figure 48 Operations: Move Media page



To move a tape, select the source and destination and then click the **Move** button in the center of the screen to start the move.

Updating the current media inventory

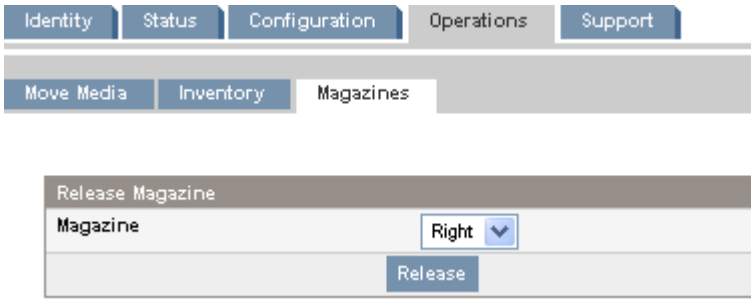
Use the Operations: Inventory page to have the device re-scan the tapes to update the media inventory.

Figure 49 Operations: Inventory page

Releasing and replacing the magazines

Use the Operations: Magazine page to release the left, right, or both magazines. When you click **Release**, the device will unlock the magazine and display **Left Magazine Unlocked** or **Right Magazine Unlocked** on the OCP screen. If you do not remove the magazine within a few seconds, the device will lock it. When you replace the magazine, the device will inventory the magazine's tape cartridges.

Figure 50 Operations: Magazines page



NOTE: To manually release a magazine, see Releasing the magazines manually (page 102). However, this manual process should only be used if the magazine cannot be released using the OCP or RMI.

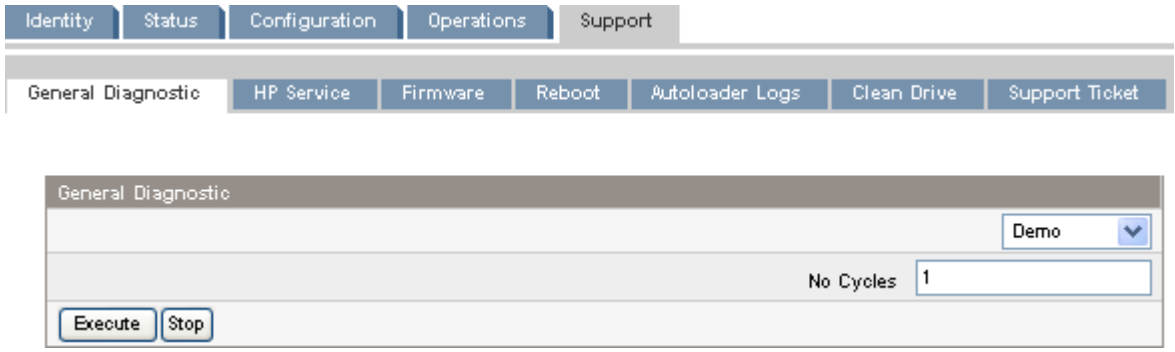
Support

CAUTION: Some RMI operations take the device offline. This inactive mode can interfere with host-based application software, causing data loss. Ensure that the device is idle before attempting to perform any remote operations that take it offline.

Performing general diagnostics

Use the Support: General Diagnostic page to run general tests to verify the usability and reliability of the device. Select the test and enter the number of test cycles before starting the test. To cancel the test early, click on the **Stop** button.

Figure 51 Support: General Diagnostic page



The available tests are:

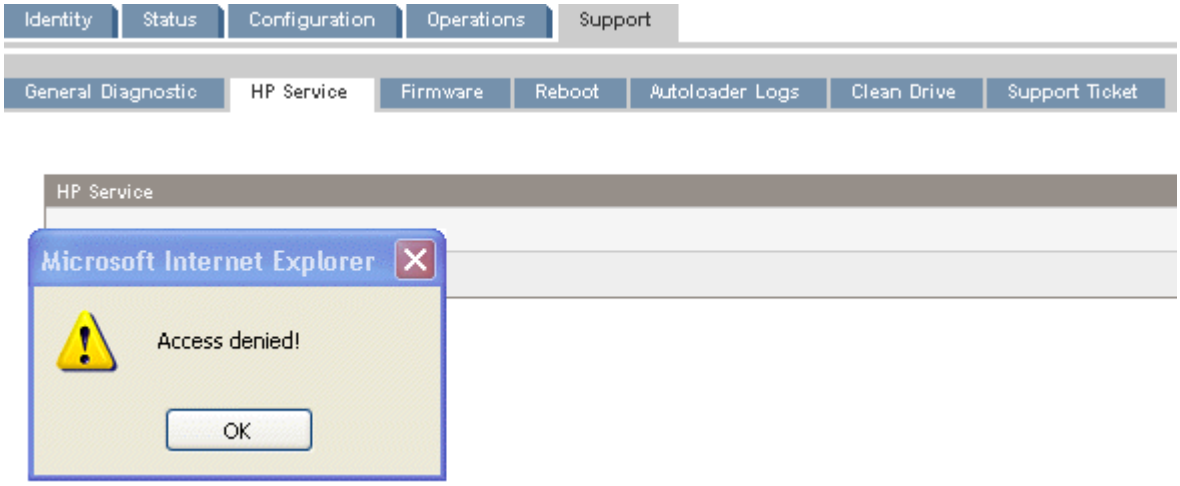
- Demo — moves cartridges from the slots to the drives and back. At the end of the test the cartridges are returned to their original slots.
- Slot to slot — shuffles the cartridges between slots to exercise the robot. At the end of the test the cartridges are NOT returned to their original slots.

The demo and slot to slot test are intended to show the device operating. For service and diagnostics, execute the wellness test from the OCP. See The wellness test (page 102).

HP Service - **Service restricted**

The Support: HP Service page page can only be accessed by service personnel to execute detailed tests on the different components of the device or special read/write diagnostics on the drives.

Figure 52 Support: HP Service page

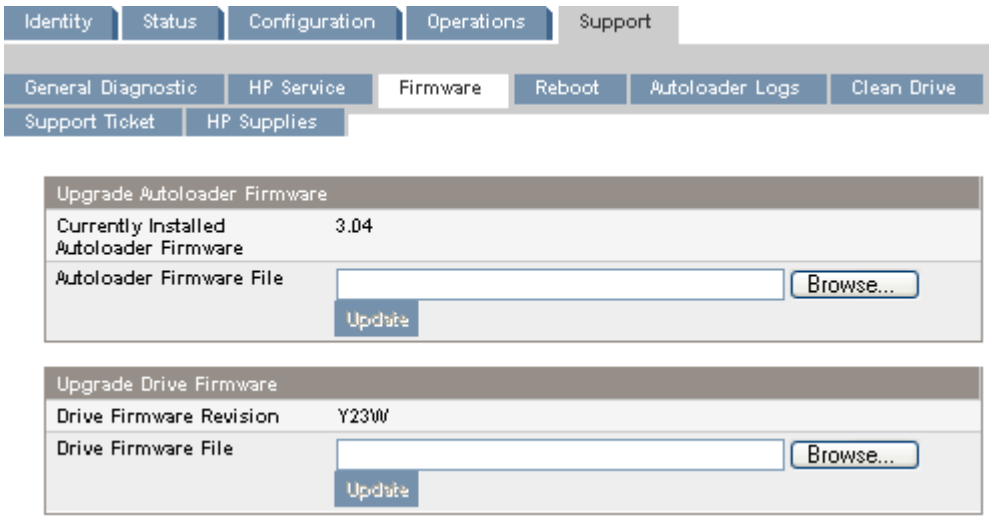


Determining and updating firmware

Use the Support: Firmware page to see the current version of the device and drive firmware, and upload new firmware. The firmware files must be in the HP L&TT format with the .frm file extension. You can find firmware files on the HP Support website: www.hp.com/support. After the firmware is updated, the device or tape drive with updated firmware is reset.

CAUTION: Do not interrupt the device while a firmware update is in progress. Updating the tape drive firmware can take several minutes because the firmware is transferred through a serial connection.

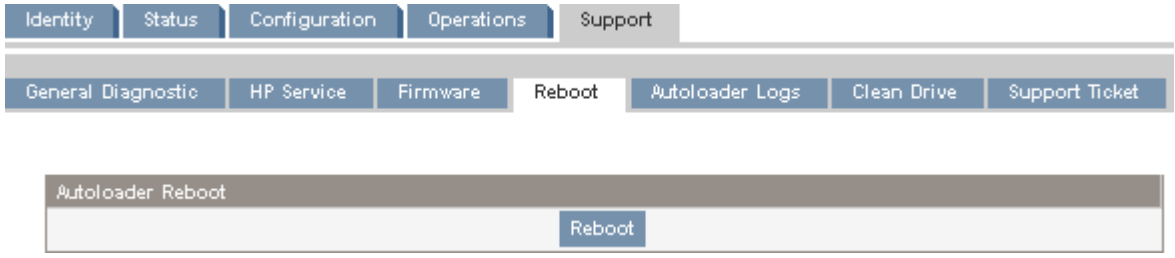
Figure 53 Support: Firmware page



Rebooting the device

Use the Support: Reboot page to do a soft reset of the device, which will run the Power On Self Test (POST) and scan for a new inventory. The RMI web page will refresh itself after a short time delay. This time should be sufficient to reload the page. However, during a reboot, the connection to the device may be lost. If the connection is lost, you will have to reload the page manually.

Figure 54 Support: Reboot page



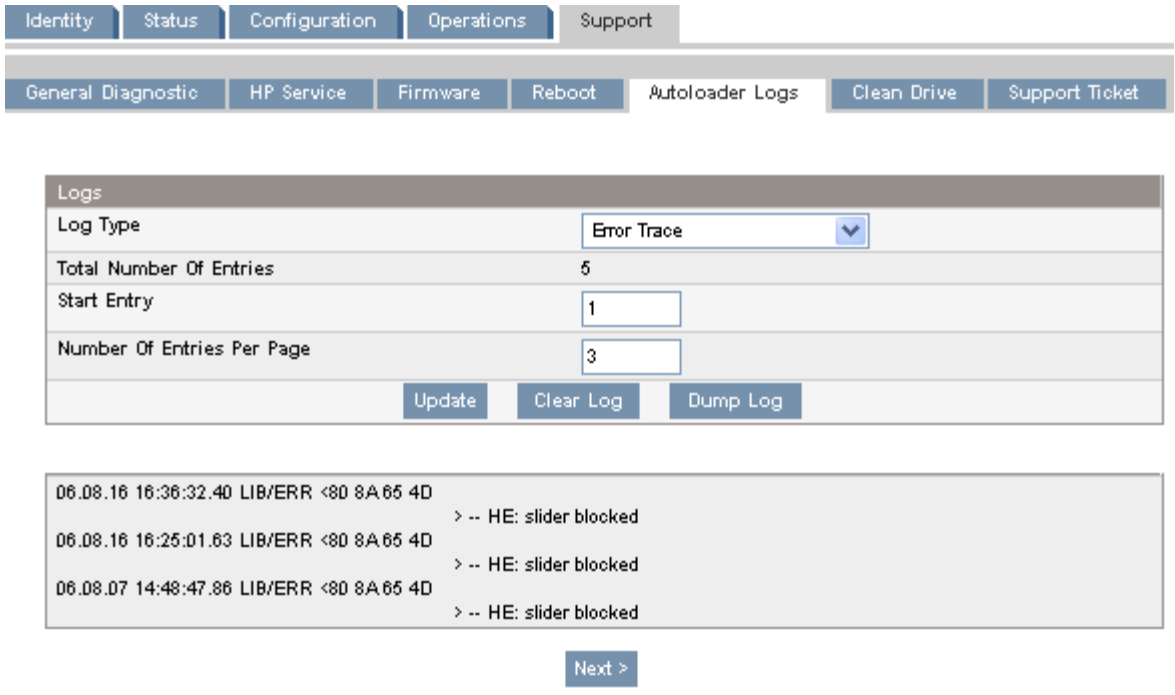
Viewing logs

From the Support: Autoloader Logs page you can see the device logs. The available logs are: Error Trace, Informational Trace, Warning Trace, Configuration Change Trace, and Standard Trace.

The log entries are displayed in order of most recent to oldest. The format for the log entries is: YY.MM.DD HH.MM.SS.ss LIB/ERR<80 89 62 40

- YY.MM.DD — the date displayed as Year.Month.Day
- HH.MM.SS.ss — the time displayed as Hour.Minute.Second.Hundredths of a second
- First code — hard or soft error. The code after LIB/ERR (80 in the example) will be 80 or 40. 80 indicates a hard error, 40 indicates a soft error.
- Second code — the main error code (89 in this example). See Error codes (page 103) for a list of error codes and recovery procedures.
- Third code — the sub-code (62 in this example). See Error sub-code descriptions (page 117) for a list of sub-codes.
- Fourth code — sub-code-specific information for factory use only

Figure 55 Support: Autoloader Logs page

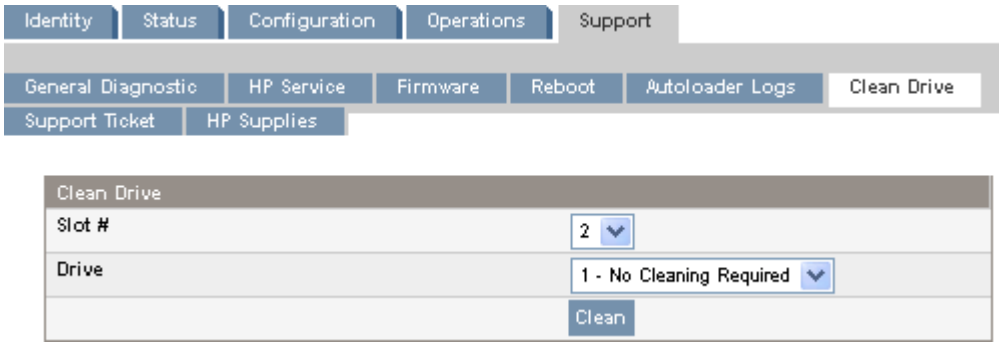


Cleaning the tape drive

Use the Support: Clean Drive page to clean the tape drive.

- Slot # — select the slot number of the cleaning tape

Figure 56 Support: Clean Drive page

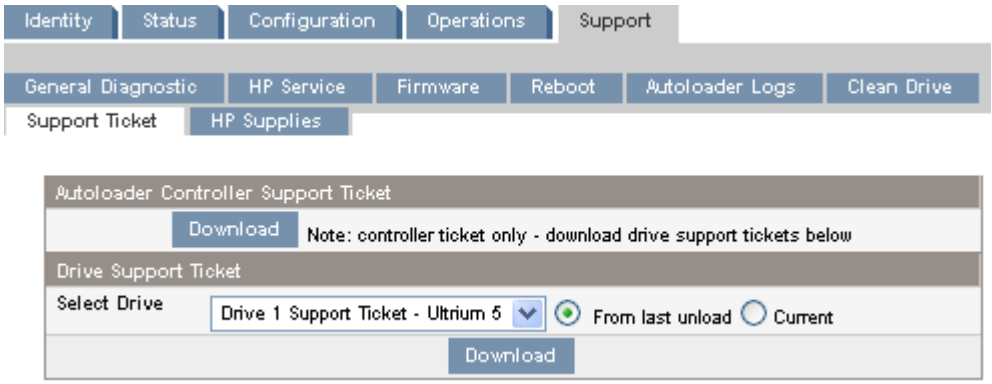


Downloading a support ticket

Use the Support: Support ticket page to download a support ticket for the Autoloader or tape drive. The support ticket can help a service engineer or system administrator diagnose a device problem.

NOTE: LTO 2 and 3 tape drives must be empty to download support tickets. LTO 4 tape drives with firmware newer than B34W (parallel SCSI) or U24W (SAS) will automatically generate a support ticket during an unload and that ticket may be downloaded at any time. LTO 4 tape drives with older firmware must be empty to download a support ticket. Gathering a current ticket for an LTO 4 tape drive may cause a temporary performance decrease while the ticket is generated.

Figure 57 Support: Support Ticket page



Operator control panel (OCP)

The operator control panel on the front of the device includes a 2-line by 16-character green backlit liquid crystal display (LCD), four function keys, and four LEDs. This panel provides everything you need to monitor the device status and control its functions.

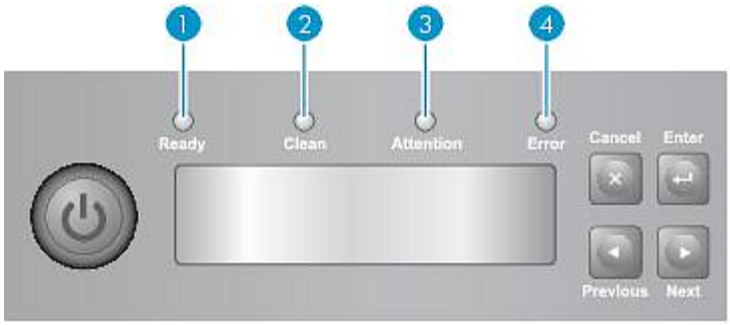
The following functions are available through the OCP:

- Upgrading firmware (Support > Autoloader FW Upgrade, Support > Drive FW Upgrade) (page 81)
- Forcing the drive to eject a tape (Support > Force Drive To Eject Tape) (page 83)
- Viewing logs (Support > Autoloader Error Log) (page 83)
- Downloading a support ticket (Support > Download Support Ticket) (page 83)

LED indicators

The operator panel includes four LEDs that provide a summary of the device status as detailed in Figure 58 (page 64).

Figure 58 LEDs

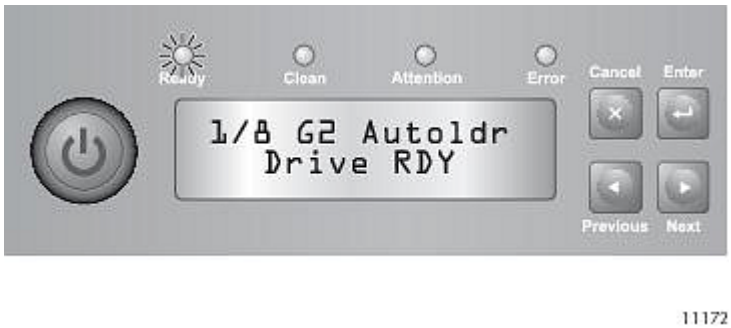


1.	Green	**Ready**. Illuminated when power is on. Blinking during tape drive or robotics activity.
2.	Amber	**Clean**. Illuminated when a cleaning cartridge should be used.
3.	Amber	**Attention**. Illuminated if the device has detected a condition that requires attention.
4.	Amber	**Error**. Illuminated if an unrecoverable error occurs. A corresponding error message displays on the LCD screen.

Autoloader home screen

The first line of the Home screen displays the device's product name as shown in Figure 59 (page 64). The second line displays a brief status message.

Figure 59 Home screen



Drive status definitions are listed in Table 16 (page 64).

Table 16 Drive status

Status	Definition
IDLE	Drive has a tape inserted, but there is no activity
RD	Drive is reading

Table 16 Drive status *(continued)*

Status	Definition
FWD	Drive is forwarding
WR	Drive is writing
LD	Drive is loading a tape
ULD	Drive is unloading a tape
CLN	Drive is cleaning
RWD	Drive is rewinding
SEEK	Drive is seeking
MOV	Performing a tape move or tape exchange operation
ERASE	Drive is erasing a tape
CAL	Drive is calibrating
TEST	Performing a test
UPGR	Performing a firmware upgrade operation
DCR	Decrypting
ENC	Encrypting

Operator control panel buttons

The four operator control panel buttons, described in Figure 60 (page 65), let you traverse the OCP menu structure and enter information.

Figure 60 Operator control panel buttons

Cancel	Cancels the current menu option, returns to the previous menu level, or returns to the Home screen.
Enter	Enters the menu or selects the option displayed on the LCD 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.

Understanding the menu structure

The OCP options are organized under five menus: Unlock Mailslot, Status/Information, Configuration, Operations, and Support.

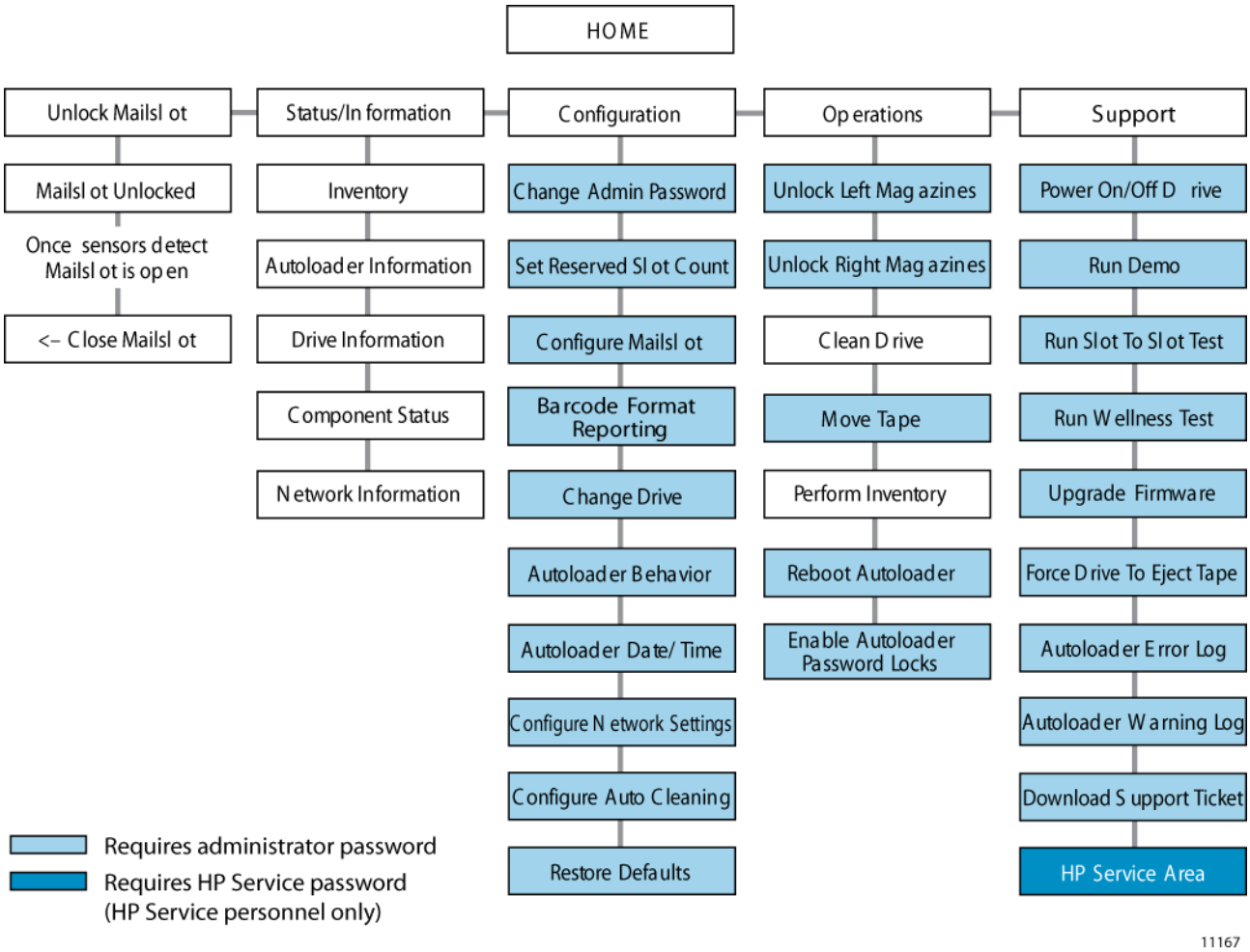
NOTE: The Unlock Mailslot menu is only displayed when the mailslot is enabled. To enable the mailslot, see Configuring the mailslot (Configuration > Configure Mailslot) (page 71)

From the Home screen, press **Enter** to bring up the first menu item. From a menu, use the **Previous** and **Next** keys to cycle through the menus, press **Enter** to see the first option in the menu, or press **Cancel** to return to the Home screen.

From an option, use the **Previous** and **Next** keys to cycle through the options in the menu, press **Enter** to select the option, or press **Cancel** to return to the menu list.

The menu structure is shown in Figure 61 (page 66).

Figure 61 Autoloader menu tree



The administrator password accesses all of the available functionality, except for the HP Service Area. A user without the administrator password has access to the **Unlock Mailslot** and **Status/Information** menus.

Entering the administrator password

TIP: By default, the administrator password is unset; all of the digits are null. You must set the administrator password from the OCP to protect the administrator functions on the OCP and enable the administrator functions in the RMI.

Options that require a password will prompt for a password before allowing access to the restricted screens. Once entered, the administrator password does not need to be entered again unless there is no user activity for five minutes or the password lock is enabled.

The number **1** should be flashing. To enter the password, do the following:

1. From the operator control panel, press **Next** to scroll to the first number of the password.

2. Press **Enter**. The number you selected is replaced with an asterisk (*), and the cursor proceeds to the next text box.
3. Repeat steps 1 and 2 until you have entered all eight numbers. After the last number has been entered, the screen continues to the restricted area.

NOTE: If you forget the administrator password, you cannot enter a new password. You must call your customer service representative.

Unlocking the mailslot (Unlock Mailslot)

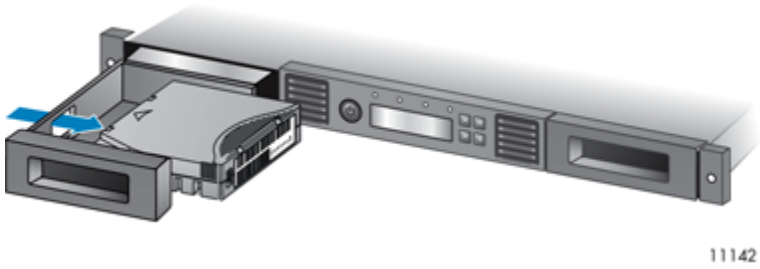
The mailslot in the left magazine is used only with host system software that supports this feature. The mailslot feature allows you to insert or remove a single tape without removing the entire magazine. The benefit of using a mailslot is that the device will not inventory the rest of the slots in the magazine so the device can return to service sooner. The mailslot is in the left magazine.

NOTE: The Unlock Mailslot menu is only displayed when the mailslot is enabled. To enable the mailslot, see Configuring the mailslot (Configuration > Configure Mailslot) (page 71)

To access the mailslot:

1. From the Home screen, press **Next** until the screen displays **Unlock Mailslot**. Press **Enter** to select.
2. The mailslot ejects automatically. Pull the mailslot out to access the tape (see Figure 62 (page 67)).
3. The screen displays **Close Mailslot**.
4. Remove the tape cartridge from the mailslot and insert a different tape cartridge.
5. Push the magazine back into the device.

Figure 62 Removing a tape from the mailslot



Status/Information

The Status/Information menu provides access to the following status options:

- Inventory (Status/Information > Inventory) (page 68)
- Autoloader information (Status/Information > Autoloader Information) (page 69)
- Drive information (Status/Information > Drive Information) (page 69)
- Component status (Status/Information > Component Status) (page 69)
- Network information (Status/Information > Network Information) (page 70)

To access the Status/Information menu:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Status/Information**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays your selected function. Press **Enter** to select.

Inventory (Status/Information > Inventory)

This option provides information on which slots have cartridges and which are empty. The second line on the screen displays one of:

- Full (tapes without bar code labels)
- Bar code identification from the tape
- Empty

The device has the following inventory locations:

- Mailslot
- Left magazine
- Right magazine
- Drive

Each location provides different information:

- Drive or Mailslot: The screen display may read **Mailslot AESO32L3**, where AESO32L3 is an example of the bar code number on the tape, or it may read **Full** or **Empty.**
- Left or right magazine: The screen display may read **Left Magazine** or **Right Magazine.** The second line on the display indicates which slots have a tape or are empty. Slots in the left magazine are numbered 1-4 or 1-3, and slots in the right magazine are numbered 5-8 or 4-7. Each slot is represented by a character, as shown in Table 17 (page 68).

Table 17 Display indication definitions

Character displayed	Definition
X	Slot has a tape
-	Slot is empty
m	Mailslot is enabled but does not have a tape
M	Mailslot has a tape
C	Slot has a cleaning tape
!	Media needs attention, often as a result of a damaged or incompatible cartridge

NOTE: If the mailslot is enabled, the storage slot count is reduced.

To view more details about the contents of each slot, press **Enter** when the screen displays either **Left Magazine** or **Right Magazine**.

To view the tape inventory:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Status/Information**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Inventory**. Press **Enter** to select.
3. By using **Previous** or **Next**, you can select from the following inventory locations:
   - Left magazine — includes the mailslot
   - Right magazine
   - Drive
4. To view the inventory of a magazine, press **Enter** when the OCP displays **Left** or **Right Magazine**. The OCP will display the contents of the lowest numbered slot in the magazine. The display will show the tape bar code number, **Full**, or **Empty**.
5. Use **Previous** or **Next** to scroll through the remaining slots in the magazine. Press **Cancel** to choose another inventory location.

6. To view the inventory of a tape drive, press **Previous** or **Next** until the screen displays **Drive**. The display will show the tape bar code number, **Full**, or **Empty**.

Autoloader information (Status/Information > Autoloader Information)

To obtain information about your device:

1. From the Home screen press **Previous** or **Next** until the screen displays **Status/Information**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Autoloader Information**. Press **Enter** to select.

   By using **Previous** or **Next**, you can select from the following information screens:

   - Autoloader Time
   - Firmware rev.
   - Product ID
   - Serial number
   - SCSI ID and LUN (SCSI devices only)
   - Slots and Mailslots
   - Odometer
   - Power On Time

Drive information (Status/Information > Drive Information)

To obtain drive information:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Status/Information**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Drive Information**. Press **Enter** to select.
3. By using **Previous** or **Next**, you can select from the following information screens:
   - Serial number
   - Drive type
   - Firmware revision
   - SCSI ID (parallel SCSI tape drives only)

Component status (Status/Information > Component Status)

To obtain component status:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Status/Information**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Component Status**. Press **Enter** to select.

3. By using **Previous** or **Next**, you can select from the following information screens:
   - Drive activity
   - Autoloader status
   - Drive status
   - Fan status

   The second line of the screen will display one of the following:
   - Good — the component is operating normally.
   - Warning — the component might have an issue that should be addressed. The device is functional.
   - Critical — the component has an error condition that should be addressed. The device may not be fully functional.
   - Failed — the component has a known failure and should be replaced.

Network information (Status/Information > Network Information)

To access network settings for the device:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Status/Information**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Network Information**. Press **Enter** to select.
3. Press **Previous** or **Next** to access the following information:
   - IPv4 Network Enabled or Disabled
   - IPv6 Network Enabled or Disabled
   - Host Name
   - Domain Name
   - MAC Address
4. For IPv4 Network or IPv6 Network, press **Enter** and then use **Previous** or **Next** to access the network addresses and configuration.

Configuration

The Configuration menu provides access to the following configuration functions:

- Changing the administrator password (Configuration > Change Admin Password) (page 71)
- Setting the number of reserved slots (Configuration > Set Reserved Slot Count) (page 71)
- Configuring the mailslot (Configuration > Configure Mailslot) (page 71)
- Bar code reporting format (Configuration > Barcode Format Reporting) (page 72)
- Changing the SCSI address — parallel SCSI devices (Configuration > Change Drive) (page 72)
- Setting behaviors (Configuration > Autoloader Behavior) (page 72)
- Setting the date and time (Configuration > Autoloader Date/Time) (page 73)
- Configuring network settings (Configuration > Configure Network Settings) (page 74)
- Configuring automatic cleaning (Configuration > Configure Auto Cleaning) (page 75)
- Restoring factory defaults (Configuration > Restore Defaults) (page 75)
- Saving and restoring the Autoloader configuration (Configuration > Save/Restore Configuration) (page 76)

To access the Configuration menu:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays your selected function. Press **Enter** to select.

Changing the administrator password (Configuration > Change Admin Password)

Use **Change Admin Password** to set or change the administrator password. Once the administrator password is set, you must know the administrator password or the service password to change the administrator password. Passwords consist of exactly eight numbers each between the values of 0 and 9.

Screens that require a password prompt for the password before allowing access to the restricted areas. Once entered, the administrator password does not have to be entered a second time unless there is no user activity for five minutes. Enter the administrator password if you are prompted to do so.

To change the administrator password:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Change Admin Password**. Press **Enter** to select.
3. The first number is flashing. Press **Previous** or **Next** to change the value of the flashing number. When the flashing number shows the desired value, press **Enter** to select.
4. The screen displays the second number flashing. Repeat Step 3 until you have entered all eight characters. Press **Enter** to select. After the last number has been entered, the password has been set to the new password.

NOTE: If you forget the administrator password, you cannot enter a new password. You must call your customer service representative.

Setting the number of reserved slots (Configuration > Set Reserved Slot Count)

Reserved slots can be accessed by the remote management interface (RMI) and the operator control panel (OCP), but are invisible to the host and backup software. For example, you might keep a cleaning cartridge in a reserved slot if your backup software does not manage the cleaning process. You can reserve up to six slots. Access to this feature requires the administrator password.

To set the reserved slot count:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Set Reserved Slot Count**. Press **Enter** to select.
3. Enter the administrator password if prompted.
4. Press **Previous** or **Next** to scroll through the display until the desired number of slots is displayed, then press **Enter**.

Configuring the mailslot (Configuration > Configure Mailslot)

The mailslot is a single slot at the front of the left magazine that you can access without removing the whole magazine. Loading a tape through the mailslot is faster than opening the magazine because the device does not need to inventory the rest of the magazine slots when you use the mailslot. Also, the device can continue to function when the mailslot is open. Access to this feature requires the administrator password.

To enable or disable the mailslot:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Configure Mailslot**. Press **Enter** to select.
3. Enter the administrator password if prompted.
4. The screen displays either **Mailslot Enabled** or **Mailslot Disabled**.

5. Press **Previous** or **Next** until the screen displays **Disable Mailslot?** or **Enable Mailslot?.** Press **Enter** when the correct action is displayed.

Bar code reporting format (Configuration > Barcode Format Reporting)

You can configure how the tape bar code is displayed in the OCP and RMI, and how it is reported to the host software. You can configure the number of characters to display and the whether the numbers should be justified to the left or right. For example, when reporting only six characters of the bar code label `12345678`, if alignment is left, the device will report `123456`. If alignment is right, the device will report `345678`. The default configuration is **8 Left**. Access to this feature requires the administrator password.

To configure the bar code report format:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Barcode Format Reporting**. Press **Enter** to select.
3. Press **Previous** or **Next** until the screen displays either **Display Format** or **Host Format**. The second line displays the number of characters and the current format. To change the current format, press **Enter** to select either **Display** or **Host**. An example of the screen display is **# of characters 8**.
4. Press **Previous** or **Next** until the desired number of characters is listed. Press **Enter** to select.
5. The screen displays either **Alignment Left** or **Alignment Right**. Use **Previous** or **Next** to toggle between the two choices. Press **Enter** to select the correct alignment.

Changing the SCSI address — parallel SCSI devices (Configuration > Change Drive)

△ **CAUTION:** If you change the SCSI ID, you might need to cycle power on the host server and reconfigure your backup software before you can use the device.

This option changes the SCSI address of the tape drive. The tape drive uses logical unit number (LUN) 0. The SCSI address for the Autoloader will always be the same as the tape drive but will use LUN 1. Access to this feature requires the administrator password.

To change the drive SCSI address:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Change Drive**. Press **Enter** to select.
3. Enter the administrator password if prompted.
4. The screen displays the current SCSI ID. Press **Previous** or **Next** to change the SCSI ID number. Press **Enter** to select. An example of the screen display is **Drive SCSI ID 6**.

Setting behaviors (Configuration > Autoloader Behavior)

The supports three behavior modes: Random, Sequential, and Automatic. The Autoloader automatically detects the required mode from the series of SCSI commands it receives; however, you can also change the mode. Choose the operating mode based on the capabilities of the software controlling the tape cartridges. Access to this feature requires the administrator password.

Random mode: In Random mode, the device does not automatically load tapes into the tape drive; it waits for commands from the software or operator to load and unload tapes. Random mode is used with a full featured or a robotics-aware backup application and is the most common mode of operation. Your backup software must support robotics, which may require an additional software module.

Sequential mode: In Sequential mode, the device automatically loads and unloads tapes from the drive. Sequential mode is used when the backup software is NOT robotics-aware or was designed for standalone drives only.

The operator begins the sequence by loading the desired tape into the tape drive. When a tape is unloaded for any reason, the device automatically removes the tape from the drive, returns it to its original slot, then loads the tape from the next available higher numbered slot.

To further determine how you want tapes loaded into the tape drive while in Sequential mode, you can set the **Loop** and **Autoload** options.

- When **Autoload** mode is set, the device automatically loads the cartridge from the lowest-numbered full slot into the tape drive. It then follows standard sequential operation. After configuring Autoload mode, you must do one of the following for Autoload mode to take effect:
  - Power cycle the device from the front panel.
  - Reboot the device from the RMI Support: Reboot screen.
  - Move the lowest-numbered cartridge to the drive before starting the backup application. If the mailslot is enabled, the lowest cartridge location will be in the mailslot.
- When **Loop** mode is on, the original first cartridge in the sequence is reloaded after the device has cycled through all available cartridges. If Loop mode is off and the last cartridge has been unloaded, the device stops loading cartridges until you load another manually.

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

Automatic mode: In Automatic mode, the device switches from Sequential mode into Random mode when it receives certain SCSI commands. Automatic mode is the default setting.

To set a behavior mode:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Autoloader Behavior**. Press **Enter** to select.
3. Enter the administrator password if prompted.
4. Press **Previous** or **Next** until the screen displays **Autoloader Mode**. Press **Enter**.
5. The screen displays **Set Autoloader Mode**, followed by the current Autoloader mode: **Automatic**, **Sequential**, or **Random**. To change the mode, press **Enter**.
6. Press **Previous** or **Next** to scroll through the screens for **Automatic**, **Sequential**, or **Random**. Press **Enter** to select the Autoloader mode.
7. If you enabled Sequential mode, you can configure the Autoload and Loop options:
   a. Press **Previous** or **Next** until the screen displays **Autoload Mode Disable** or **Autoload Mode Enable**. To change the Autoload mode, press **Enter**. The screen displays either **Disable Autoload Mode** or **Enable Autoload Mode.** Press **Previous** or **Next** to toggle between the enabled and disabled screens. Press **Enter** to select the Autoload mode. The display shows the new Autoload mode.
   b. Press **Previous** or **Next** until the screen displays either **Loop Mode Disable** or **Loop Mode Enable**. To change loop mode, press **Enter.** The screen displays either **Enable Loop Mode** or **Disable Loop Mode.** Press **Previous** or **Next** to toggle between the enabled and disabled screens. Press **Enter** to select the loop mode.

Setting the date and time (Configuration > Autoloader Date/Time)

NOTE: When setting the hours, the time is based on a 24-hour clock. There is no a.m. or p.m. designation.

Use **Set Date and Time** to set the date and time used to record events. Access to this feature requires the administrator password.

To set the date:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Autoloader Date/Time**. Press **Enter** to select.
3. Enter the administrator password if prompted.
4. The screen displays **Set Yr/Month/Day 2006 / 07 / 21** with a flashing number. Press **Previous** or **Next** to change the value of the flashing number. Press **Enter** to accept the value of the flashing number and move to the next number.
5. Repeat Step 5 until all numbers in the date are correct. Press **Enter**.
6. The screen displays (example) **Set Hour / Mins 16 : 52** with the first number flashing. Press **Previous** or **Next** until the flashing number reads correctly. Press **Enter** to move to the next number. Repeat this step until all numbers in the time are correct. Press **Enter**.

Configuring network settings (Configuration > Configure Network Settings)

The device can automatically obtain an IP address from a DHCP server when the device is powered on. The device also supports user-specified fixed addresses through the front panel.

The device also supports SNMP. You can enable SNMP and configure the target addresses with the RMI. See Changing the network configuration (page 49).

To configure IPv4 network settings:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Configure Network Settings**. Press **Enter** to select.
3. Press **Previous** or **Next** until the screen displays **IPv4 Networking Enabled**. Press **Enter** to select.
4. Press **Previous** or **Next** until the screen displays **DHCP Enabled**. To change the setting, press **Enter**. Press **Next** until the screen shows the desired setting. Press **Enter** to accept the new setting.
5. If DHCP is disabled, press **Previous** or **Next** until the screen displays **IP Address**. The second line displays the current IP address.
6. To change the IP address, press **Enter**. The screen displays **Set IP Address** with the first number flashing. Press **Previous** or **Next** to change the flashing number to the correct value.
7. Press **Enter** to select the next number, until all numbers have been set. The screen displays **New IP Address.**
8. Press **Previous** or **Next** until the screen displays **Subnet Mask Address**. To change the **Subnet Mask Address**, press **Enter**. The screen displays **Set Subnet Mask Address,** with the first number flashing.
9. Press **Previous** or **Next** to change the flashing number to the correct value. Press **Enter** to select the next number.
10. Repeat Step 9 until all numbers have been set. The screen displays **New Subnet Address.**
11. Press **Previous** or **Next** until the screen displays **Gateway Address**. To change the **Gateway Address**, press **Enter**. The screen displays **Set Gateway Addr,** with the first number flashing.
12. Press **Previous** or **Next** to change the flashing number to the correct value. Press **Enter** to select the next number.
13. Repeat Step 12 until all numbers have been set. The screen displays **New Gateway Addr.** Press **Enter**.

To enable IPv6:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Configure Network Settings**. Press **Enter** to select.
3. Press **Previous** or **Next** until the screen displays **IPv6 Networking**. Press **Enter** to select.

4. The screen displays **IPv6 Network Addressing Disabled**. To change the setting, press **Enter**.
5. Press **Next** until the screen displays the desired setting. Press **Enter** to accept the new setting.
6. Configure IPv6 networking from the RMI. See Changing the network configuration (page 49).

Configuring automatic cleaning (Configuration > Configure Auto Cleaning)

When auto clean is enabled, the device automatically loads a cleaning cartridge when a tape drive needs to be cleaned. The device identifies a tape cartridge as a cleaning cartridge if it has a barcode label that starts with CLN or after an unlabeled cleaning tape has been loaded into the tape drive.

The device can use a cleaning cartridge from any slot, even if the slot is reserved. The device keeps track of the usage count for each of the cleaning cartridges. When multiple cleaning cartridges are available, the device will first choose an unknown cleaning cartridge so the device can start tracking the cartridge usage count. If the deviceknows the usage count for all of the cleaning cartridges, the device will choose the one with the highest usage count.

Auto cleaning is disabled by default. You can enable automatic cleaning even if there are no cleaning cartridges in the device. In this case, the device will display a warning message.

△ **CAUTION:** Only enable automatic cleaning in either the backup application or the device, not both.

To configure automatic cleaning:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Configure Auto Cleaning**. Press **Enter** to select.
3. The screen displays **Auto Cleaning Disabled** or **Auto Cleaning Enabled** depending on the current setting. To change the auto cleaning configuration, press **Enter**.
4. Press **Previous** or **Next** until the screen displays the configuration you want. Press **Enter**.

Restoring factory defaults (Configuration > Restore Defaults)

The device can reset most of the configurations to the factory defaults, while retaining the settings necessary to use the RMI. The device will perform an inventory after the defaults are restored.

The restored settings are:

- SCSI address: 4
- Master drive: reset to Drive 1
- Drive power: drive powered on
- Active slots: maximum possible
- Autoloader mode: Automatic
- Loop: No
- Event log levels and filter: continuous trace and all levels and filters active (for HP Service use only)
- Barcode reader label length: 8
- Barcode reader alignment: Left
- Error recovery: On
- Mailslot configuration: mailslot disabled
- Auto clean: disabled

- SNMP: disabled, but saved addresses to not change
- E-mail notification: disabled, but configurations retained

The following settings are not reset:

- Administrator password
- Network settings (network is always enabled)
- Date and time

To restore the factory defaults:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Restore Defaults**. Press **Enter** to select.

Saving and restoring the Autoloader configuration (Configuration > Save/Restore Configuration)

Use this option to save the configuration settings to a USB flash drive. The saved configuration information will make it easier to recover the device configuration if you need to replace the chassis.

This feature is also useful when installing multiple devices. Either save the configuration before configuring the network or ensure that only one device with the same network configuration is on the network at a time until they have unique network identities.

To save the device configuration settings to a USB flash drive:

1. Insert the USB flash drive in the USB port on the back of the device.
2. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.
3. Press **Previous** or **Next** until the screen displays **Save/Restore Configuration**. Press **Enter** to select.
4. Enter the administrator password if prompted.
5. The screen displays **Save Configuration to USB**. Press **Enter** to save.
6. When the save operation is completed, remove the USB flash drive from the USB port.

To restore the device configuration settings from a USB flash drive:

1. Insert the USB flash drive in the USB port on the back of the device.
2. From the Home screen, press **Previous** or **Next** until the screen displays **Configuration**. Press **Enter** to select.
3. Press **Previous** or **Next** until the screen displays **Save/Restore Configuration**. Press **Enter** to select.
4. Enter the administrator password if prompted.
5. Press **Previous** or **Next** until the screen displays **Restore Config from USB**. Press **Enter**.
6. Press **Previous** or **Next** until the screen displays the filename of the device configuration file on the USB drive. Press **Enter** to select the firmware file.
7. When the restore operation is completed, remove the USB flash drive from the USB port.

NOTE: You can save the configuration settings to a file from the RMI. See Saving and restoring the device configuration and restoring factory defaults (page 56)

Operations

The Operations menu provides access to the following options:

- Unlocking, removing, and replacing magazines (Operations > Unlock Left or Right Magazine) (page 77)
- Cleaning the tape drive (Operations> Clean Drive) (page 77)
- Moving tapes in the Autoloader (Operations > Move Tape) (page 78)

- Updating tape cartridge inventory (Operations > Perform Inventory) (page 79)
- Rebooting the Autoloader (Operations> Reboot Autoloader) (page 79)
- Enabling password locks (Operations > Enable Autoldr Password Locks) (page 79)

To access the Operations menu:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Operations**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays your selected function. Press **Enter** to select.

Unlocking, removing, and replacing magazines (Operations > Unlock Left or Right Magazine)

These OCP options let you gain access to the left and right magazine. Access to the magazines requires the use of the administrator password.

To remove a magazine:

1. From the Home screen, press **Previous** or **Next** on the OCP until the screen displays **Operations**.
2. Press **Enter** to select.
3. Press **Previous** or **Next** until the screen displays either **Unlock Left Magazine** or **Unlock Right Magazine**.
4. Press **Enter** to select the desired magazine to unlock.
5. Enter the administrator password if requested.
6. The display reads **Left Magazine Unlocked** or **Right Magazine Unlocked**.
7. Pull the released magazine out of the device.
8. The screen now displays **Insert Left Magazine** or **Insert Right Magazine**. The device cannot perform any other operation until the magazine is replaced. After exchanging tapes in a magazine, slide the magazine completely into the device. The magazine locks into place once it is correctly installed and the device inventories the magazine. The Ready LED blinks while the device inventories the magazine and then stops when the operation is complete.

Cleaning the tape drive (Operations> Clean Drive)

When the **Clean** LED is on, the 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. Use only the designated cleaning cartridge for your tape drive model. All cartridges are available at www.hp.com/go/storagemedia.

Use only Ultrium Universal cleaning cartridges.

IMPORTANT: If the cleaning cartridge is not a valid cleaning cartridge, the LCD screen displays **Invalid Tape** and the cartridge is returned to its original location.

IMPORTANT: If the **Clean** LED or the **Attention** LED (on load or unload) lights when inserting the same cartridge after you have cleaned the drive, there may be a problem with that cartridge.

If you use the operator control panel to clean the tape drive, load the cleaning cartridge into the mailslot or any other empty slot before beginning the cleaning steps. If you would like to keep a cleaning cartridge in the device, the backup software must manage tape drive cleaning or be configured to bypass the slot containing the cleaning cartridge.

To clean the tape drive:

1. Make sure a cleaning cartridge is in the mailslot or one of the magazines.
2. From the Home Screen, press **Previous** or **Next** until the screen displays **Operations**. Press **Enter** to select.
3. Press **Previous** or **Next** until the screen displays **Clean Drive**. Press **Enter** to select.
4. Use **Previous** or **Next** until the screen displays **Drive**. The second line can display either **Clean Required** or **Good**.

5. Press **Enter**. The screen displays either **Cleaning Tape Slot 4** or **Cleaning Tape Slot XX**, where *XX* represents flashing blocks. If a slot number is displayed, the tape in that slot has a bar code label identifying the tape as a cleaning tape. If a slot number is displayed, continue to Step 6. If no slot number is displayed, it indicates that the device is not able to detect that a cleaning tape with a bar code is in the device. In this case, the operator must select the slot where a cleaning tape resides.
6. Use **Previous** or **Next** to display the location of a cleaning tape.
7. When the correct location for the cleaning tape is displayed, press **Enter** to select. While the device cleans the drive, **Cleaning Drive in progress** it displays.
8. After the cleaning cycle is complete, the screen displays either **Cleaning Drive Complete**, or **Cleaning Drive Failed**. If the cleaning cycle failed, press **Enter** to display the error code and message explaining the failure.

The device returns the cleaning cartridge to the original slot. If you loaded the cartridge from the front panel, you should now unload it either by using the mailslot, or by removing the magazine. When the tape drive cleaning cycle is complete, the **Clean** LED turns off (if previously on).

Moving tapes in the Autoloader (Operations > Move Tape)

Use this option to move a cartridge from a tape drive, a tape slot in any magazine or the mailslot to any other location not already holding a tape. You can also load and unload tape cartridges to and from the installed tape drives. You must first select where you want to move the tape from and then indicate where you want to move the tape to. Access to this command requires the administrator password.

To move a tape:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Operations**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Move Tape**. Press **Enter** to select.
3. Enter the administrator password if prompted. Use **Previous** or **Next** to select from the possible sources:
   - Mailslot
   - Right Magazine
   - Left Magazine
   - Drive
4. When the correct source is displayed, press **Enter** to select.
5. If the source selected is a magazine, use **Previous** or **Next** to select the slot. Only slots with tapes are listed. The second line displays the bar code for the tape or reads **Full**.
6. Once the correct slot is displayed, press **Enter** to select.

   You have now selected the tape you would like to move. The screen now requests the destination for this tape.
7. Use **Previous** or **Next** to select from the possible destinations as follows:
   - Mailslot
   - Right Magazine
   - Left Magazine
   - Drive
8. When the correct destination is displayed, press **Enter** to select.
9. If the destination selected is a magazine, use **Previous or Next** to display the slot. Only empty slots are listed.

Once the correct slot is displayed, press **Enter** to select. The device now moves the tape from the selected source, to the selected destination. While the device moves the tape, the screen displays

Moving Tape. Once the tape has been moved, the screen displays either **Move Complete**, or **Move Failed**. If the move failed, press **Enter** to display the error code and message explaining the failure.

Updating tape cartridge inventory (Operations > Perform Inventory)

This option updates the device's tape cartridge inventory. The device checks each slot and drive to determine which tape, if any, is present.

To update the tape cartridge inventory:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Operations**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Perform Inventory**. Press **Enter** to select.
3. While the inventory is in progress, the screen displays **Inventory in Progress...**
4. The Autoloader now checks the drive and each slot for the presence of a tape to update the inventory information. The **Ready** LED blinks during this operation.

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

Rebooting the Autoloader (Operations> Reboot Autoloader)

This option reboots the device and forces a new cartridge inventory, clearing any current error condition.

△ **CAUTION:** This option interrupts the current backup or restore operation and causes the operation to fail. Use this option if the device is in an error state.

To reboot:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Operations**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Reboot Autoloader**. Press **Enter** to select.
3. The **Ready** LED blinks during the reboot operation.

Enabling password locks (Operations > Enable Autoldr Password Locks)

This option locks the restricted areas. This is typically used if you do not want to wait for the time out to reset the locks. Power cycling or rebooting the device also resets the locks.

To enable the password locks:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Operations**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Enable Autoldr Password Locks**. Press **Enter** to select.

Support

The Support menu provides access to the following support options:

- Powering a drive on or off (Support > Power On/Off Drive) (page 80)
- Running the demonstration (Support > Run Demo) (page 80)
- Running the slot to slot test (Support > Run Slot To Slot Test) (page 80)
- Running the wellness test (Support > Run Wellness Test) (page 81)
- Upgrading firmware (Support > Autoloader FW Upgrade, Support > Drive FW Upgrade) (page 81)
- Viewing logs (Support > Autoloader Error Log) (page 83)

- Downloading a support ticket (Support > Download Support Ticket) (page 83)
- Forcing the drive to eject a tape (Support > Force Drive To Eject Tape) (page 83)

To access the Support menu:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays your selected function. Press **Enter** to select.

Powering a drive on or off (Support > Power On/Off Drive)

Use this option to power a drive on or off without interrupting power to the rest of the device. Access to this feature requires the administrator password.

To power on or off the drive:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Power On/Off Drive**. Press **Enter** to select.
3. Enter the administrator password, if prompted.
4. The screen displays **Drive**. The second line in the display displays the current state, which is either **Power ON** or **Power OFF**.
5. To change the power status, press **Enter**. The screen displays either **Press Enter to Power off Drive**, or **Press Enter to Power on Drive**. Press **Enter** to select. The **Ready** LED blinks during the operations.

Running the demonstration (Support > Run Demo)

Use this option to run a device demonstration program. The demonstration continues until the **Cancel** button is pressed on the operator control panel. During the demonstration the device will move cartridges to the tape drive and back. At the end of the demonstration the cartridges are returned to their original slots. Access to this feature requires the administrator password.

To run the demonstration:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Run Demo**. Press **Enter** to select.
3. Enter the administrator password if prompted.
4. Use **Previous** and **Next** to select the number of cycles: 270, 540, 1080, or Endless. Press **Enter** to start the demonstration.
5. While the test is running, the first line of the screen displays **Demo Test**. The second line displays the number of cycles completed and the number of errors. The **Ready** LED blinks until the test is complete.

NOTE: To stop the demonstration, press **Cancel** on the operator control panel.

Running the slot to slot test (Support > Run Slot To Slot Test)

Use this option to show the robot's ability to move media in and out of each of the magazine slots. Access to this feature requires the administrator password.

NOTE: At the end of the test, the cartridges are NOT returned to their original slots.

To run the slot to slot test:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Run Slot To Slot Test**. Press **Enter** to select.
3. Enter the administrator password, if prompted.

4. Press **Previous** or **Next** until the screen displays **Select Number of Cycles.** Use **Previous** or **Next** to select the number of cycles: 270, 540, 1080, or Endless. Press **Enter**.
5. While the test is running, the screen displays progress as shown: **Run Slot To Slot**. The second line on the display shows the number of cycles completed. The **Ready** LED blinks until the test is complete.
6. When the test is complete, the screen displays the number of cycles completed and the number of errors. If the test failed, press **Enter** to display the error and message describing the cause.

NOTE: To stop the slot to slot test, press the **Cancel** button.

Running the wellness test (Support > Run Wellness Test)

Use this option to check the health of the device for the specified number of loops. If a failure occurs during the test, check the error code and failure message for more information. Access to this feature requires the administrator password. For more information about the wellness test, see The wellness test (page 102).

For complete testing, enable the mailslot and ensure that each top-row corner slot contains a tape cartridge. During the test, the device will open the mailslot and ask you to insert a tape cartridge. You can use any compatible Ultrium data tape cartridge for this test.

IMPORTANT: The device will remove any tape cartridges from tape drives and go offline when running the wellness test. Verify that any applications using the device have completed before starting the wellness test.

To run the wellness test:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Run Wellness Test**. Press **Enter** to select.
3. Enter the administrator password, if prompted.
4. Use **Previous** or **Next** to select a number of cycles: 1 - 10. Press **Enter**.
5. While the test is running, the screen displays progress as shown: **Wellness test**. The second line on the display shows the number of cycles completed. The **Ready** LED blinks until the test is complete.
6. When the test is complete, the screen displays the test completion status, including any recoveries or errors that may have occurred. See Error codes (page 103) for a list of error codes and error messages.

NOTE: To stop the wellness test, press the **Cancel** button.

Upgrading firmware (Support > Autoloader FW Upgrade, Support > Drive FW Upgrade)

The Autoloader allows two types of firmware to be upgraded — one for the tape drive and the other for the Autoloader itself. You can upgrade both types of firmware from a USB flash drive. You can also upgrade the tape drive firmware from a firmware upgrade tape. Access to this feature requires the administrator password.

To upgrade Autoloader firmware from a USB flash drive:

1. Download current Autoloader firmware using HP Library & Tape Tools or from the HP support website: www.hp.com/support/storage. Copy the firmware onto the USB flash drive.

TIP: The display will only show the first 16 characters of the file name. If the USB drive has multiple firmware files, ensure that you can distinguish the files from the first 16 characters in their file names.

2. Insert the USB flash drive into the USB port on the back of the device.

3. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.
4. Press **Previous** or **Next** until the screen displays **Autoloader FW upgrade**. Press **Enter** to select.
5. Enter the administrator password if prompted.
6. Press **Previous** or **Next** until the screen displays the filename of the Autoloader firmware file on the USB drive. Press **Enter** to select the firmware file.
7. If the upgrade failed, press **Enter** to display the error code and message describing the cause of the failure.
8. Remove the USB flash drive from the USB port.

To upgrade drive firmware from a USB flash drive:

1. Download current tape drive firmware using HP Library & Tape Tools or from the HP support website: www.hp.com/support/storage. Copy the firmware onto the USB flash drive.

TIP: The display will only show the first 16 characters of the file name. If the USB drive has multiple firmware files, ensure that you can distinguish the files from the first 16 characters in their file names.

2. Insert the USB flash drive into the USB port on the back of the device.
3. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.
4. Press **Previous** or **Next** until the screen displays **Drive FW Upgrade**. Press **Enter** to select.
5. Enter the administrator password if prompted.
6. Press **Previous** or **Next** until the screen displays **Drive FW Upgrade by USB**. Press **Enter** to select.
7. Press **Previous** or **Next** until the screen displays the filename of the drive firmware file on the USB drive. Press **Enter** to select the firmware file.
8. If the upgrade failed, press **Enter** to display the error code and message describing the cause of the failure.
9. Remove the USB flash drive from the USB port.

To update drive firmware from a firmware upgrade tape:

1. Load a firmware upgrade tape into the mailslot or any open slot. If all slots are full, remove a data tape to make room for the firmware upgrade tape.
2. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.
3. Press **Previous** or **Next** until the screen displays **Drive FW Upgrade**. Press **Enter** to select.
4. Enter the administrator password if prompted.
5. Press **Previous** or **Next** until the screen displays **Drive FW Upgrade by Tape**. Press **Enter** to select.
6. Press **Previous** or **Next** until the screen displays one of the following: **Drive 1.** The second line may read: **Firmware: G39W** or **All Drives**. Press **Enter** to select the appropriate drive to upgrade.
7. Press **Previous** or **Next** until the display shows the correct slot location of the firmware upgrade tape installed in the device (example) **FW Tape Location Slot: Mailslot**. Press **Enter** to select the correct firmware tape location. The screen displays **Upgrading Drive FW**.
8. When the update is complete, the screen displays either **Success Export FW Tape**, or **Failed Export FW Tape**. If the upgrade failed, press **Enter** to display the error code and message describing the cause of the failure.
9. Remove the firmware upgrade tape from the device using either the mailslot or by removing the magazine where the tape has been placed.

Viewing logs (Support > Autoloader Error Log)

The Autoloader keeps a log of recent error and warning messages. See Error codes (page 103) for more information about error codes.

To access the error or warning log:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Autoloader Error Log** to see error messages or **Autoloader Warning Log** to see warnings. Press **Enter** to select.
3. Enter the administrator password, if prompted.
4. Press **Enter** to see the message description. Press **Cancel** to return to the message code.
5. Press **Next** to see the next message.

Downloading a support ticket (Support > Download Support Ticket)

A support ticket contains information that can help a system administrator or support engineer diagnose device problems. Use this option to download a support ticket to a USB flash drive. Downloading the support ticket to a USB flash drive lets you view the ticket on a computer that is not connected to the device. You can view the support ticket with the Library & Tape Tools.

To download a support ticket:

1. Insert a USB flash drive into the USB port on the back panel.
2. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.
3. Press **Previous** or **Next** until the screen displays **Download Support Ticket**. Press **Enter** to select.

Forcing the drive to eject a tape (Support > Force Drive To Eject Tape)

Use this option to make the tape drive eject the tape and place it into an open slot. Before issuing this command, attempt to eject the tape with the move command (See Moving tapes in the Autoloader (Operations > Move Tape) (page 78)).

To force the tape to eject:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Support**. Press **Enter** to select.
2. Press **Previous** or **Next** until the screen displays **Force Drive To Eject Tape**. Press **Enter** to select.
3. Press **Previous** or **Next** until the screen displays **Drive**. The second line on the display shows the bar code number of the tape, **Full**, or **Empty.** Press **Enter** to select the desired drive to eject the tape.
4. If the tape is successfully ejected from the drive, the screen displays the slot location where the tape was moved to.

NOTE: If the drive has difficulty ejecting the tape, suspect bad or damaged media.

5 Troubleshooting

CAUTION: This Autoloader is designed to operate with both side edges properly supported. The installation approaches that provide the proper edge support are:

- Installed in a rack using the optional Rack Kit.
- Installed in the optional Rack-to-Tabletop Conversion Kit sitting on a flat surface.
- Sitting on a level surface on the included plastic feet.

Operating the Autoloader without one of these kits or the feet could result in Autoloader errors.

The optional tabletop conversion cover can support 15 kg (33 lb). Placing any weight on top of the Autoloader without the tabletop conversion cover might cause errors.

CAUTION: **Shipping Lock:** The shipping lock must be removed for the robotics to work properly. The device displays a robot move error if the shipping lock is not removed (see Removing the shipping lock (page 23)).

TIP: For an online troubleshooting tool, go to www.hp.com/support/MSLG3Tstree. The problems and solutions in the troubleshooting tree are updated more frequently than this manual.

Detection problems after installing a parallel SCSI device

Problems encountered after installation are often caused by improper parallel SCSI bus configuration, application software configuration errors, or an incorrectly configured operating system. If the application software or operating system does not communicate with the device after installation, determine the extent of the detection problem:

- Does the application software detect the tape drive?
- Does the application software detect the Autoloader?
- Does the operating system detect the tape drive?
- Does the operating system detect the Autoloader?
- Does the operating system detect the Autoloader, but list it as a generic device?

Based on the extent of the detection problem, check the following:

- If neither the application software nor operating system detects the tape drive, or they do not detect both the tape drive and the Autoloader:
  - Check the SCSI ID and change it if necessary. The Autoloader is pre-configured to SCSI ID 4. Depending on other devices attached to the same parallel SCSI bus and their SCSI IDs, you may need to change the SCSI ID before using the device. Review the manuals for the other devices on the parallel SCSI bus or your operating system to determine which SCSI IDs are currently in use. Change the SCSI ID with the OCP (see Changing the SCSI address — parallel SCSI devices (Configuration > Change Drive) (page 72)) or RMI (see Changing the drive configuration (page 48)).
  - Verify that all parallel SCSI cables are securely connected on both ends. Check the length and integrity of your parallel SCSI cabling. Check the parallel SCSI connector for bent

pins. The length of the internal parallel SCSI cabling inside the device is 0.5 m (1.6 ft). This length must be included in any calculations of cable length.

  - For LVD SCSI, the maximum length with only a single device on the parallel SCSI bus is 25 m (82 ft).
  - For Ultra 320 or multiple devices on an LVD bus, the maximum combined internal/external length is 12 m (40 ft).
  - 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 3 m (10 ft) for four or fewer devices, and 1.5 m (5 ft) for more than four devices.

- If the application software or operating system detects the tape drive, but not the Autoloader:
  - Verify that multiple LUN support is enabled on the HBA. The device uses two Logical Unit Numbers (LUNs) to control the tape drive (LUN 0) and robotic (LUN 1). The device requires an HBA with multiple LUN support and multiple LUN support must be enabled on the host computer. When multiple LUN support is not enabled, the host computer can see the tape drive, but not the Autoloader.

    NOTE: Many RAID or array controllers do not provide multiple LUN support.

- If the application software or operating system does not detect any devices on the HBA:
  - Verify that your parallel SCSI host adapter is installed correctly. Refer to the manual that came with your parallel SCSI host adapter for installation and troubleshooting instructions. Pay particular attention to any steps describing configuration settings. 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 parallel SCSI host adapter.
- If the Autoloader is detected by the operating system, but not by the application software:
  - 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 robotics.
- If the Autoloader is detected by the operating system, but is listed as an unknown or generic device:
  - Make sure that the proper device driver, if applicable, is installed for the device. Check your software provider's website for the latest drivers and patches.

    NOTE: Many backup applications use their own drivers. Before installing a driver, make sure it is not in conflict with the application software.

If you continue to have problems with a parallel SCSI Autoloader, check the following:

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

NOTE: The host bus adapter should be SCSI-3 LVDS. A single-ended parallel SCSI host bus adapter severely degrades performance. Also, if any SE devices are on the same parallel SCSI bus, all of the devices on the bus slow down to SE speed, which severely degrades performance.

The Autoloader is NOT compatible with a standard differential (Diff) or high-voltage differential (HVD) SCSI bus.

- Verify that your HBA is supported by the host computer and qualified with the Autoloader. Refer to the EBS matrix at www.hp.com/go/ebs for current HBA compatibility information.
- If one of the ports on the device is not connected to another parallel SCSI device, the port must be terminated. Only the devices physically located at the beginning and end of the parallel SCSI bus should be terminated. Refer to the manuals supplied with the other devices on the parallel SCSI bus for information on enabling or disabling termination on those devices.
  - To terminate the second parallel SCSI port on the device, locate the terminator in the accessories package and press it firmly into either of the two parallel SCSI connectors on the back panel. Secure the terminator by tightening the finger-screws until snug. The supplied terminator is "dual mode" and works on both Low-Voltage Differential (LVD) and Single Ended (SE) SCSI buses. Check all parallel SCSI and power connections and confirm that the unit is attached to a valid SCSI SE or LVDS bus.

Detection problems after installing a SAS device

Problems encountered after installation are often caused by improper SAS cable connections, application software configuration errors, or an incorrectly configured operating system. If the application software or operating system does not communicate with the device after installation, determine the extent of the detection problem:

- Does the application software detect the tape drive?
- Does the application software detect the Autoloader?
- Does the operating system detect the tape drive?
- Does the operating system detect the Autoloader?
- Does the operating system detect the Autoloader, but list it as a generic device?

Based on the extent of the detection problem, check the following:

- If neither the application software nor operating system detects the tape drive, or they do not detect both the tape drive and the Autoloader:
  - Verify that all SAS cables are securely connected on both ends. If the mini-SAS connectors that connect to the tape drive and some HBAs will not plug in, check the key. The mini-SAS connector on the tape drive is keyed at location four, which is the standard location for end devices. If the connector on the cable is keyed in a different location, not only will the connector not plug in, but the cable probably will not work.
  - Check the length and integrity of your SAS cabling. For reliable operation, do not use a SAS cable longer than six meters. Do not use a cable adapter or converters between the HBA and the Autoloader.
  - Check the SAS connectors for damage or debris.

- Verify that your HBA is supported by the host computer and qualified with the Autoloader. Refer to the EBS matrix at http://www.hp.com/go/ebs for current HBA compatibility information.
- Verify that your HBA has the latest firmware.

- If the application software or operating system detects the tape drive, but not the Autoloader:
  - Verify that multiple LUN support is enabled on the HBA. The device uses two Logical Unit Numbers (LUNs) to control the tape drive (LUN 0) and robotic (LUN 1). The device requires an HBA with multiple LUN support and multiple LUN support must be enabled on the host computer. When multiple LUN support is not enabled, the host computer can see the tape drive, but not the Autoloader.

    NOTE: Many RAID or array controllers do not provide multiple LUN support.

- If the application software or operating system does not detect any devices on the HBA:
  - Verify that the SAS host adapter is installed correctly. Refer to the manual that came with your host adapter for installation and troubleshooting instructions. Pay particular attention to any steps describing configuration settings. Make sure that the host adapter is properly seated in the motherboard slot and the operating system correctly detects the host adapter.
  - Verify that the proper device driver is installed for the SAS host adapter.
- If the Autoloader is detected by the operating system, but not by the application software:
  - 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 robotics.
- If the Autoloader is detected by the operating system, but is listed as an unknown or generic device:
  - Make sure that the proper device driver, if applicable, is installed for the device. Check your software provider's website for the latest drivers and patches.

    NOTE: Many backup applications use their own drivers. Before installing a driver, make sure it is not in conflict with the application software.

If you continue to have problems with a SAS Autoloader, check the following:

- Ensure that the device is compatible with the SAS host adapter and backup application you plan to use.
- Verify that your HBA is supported by the host computer and qualified with the Autoloader.
- Ensure you are using a compatible, high-quality cable. See the product QuickSpecs for a list of supported cables.

Fibre Channel connection problems

Use the Status screen to check the link connection for your tape drive.

If the screen shows Logged Out:

- Check that the Fibre speed is set to Automatic (on the RMI) or Auto Detect (on the OCP), or that the correct fibre speed is selected. If you are unsure of the speed of the HBA or switch that the is connected to, try Automatic (on the RMI) or Auto Detect (on the OCP).
- Check that the correct port type, fabric or loop, is selected. Loop requires additional configuration. If you are unsure of the correct port type, try Automatic (on the RMI) or Auto Detect (on the OCP).

If the screen shows No Link, the Speed Status is – and the Link LED on the back of the drive is off:

- The speed is probably set incorrectly. Try setting the speed to Automatic (on the RMI interface) or Auto Detect (on the OCP).
- If there are still issues, change the port type to Auto Detect.

If the screen shows No Light:

- The cable is not plugged in correctly. Check that it is connected correctly to Port A of the tape drive.
- The cable is damaged. FC cables are delicate. If the cable has been bent or twisted sharply, it may be broken and must be replaced.

If the screen shows ALPA Conflict:

- There might be a conflict with the ALPA address on Loop ports. Select Soft for the Loop mode to allow the system to select an available address each time the tape drive connects to the FC fabric. If your server configuration does not support changing addresses, try using the Hard Auto-Select option for the Loop mode. This allows the system to select an available address when it first connects, and then retain that address for future connections.

Operation problems

Table 18 Power problems

Problem	Solution
Device does not power on.	1. Check all power cord connections. 2. Make sure the power button on the front panel has been pressed, and the green **READY** LED is lit. 3. Make sure the outlet has power. Try another working outlet. 4. Replace the power cord.
No display messages appear.	1. Make sure the power cord is connected. 2. Make sure the power button on the front panel has been pressed, and the green **READY** LED is lit. 3. Power cycle the device. 4. If the display is still blank but the device seems to be powered on, try to get the device status or error information from the RMI.

Table 19 Failure/attention indications displayed on the front panel

Problem	Solution
"!" in operator panel inventory display.	Export the data cartridge marked with an **!** in the inventory. The cartridge is either damaged, incompatible with the drive, or the wrong type for the attempted operation. See Moving tapes in the Autoloader (Operations > Move Tape) (page 78) for more information.
The LCD displays an error code.	Look up the error code, try to resolve the failure, and power cycle the device (see Error codes (page 103)). On the OCP, press **Enter** to see the error message for the error code.

Table 20 Tape movement problems

Problem	Solution
Tape stuck in drive.	Try the following steps, in this order, to remove the stuck tape. **NOTE:** The tape drive must rewind the tape before ejecting it. This can take as long as five minutes, depending on how much tape must be rewound. Once the tape is rewound, the eject cycle will take fewer than 16 seconds. The **READY** light flashes while the tape rewinds. Wait for the tape to finish rewinding before attempting another operation. 1. Attempt to unload the tape from your backup software. 2. Shut down the backup software and stop the operating system's removable storage services. From the OCP, attempt to unload or move the tape to a slot. (See Moving tapes in the Autoloader (Operations > Move Tape) (page 78).) 3. Power down the unit, disconnect the cable from the drive, power up the unit, and wait until the tape drive is idle or ready. From the OCP, attempt to unload or move the tape to a slot. 4. From the OCP, attempt a force eject or emergency unload operation. (See Forcing the drive to eject a tape (Support > Force Drive To Eject Tape) (page 83).) **IMPORTANT:** Inspect the tape cartridge that was stuck. Damage or misplaced labels on the cartridge could have caused the load/unload failure. Discard any tape cartridge found to have issues.
Tape stuck in storage slot.	To remove a stuck tape from a storage slot: If the operator control panel or the remote management interface is still operational: 1. Move the tapes from the drives to the magazines using the **Move Tape** command. (See Moving tapes in the Autoloader (Operations > Move Tape) (page 78).) 2. Use the magazine removal process to release the magazine and remove it from the device. To use the operator control panel, see Unlocking, removing, and replacing magazines (Operations > Unlock Left or Right Magazine) (page 77). To use the RMI, see Releasing and replacing the magazines (page 58). If neither one of these processes works, see Releasing the magazines manually (page 102). 3. Manually remove the cartridge from the magazine by inserting a finger in the hole at the back of the magazine. Some tapes need to be inserted and removed several times to condition them for free movement in and out of the magazine.

Table 21 Media problems

Problem	Solution
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 device (see Tape cartridges (page 30)) and that you are using the correct cartridge type for the operation. The device automatically unloads incompatible cartridges, the **Attention** LED flashes, and an exclamation point (!) displays in the inventory display for the indicated slot number. Export the media to clear the state.
Cannot write to or read from tape.	• Make sure that the cartridge is not a WORM cartridge that has already been used. • Make sure that the cartridge is write enabled (move the write-protect switch to the enabled position). • Make sure the data cartridge is compatible with the drive model. LTO tape drives can read data cartridges from two generations back and write to data cartridges one generation back. (See Backward read compatibility (page 33).) • 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 tape drive (page 62).)

Table 22 Parallel SCSI device not detected

Problem	Solution
Device not detected	• Check that the HBA supports multiple LUNs and this feature is enabled. If not, only the tape drive will be detected. • Check for conflicting SCSI IDs. • Power on the device before powering on the host computer. • Make sure the Autoloader does not have the drive off line and that the Autoloader is not running a test. • Attach the device to an LVDS SCSI host adapter/bus. • The parallel SCSI cable length might be too long. Use a shorter cable or remove other devices from the bus. • Parallel SCSI bus not properly terminated. See SCSI detection problems (page 84). • Check that the device is fully powered up and is not in an error state. • Check the parallel SCSI connector and terminator for bent pins. See SCSI detection problems (page 84) for more detailed troubleshooting help.
Changed drive SCSI ID, but the host server does not recognize the new ID.	• Make sure that all parallel SCSI devices on the same bus have unique SCSI ID numbers. • Only SCSI IDs 0 through 7 are available on a narrow (50 pin) bus. If the device is on a narrow bus and has a SCSI ID of 8 or greater, the host server will not detect the drive. If you must use SCSI IDs 8 or greater, use a wider bus. • Reboot the host server.

Table 23 Attention LED is lit

Problem	Solution
Both the Attention and Cleaning LEDs are lit.	This is most likely caused by a dirty drive that cannot read a tape and marks the tape invalid. 1. View the inventory with the RMI. Note the slots that have tapes marked with !. 2. Remove any magazines that contain tapes marked with !. 3. Remove the tapes that were marked with !. 4. Inspect each removed tape for damage, check that the tape is compatible with the drive, and ensure that it is not past its usage life. See Tape cartridges (page 30). Discard any tapes that are damaged or past their usage life. Do not use cartridges that are incompatible with the tape drive. 5. Reload the magazines with tapes that have passed inspection and new tapes to replace cartridges that did not pass inspection. 6. Replace the magazines. 7. Clean the tape drive.
A particular cartridge sets off the cleaning light.	Check the cartridge for contamination by loose debris.
A cartridge recently imported from a different environment is causing issues.	Media that is moved from one environment to another can cause issues until it has acclimated to the new conditions. 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 device.

Table 23 Attention LED is lit *(continued)*

Problem	Solution
The Attention LED is lit but the Cleaning LED is not lit after a cartridge load.	The Autoloader was unable to complete the requested operation with the selected tape cartridge. • Use only cartridges that are compatible with the drive type (see Tape cartridges (page 30)). • Use the correct type of cartridges for the operation. For example, use a cleaning cartridge for cleaning. • Make sure you are using an Ultrium Universal cleaning cartridge (see Tape cartridges (page 30)).
The Cleaning LED is lit after using a cleaning cartridge.	The cleaning cartridge is expired. A cleaning cartridge will expire after 50 cleaning cycles.
A particular cartridge sets off the Attention LED and possibly the Cleaning LED.	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 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. • If the bad cartridge is a cleaning cartridge, it might be expired.

Table 24 Inventory problems

Problem	Solution
The inventory labels the cartridge **Full** instead of showing its bar code	• Verify that the label is an HP label. The bar code reader might not be able to read other labels. • Verify that the label is properly applied. See Labeling and loading the tape cartridges (page 28). • Verify that the label is not soiled.
The inventory process takes a long time	Apply high-quality HP labels to all tape cartridges. During the inventory process, the bar code reader attempts to read the bar code on the cartridge or the bar code on the back of the storage slot until it identifies the cartridge or determines that the slot is empty. The reader can usually identify a properly-labeled cartridge the first time, while determining that an unlabeled cartridge is in a storage slot can take four times as long.

Table 25 RMI network connection issues

Problem	Solution
Cannot connect to the remote management interface (RMI)	• Verify that the device is connected to the LAN with a CAT 5E, 6, or 6E Ethernet cable. • Verify that the link LED on the RJ45 (LAN) connector is lit when the device is powered up. If the LED is not lit, the device is not communicating with the LAN. See your network administrator for help. • Verify that the device has been configured with a valid static network address or DHCP has been enabled so the device can obtain a network address. If using DHCP, write down the device's network address from the OCP Information menu. If the device did not obtain a valid address via DHCP, verify that the DHCP server is up and the device has network access to it. If necessary, set a static network address instead. • Enter the device's IP address into the address bar of a web browser connected to the same LAN as the device. If the RMI web page does not display, ping the device's IP address. If the ping fails, verify that the device has a valid network address and that there are no firewalls or other obstructions to network traffic between the computer with the web browser and the device. See your network administrator for help.

Table 26 Cleaning problems

Problem	Solution
Cannot load the cleaning cartridge.	• Make sure you are using an Ultrium Universal cleaning cartridge (see Tape cartridges (page 30)). • Make sure the cleaning cartridge has not expired. A cleaning cartridge will expire after 50 cleaning cycles. • Contact your service representative.

Performance problems

TIP: For more performance troubleshooting information, see the *Performance Troubleshooting Guide* at www.hp.com/support/pat.

The process of backing up files goes through many devices, from the files in the file system on the disk, through the backup server, and out to the Autoloader, all managed by software running on an operating system. The backup process can only run as fast of the slowest link in this chain.

To find the performance bottlenecks in your system, check the specifications and performance of the:

- Average file size (page 94)
- File system type (page 94)
- Connection from the host server to the disks (page 95)
- Operating system configuration (page 98)
- Backup server (page 99)
- Backup type (page 99)
- Connection from the host server to the device (page 100)
- Media (page 101)

Average file size

The hard drive must seek to the position of a file before it can start reading. The more time the disks are seeking to files, the lower the performance.

To determine the average file size, divide the size of the backup by the number of files. See the performance impact of your system's average file size in Table 27 (page 94).

Table 27 Performance impact of various file sizes

Average file size	Performance impact	Recommendations
<64 k: small files	**POOR**. Lots of small files require the disk to perform many random accesses instead of a continuous read.	• If possible, do NOT use a file-by-file backup method. • For backups with an average file size <64 k, HP recommends using a sequential/image backup that backs up the hard drive or LUN image instead of the individual files. The drawback with the sequential/image backup method is that you might only be able to restore the entire disk image and not individual files. If you can restore individual files, the restore operation will be very slow.
64 k – 1 mb: medium files	**NEUTRAL**. Performance accessing medium-sized files should be okay. The disks will still need to do a fair number of random accesses.	No change is necessary but using a sequential backup method, such as an image backup, could offer some performance gains. See above for drawbacks.
>1 mb: large files	**GOOD**. Large files let the disk do less seeking and spend more time doing continuous reads.	None.
Image or sequential backup	None. File size is irrelevant for Image or sequential backups.	None.

File system type

The file system determines the organization of the files on the disks. When the files are spread over multiple disks with multiple controllers, some disks can be seeking while others are reading. Find the performance impact of your system's file system in Table 28 (page 95)

Table 28 Performance impact of various file systems

File system	Performance impact	Recommendations
Disk array	**GOOD**. Disk arrays typically provide excellent access to data. They usually include many disks, which improves bandwidth.	None.
Server or workstation with RAID	**VARIABLE**. RAID uses a group of disks to improve performance, and in the case of RAID 5, provides some parity protection in case one of the drives fail.	To achieve optimal performance, your array must support the following transfer rate: • LTO-2 HH: 48 MB/s • LTO-3 HH: 120 MB/s • LTO-4 HH: 160 MB/s • LTO-5: 280 MB/s Also, make sure that the server or workstation is used as little as possible during the backup, and close down programs such as virus scanners, which check each file that is opened.
Server or workstation with a single disk (spindle)	**POOR**. A single disk cannot retrieve or write data fast enough for any of the supported tape drives.	Upgrade to a disk array or RAID 5 with the minimum number of disks needed for your tape drives, or use concurrency or multithreading in the backup software to pull from more than one disk at a time. The drawback with concurrency or multithreading is that it slows the restore operation. Also, make sure that the server or workstation is used as little as possible during the backup, and close down programs such as virus scanners, which check each file that is opened.

Connection from the host server to the disks

The connection between the host server and the disks determines how much data can be transferred from the disks to the host computer at a time. A connection with insufficient bandwidth cannot provide enough data for the tape drives to write at full speed. Find the performance impact of your system's disk connection in Table 29 (page 96).

Table 29 Performance impact of various disk connections

Connection type	Performance impact	Recommendations
Fibre: 1 Gb	• LTO-2: **GOOD**. When fully used, a 1 Gb fibre connection can provide enough bandwidth for two LTO-2 tape drives. • LTO-3, LTO-4, LTO-5: **POOR**. A 1 Gb fibre connection is inadequate for an LTO-3, LTO-4, or LTO-5 tape drive.	For good performance, use a faster connection with LTO-3, LTO-4, and LTO-5 tape drives.
Fibre: 2 Gb	• LTO-2: **GOOD**. When fully used, a 2 Gb fibre connection can provide enough bandwidth for 4 LTO-2 tape drives. • LTO-3: **GOOD**. When fully used, a 2 Gb fibre connection can provide enough bandwidth for an LTO-3 tape drive. • LTO-4 HH: **GOOD**. When fully used, a 2 Gb fibre connection can provide enough bandwidth for an LTO-4 HH tape drive. • LTO-5: **POOR**. A 2 Gb fibre connection is inadequate for an LTO-5 tape drive.	For good performance, use a faster connection if you have multiple LTO-3 or LTO-4 tape drives, or an LTO-5 tape drive.
Fibre: 4 Gb	**GOOD**. When fully used, a 4 Gb fibre connection can provide enough bandwidth for the following number of tape drives: • LTO-2: 8 • LTO-3 HH: 4 • LTO-4 HH: 2 • LTO-5: 1	
Fibre: 8 Gb	**GOOD**. When fully used, an 8 Gb fibre connection can provide enough bandwidth for the following number of tape drives: • LTO-2: 16 • LTO-3 HH: 6 • LTO-4 HH: 3 • LTO-5: 2	
SAS: 3 Gb	**GOOD**. When fully used, a 3 Gb high-performance RAID array can support up to the following number of tape drives: • LTO-2: 10 • LTO-3, LTO-4: 6 • LTO-5: 3	
SAS: 6 Gb	**GOOD**. When fully used, an 6 Gb high-performance RAID array can support up to the following number of tape drives: • LTO-2: 20 • LTO-3, LTO-4: 12 • LTO-5: 2	

Table 29 Performance impact of various disk connections *(continued)*

Connection type	Performance impact	Recommendations
Parallel SCSI: Ultra 320	• LTO-2: **GOOD**. When fully used and assuming that the connection to the disks does not force the speed to a lower parallel SCSI type, an Ultra 320 connection can provide enough bandwidth for five LTO-2 tape drives. • LTO-3, LTO-4: **GOOD**. When fully used and assuming that the connection to the disks does not force the speed to a lower parallel SCSI type, an Ultra 320 connection ban provide enough bandwidth for a single LTO-3 or LTO-4 tape drive. • LTO-5: **POOR**. An Ultra 320 connection is inadequate for an LTO-5 tape drive.	If cables not designed for Ultra 320 speeds are used or there are more than a couple devices on the bus, the bus may slow down to Ultra 160 speeds.
Parallel SCSI: Ultra 160	• LTO-2: **GOOD**. When fully used and assuming that the connection to the disks does not force the speed to a lower parallel SCSI type, an Ultra 160 connection can provide enough bandwidth for two LTO-2 tape drives. • LTO-3: **MARGINAL**. An Ultra 160 connection is barely adequate for an LTO-3 tape drive. The bus would be saturated when providing 2:1 compressible data to an LTO-3 tape drive. • LTO-4 HH: **MARGINAL**. An Ultra 160 connection is barely adequate for an LTO-4 HH tape drive. The bus would be saturated when providing 2:1 compressible data to an LTO-4 HH tape drive. • LTO-5: **POOR**. An Ultra 160 connection is inadequate for an LTO-5 tape drive.	Upgrade to Ultra 320 for parallel SCSI disk drives when using an LTO-3 or LTO-4 tape drive, especially if your data is greater than 2:1 compressible.
Parallel SCSI: Ultra 2 (80)	• LTO-2: **MARGINAL**. When fully used and assuming that the connection to the disks does not force the speed to a lower parallel SCSI type, an Ultra 2 (80) connection barely provides enough bandwidth for an LTO-2 tape drive. • LTO-3, LTO-4, LTO-5: **POOR**. An Ultra 2(80) connection is inadequate for an LTO-3, LTO-4, or LTO-5 tape drive.	Upgrade to Ultra 320 for parallel SCSI disk drives when using an LTO-3 or LTO-4 tape drive.
Parallel SCSI: Ultra Wide, Fast Wide	**POOR**. Ultra Wide and Fast Wide are inadequate transport mechanism for LTO tape drives.	Upgrade to a faster transport medium, such as Ultra 320 SCSI.
Ethernet: 10 Gigabit	**GOOD**. When fully used, a 10 Gigabit Ethernet connection can provide enough bandwidth for the following number of tape drives: • LTO-2: 14 • LTO-3 HH: 5 • LTO-4 HH: 4 • LTO-5: 2	

Table 29 Performance impact of various disk connections *(continued)*

Connection type	Performance impact	Recommendations
Ethernet: 1 Gigabit	• LTO-2: **MARGINAL**. A 1 Gigabit Ethernet connection barely provides enough bandwidth for an LTO-2 tape drive when two concurrent streams are used. The drawback of using concurrency is that restore operations take longer. • LTO-3, LTO-4, LTO-5: **POOR**. A 1 Gigabit Ethernet connection is inadequate for an LTO-3, LTO-4, or LTO-5 tape drive.	Upgrade to Fibre Channel or 10 Gig Ethernet if using LTO-3, LTO-4, or LTO-5 tape drives.
Ethernet: 100 Base T, 10 Base T	**POOR**. 100 Base T and 10 Base T Ethernet do not have enough bandwidth to support any of the drives and would require too many streams to make concurrency practical.	Upgrade to Gigabit Ethernet or Fibre Channel.
Internal disks on backup server	**POOR**. Add-in RAID controllers, RAID on a chip (ROC), RAID on the mother board (ROMB), internal parallel SCSI, and internal IDE (non-RAID) are inadequate transport mechanisms for LTO tape drives.	Use a dedicated disk array or upgrade to RAID 5.

Operating system configuration

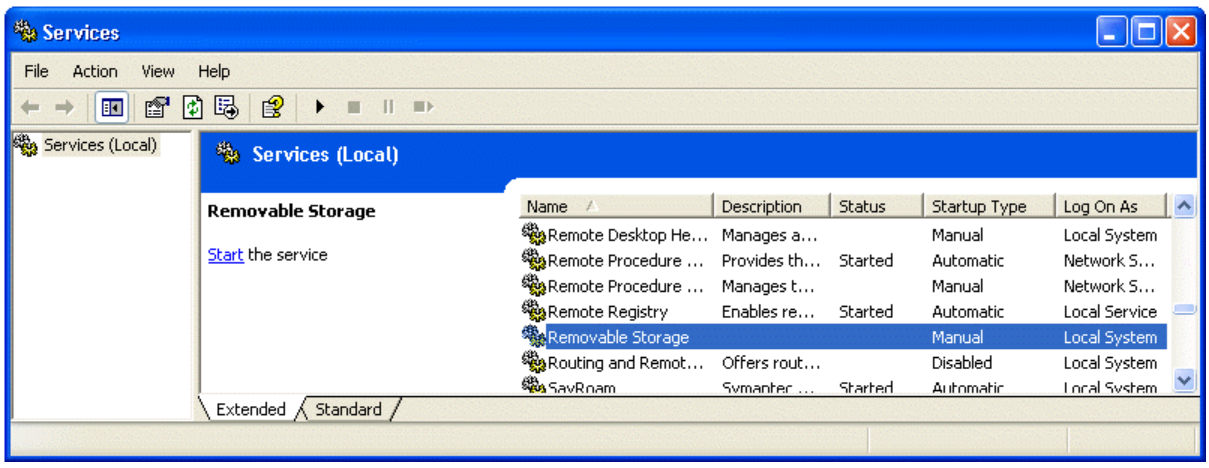
The operating system configuration and other programs running on the host computer can impact the ability of the host computer to transfer files from the disks to the tape drive.

Windows

To improve backup performance and improve SAN stability, shutdown and disable the Windows Removable Storage Manager unless the backup software requires it:

1. From the Windows **start** menu, select **Control Panel**.
2. In the Control Panel, select **Administrative Tools**.
3. In the Administrative Tools, select **Services**.
4. In Services, right-click **Removable Storage** and select **Stop**. The Status should be blank as shown in Figure 63 (page 98).

Figure 63 Removable Storage service



5. Right-click **Removable Storage** again and select **Properties**.
6. Change the **Startup type** to Disabled and click **OK**.

Stop as many programs as possible while a backup or restore is in progress. Be especially aware of monitoring applications, such as anti-virus software, which check every file that is read. If you

are concerned about viruses and backup performance, perform a virus scan before starting the backup, and shut down the anti-virus software while the backup is running.

Novell

You might need to tweak some Novell operating system parameters to achieve good backup performance.

- The MAXIMUM PACKET RECEIVE BUFFERS and MINIMUM PACKET RECEIVE BUFFERS parameters may need to be increased (if currently maxed out, try setting the MINIMUM to the current MAXIMUM and then double the value for the MAXIMUM on the backup server and any remote servers that are backed up).
- The MAXIMUM DIRECTORY CACHE BUFFERS and MINIMUM DIRECTORY CACHE BUFFERS parameters may need to be increased (if currently maxed out, try setting the MINIMUM to the current MAXIMUM and then double the value for the MAXIMUM on the backup server and any remote servers that are backed up.)
- Set TCP DELAYED ACKNOWLEDGEMENTS to OFF.
- Since Novell volumes may be compressed, hardware compression may lower the performance and capacity. If the volumes are compressed, make sure that the backup software does not uncompress the data on read and has hardware and software compression disabled.

  NOTE: Disabling the hardware compression should not be necessary on Ultrium drives as they sense the compression ratios and can automatically adjust if they receive non-compressable data.

- Stop as many programs as possible while a backup or restore is in progress. Be especially aware of monitoring applications, such as anti-virus software, which check every file that is read. If you are concerned about viruses and backup performance, perform a virus scan before starting the backup, and shut down the anti-virus software while the backup is running.

Backup server

The backup server must have enough RAM and processor power to transfer the files from the disk to the tape drive. See Table 30 (page 99) for the minimum RAM and CPU speed needed for each tape drive. In some cases, a multi-processor server may be required.

NOTE: Processor speed numbers as based on Intel x86 type processors. Use the equivalent on a RISC or other type of processor.

Table 30 Backup server requirements

Tape drive	Minimum RAM/drive	Processor power/drive
LTO-2	512 MB	1 GHz
LTO-3, LTO-4	1 GB	2 GHz
LTO-5	2 GB	4 GHz

In addition to having enough RAM and processing power, ensure that the PCIe bus is at least 64 bit, has a speed of 66 MHz or better, and is not overloaded by too many high-bandwidth cards. PCIe is preferred.

Backup type

Each type of backup has its own impact on performance, depending on how well it can keep data streaming to the tape drive.

File-by-file with a full-featured backup application

Performance impact: **VARIABLE**.

File-by-file backup with a full-featured backup application can be fast enough if the average file size is at least 64 k and there are not too many fragmented files. Full-featured backup applications also offer the best speeds for single file restores and allows for backing up only specific data. Check the compatibility matrix on the EBS website for a list of full-featured backup applications supported on your operating system for your Tape Autoloader: www.hp.com/go/ebs.

If the average file size is less than 64 k or if the file system is very fragmented, file-by-file backup will have poor performance. If the file system has a lot of fragmentation, use a de-fragmentation utility to make the files contiguous again. If the average file size is less than 64 k, HP recommends that you use a sequential/image backup that backups up the hard drive or LUN image instead of the individual files. The drawback with sequential/image backups is that they may only be able to restore the entire disk image and not individual files. If they can restore individual files, the restore operation will be very slow.

File-by-file with a native application

Performance impact: **POOR**.

Native backup applications based on tar, cpio, NT Backup, etc. do not have the extra features needed to manage the bandwidth requirements of the faster tape drives and should only be used to test basic functionality.

To get the best backup and restore performance, use a full-featured backup application. If the average file size is less than 64 k, use a sequential/image backup for best performance. However, a sequential/disk image backup might not allow you to restore individual files or the restore process will be very slow.

Disk image, flash, or sequential

Performance impact: **GOOD**.

A disk image or sequential backup backs up an entire disk, partition, or LUN by looking at the disk sector by sector instead of file by file. The entire disk contents is backed up contiguously, without the disk seeking, which prevents performance degradation caused by small or fragmented files.

If you are more concerned about backup performance than single-file restore, disk image or sequential backups can offer a real performance benefit. The disadvantage is that backup and restore operations work on an entire disk, partition, or LUN. You might not be able to backup a subset of files or restore a single file. If you can restore a single file, the restore process will be slow.

Database backup

Performance impact: **VARIABLE**.

To improve performance when backing up data from a database:

- Use specific backup agents for the database.
- Use the latest versions of the databases.
- Do not backup individual mailboxes.
- Do not backup specific records or do a record-by-record backup.
- Do not backup when the database is in heavy use.

Connection from the host server to the Autoloader

For the best performance, the connection from the host server to the device must have enough bandwidth to provide enough data to keep the tape drive streaming.

NOTE: Unlike most tape technologies, an LTO tape drive can write data as fast as the server can send it, even if the tape drive is not streaming.

Find the performance impact of your system's Autoloader connection in Table 31 (page 101)

Table 31 Performance impact of various Autoloader connections

Connection type	Performance impact	Recommendations
Parallel SCSI: Ultra 320	**GOOD**. When fully used, an Ultra 320 SCSI connection can provide enough bandwidth for the following number of tape drives, assuming 2:1 compression: • LTO-2: 2 • LTO-3, LTO-4: 1	Ultra 320 is an excellent transport medium, but only has enough bandwidth for one LTO-3 or LTO-4 drive per bus. **NOTE:** If the parallel SCSI cables are not designed for Ultra 320 speeds or more than a couple devices are on the parallel SCSI bus, the bus may slow down to Ultra 160 speed.
Parallel SCSI: Ultra 160	• LTO-2: **GOOD**. When fully used and assuming that the connection to the disks does not force the speed to a lower parallel SCSI type, an Ultra 160 connection can provide enough bandwidth for two LTO-2 tape drives. • LTO-3: **MARGINAL**. An Ultra 160 connection is barely adequate for an LTO-3 tape drive. The bus would be saturated with 2:1 compressible data. • LTO-4: **POOR**. An LTO-4 tape drive is unable to sustain maximum transfer speeds with 2:1 compressible data.	Ultra 160 is a good transport medium, but does not have enough bandwidth for LTO-3 or LTO-4 tape drives. If using LTO-3 or LTO-4, upgrade to an Ultra 320 HBA, especially if you have greater than 2:1 compressible data.
Parallel SCSI: Ultra 2 (80)	• LTO-2: **MARGINAL**. Ultra 2 (80) barely has enough bandwidth for one LTO-2 drive. • LTO-3, LTO-4: **POOR**. An Ultra 2 (80) connection is inadequate for an LTO-3 or LTO-4 tape drive.	Upgrade to Ultra 320.
Parallel SCSI: Ultra Wide, Fast Wide	Ultra Wide and Fast Wide are inadequate for all of the currently supported tape drives.	Upgrade to Ultra 320.
Fibre Channel: 1 Gb	**POOR**. One gigabit fibre is inadequate for an LTO tape drive.	
Fibre Channel: 2 Gb	• LTO-5: **POOR**. Two gigabit fibre is inadequate for an LTO-5 tape drive.	
Fibre Channel: 4 Gb, 8 Gb	**GOOD**. When fully used, 4 Gb and 8 Gb Fibre Channel have sufficient bandwidth for all supported tape drives.	
SAS: 3 Gb, 6 Gb	**GOOD**. When fully used, 3 Gb and 6 Gb SAS have sufficient bandwidth for all supported tape drives.	

Media

Once the data gets to the tape drive, it must be written onto the tape. If there are no bottlenecks and the Autoloader starts having performance problems:

- Try a new cartridge. A marginal cartridge can cause performance problems when the tape drive has to retry writing to bad spots on the tape.
- Clean the tape drive. See Tape cartridges (page 30) for instructions.

Service and repair

Releasing the magazines manually

If you cannot remove the magazines via the OCP or RMI, do the following:

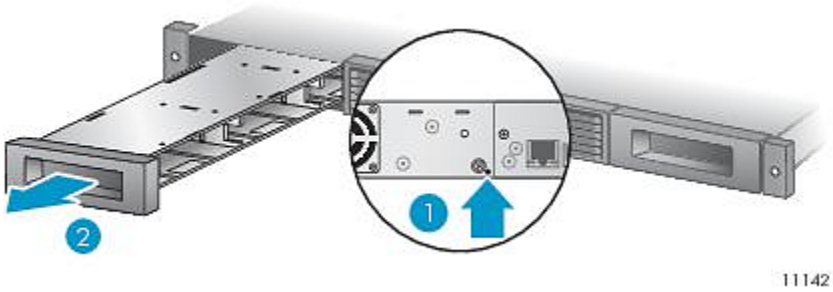
1. Unplug the power cord from the device.
2. From the back of the device, find the access holes for the right and left magazines. See Figure 64 (page 102).

Figure 64 Access holes for the right and left magazine

1. Right magazine release
2. Left magazine release

3. To manually release a magazine, insert the end of a small metal pin or straightened paper clip into the magazine access hole at the back of the device about 1.5 cm (0.6 inch), while another person grasps the magazine on that side and pulls it out of the front of the unit. See Figure 65 (page 102).

Figure 65 Releasing the magazine



1. Push a paper clip into the access hole.
2. Pull the magazine out of the front of the unit.

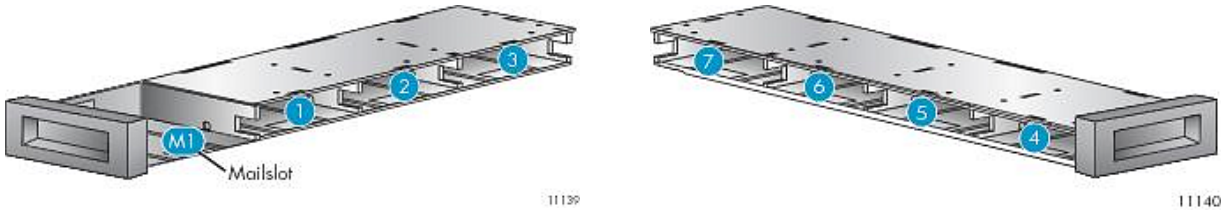
IMPORTANT: Do not force the pin once you encounter resistance. Doing so can damage the device.

4. Repeat step 3 for the other magazine if necessary.
5. If other tapes are still in the device, or if you were unable to manually remove the magazines and drive, contact HP customer service for further instructions. See HP technical support (page 137).

The wellness test

The wellness test exercises all Autoloader and tape drive hardware, except the external connections, and is useful for verifying that a device is working correctly. The wellness test requires operator interaction with the mailslot so cannot be initiated from the RMI.

For complete testing, enable the mailslot and ensure that each corner slot contains a tape cartridge. The corner slot positions are M1, 3, 4, and 7 when the mailslot is enabled



IMPORTANT: The Autoloader will remove any tape cartridge from the tape drive and go offline when running the Wellness test. Verify that any applications using the device have completed before starting the wellness test.

You can have the device run up to 10 cycles of the wellness test.

The wellness test requires operator interaction and can only be run from the OCP. During the wellness test:

1. The operator starts the wellness test from the OCP. The administrator password is required.
2. The device performs a self test and verifies that it can communicate with the tape drive.
3. The Autoloader returns the tape cartridge in the tape drive to its home slot, if necessary. If the home slot is not known, the Autoloader will move the cartridge to the mailslot and prompt the operator to remove it.
4. The device prompts the operator to enter the number of cycles to run the test.
5. The device opens the mailslot and prompts the operator to insert a scratch cartridge.
6. The operator inserts a scratch cartridge into the mailslot. If the mailslot is disabled or the operator closes the mailslot without inserting a cartridge into the mailslot, the device will perform a shortened version of the wellness test, skipping step 7.
7. The device loads the scratch cartridge into the tape drive, unloads the scratch cartridge from the tape drive, and returns the scratch cartridge to the mailslot.
8. The device moves the tape cartridge from the four top-row corner slots to the tape drive load point and then returns the tape cartridge to its slot. If one of the top-row corner slot positions does not contain a tape cartridge, the device will skip that location. If none of the top-row corner slots contain a tape cartridge, the device displays an error message.
9. If additional cycles remain to be run, the test will return to step 7 if there is a tape cartridge in the mailslot or step 8 if there is not a cartridge in the mailslot.
10. At the conclusion of the test, the device pops open the mailslot and waits for the operator to remove the scratch tape.
11. The device displays the test completion status, including any recoveries or errors that may have occurred.

Error codes

If an error occurs during operation, the device stops the current operation and displays an error code on the LCD screen. Unless otherwise noted in Operation problems (page 88), record the error code or error message from the LCD screen, and then try to resolve the error by cycling power to the device and retrying the operation.

To check the overall operation of the device, run the wellness test from the RMI or OCP. The wellness test exercises all robotic movements and checks the status of the electrical components and communication. To run the wellness test from the RMI, see Performing general diagnostics (page 59). To run the wellness test from the OCP, see Running the wellness test (Support > Run Wellness Test) (page 81).

If the error persists, contact support personnel, see HP technical support (page 137).

There are three ways to obtain error codes from the device:

- On the OCP
- On the RMI
- On an L&TT support ticket or report

Finding error code information on the OCP

When an error first occurs, the error message and error code are displayed on the OCP, as shown in Figure 66 (page 104).

Figure 66 Initial OCP error message

The code **9B** is the main error code, and **37** is the error sub-code.

If you review the Error Log in the Support menu, the OCP error log displays the error code, as shown in Figure 67 (page 104).

Figure 67 Error code in the OCP Error Log

The code **9B** is the main error code, **37** is the error sub-code, and **31** is sub-code specific information for factory use only. When you press **Enter**, the OCP displays the error message, as shown in Figure 68 (page 104).

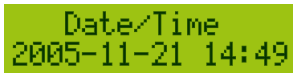
Figure 68 Error message in the OCP Error Log

If you press **Next**, the OCP will display additional information, if available, as shown in Figure 69 (page 104).

Figure 69 No additional information in the OCP error log

If you press **Next** again, the OCP will display the date and time in the format: **YYYY-MM-DD** followed by the time in 24–hour clock format, where 1:00 pm is 13:00, as shown in Figure 70 (page 104).

Figure 70 Date and time in the OCP error log



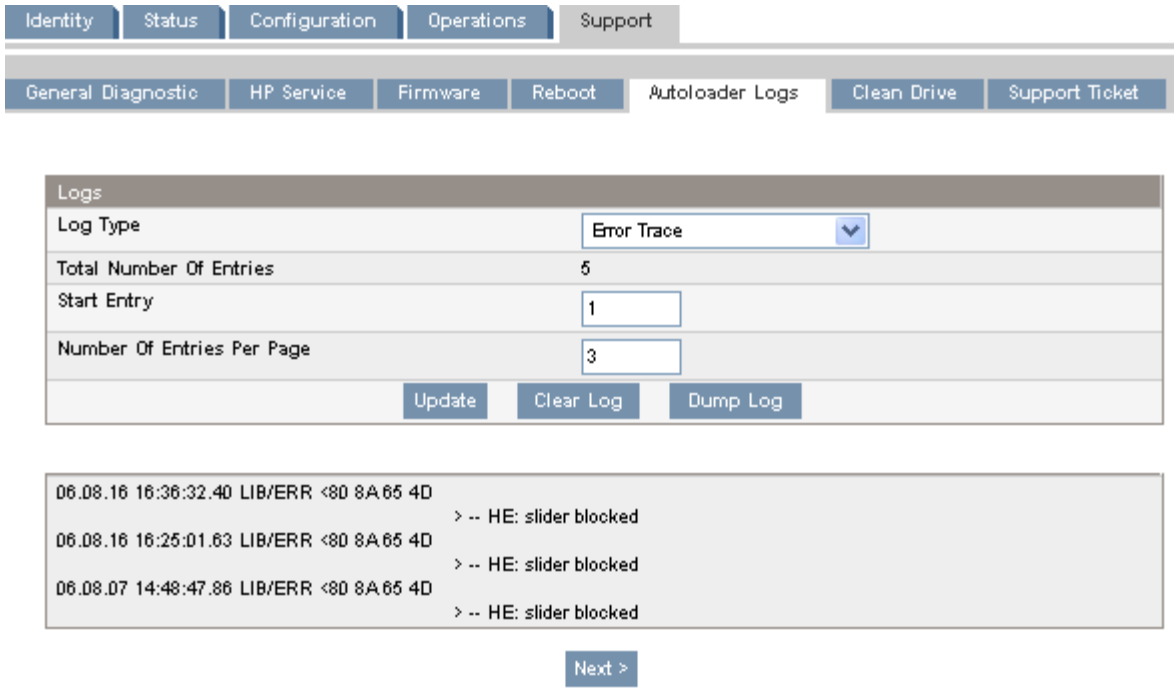
Finding error code information on the RMI

You can find error codes on the RMI Support: Autoloader Logs page. The available logs are: Error Trace, Informational Trace, Warning Trace, Configuration Change Trace, and Standard Trace.

The log entries are displayed in order of most recent to oldest. The format for the log entries is: YY.MM.DD HH.MM.SS.ss LIB/ERR<80 89 62 40

- YY.MM.DD — the date displayed as Year.Month.Day
- HH.MM.SS.ss — the time displayed as Hour.Minute.Second.Hundredths fo a second
- First code — hard or soft error. The code after LIB/ERR (80 in the example) will be 80 or 40. 80 indicates a hard error, 40 indicates a soft error.
- Second code — the main error code (89 in this example). See Error codes (page 103) for a list of error codes and recovery procedures.
- Third code — the sub-code (62 in this example). See Error sub-code descriptions (page 117) for a list of sub-codes.
- Fourth code — sub-code-specific information for factory use only

Figure 71 Support: Autoloader logs page



Finding error code information on an L&TT support ticket or report

An L&TT support ticket or report contains detailed information about the device configuration, along with errors and warnings. The support ticket and report contain the same information. The report is easier to read, but must be generated and read on the host computer. The support ticket can be downloaded from the device and then viewed on any computer with L&TT installed.

To generate and view a report or support ticket from L&TT:

1. In the L&TT **By Product** or **By Connection** tab, select the device from the device list.
2. Click the **Health** button on the main toolbar to generate and display a standard report. or click the **Support** button on the main toolbar to display the **Support** screen for additional report or support ticket options.

To download a support ticket from the device, do one of the following:

- From the RMI **Support: Support ticket** screen, click **Download**.
- Insert a USB flash drive into the USB port on the rear panel and then from the OCP, select **Download support ticket to USB**.

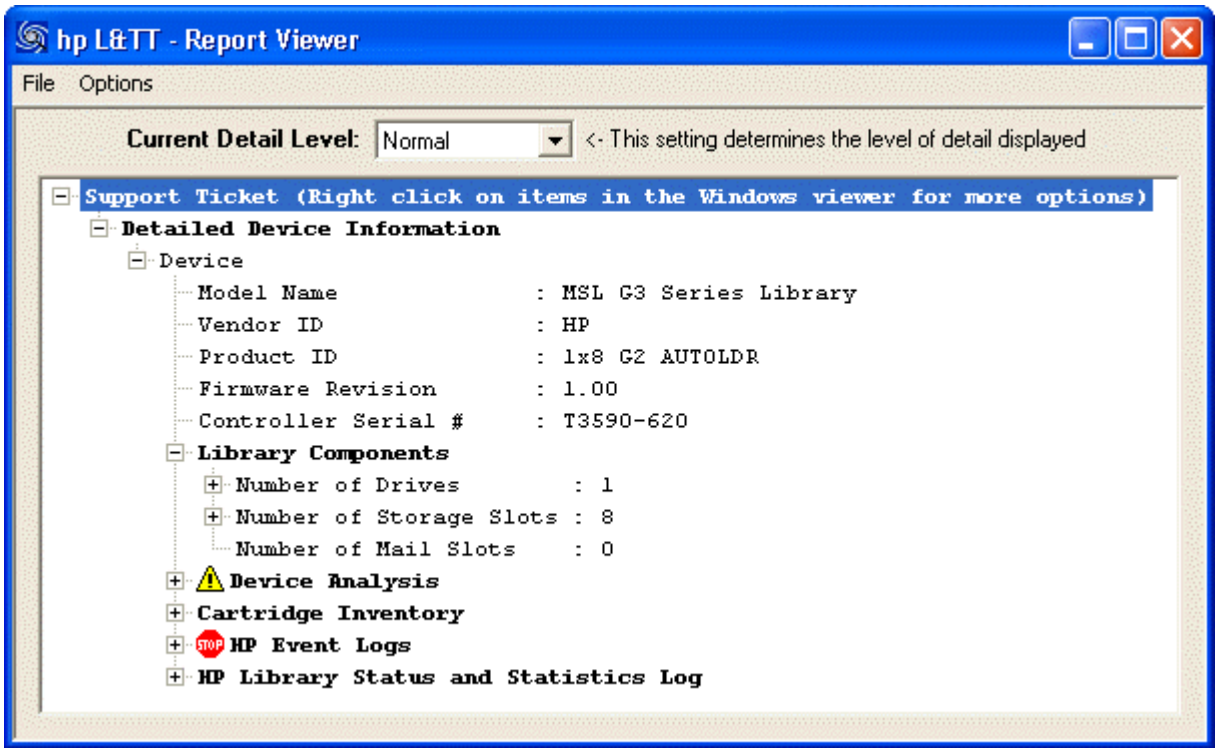
TIP: Each support ticket downloaded from the RMI will only contain information for the Autoloader itself or one drive. To capture all support information, download a ticket from the Autoloader and from each drive. To generate a consolidated support ticket with all support data in a single compressed file download the support ticket with L&TT.

To view a downloaded support ticket:

1. From the L&TT **File** menu, select **Load Support Ticket**.
2. Select the support ticket file in the browser.

The top of the support ticket contains basic configuration information about the device, as shown in Figure 72 (page 106).

Figure 72 Support ticket in viewer



Expand **HP Event Logs** to see events divided into three categories:

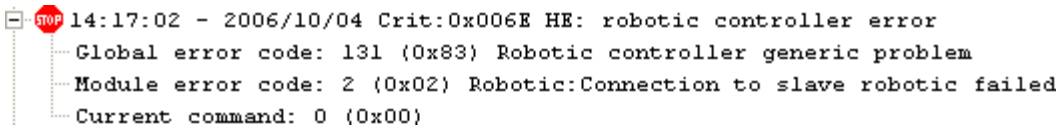
- Events in the last 24 hours
- Events in the last 31 days
- Events older than 31 days

Set the **Current Detail Level** to see additional types of events:

- **Normal** will only show critical events or hard errors.
- **More details** will also show warning and configuration events.
- **Everything** shows all events.

Critical events are designated with a STOP sign icon. Expand the event for more information, as shown in Figure 73 (page 107).

Figure 73 Critical event details



- The time stamp is in the format hours : minutes : seconds. The hours are in 24–hour clock format. For example, in this case `14` is 2 p.m.
- The date is in the format year/month/day.
- The event ID is the number on the header line, `0x006E` in this example. It uniquely maps to an error code.
- `HE` designates a hard error. The STOP sign icon and the word `Crit` before the event ID also indicate a hard error.
- The text description in the header ("robotic controller error" in this example) is the simple text description of the main error code.
- The main error code `(0x83)` is displayed in parenthesis as the **Global error code**. The error codes are described in Main error codes. The text after the main error code (`Robotic controller generic problem` in this example) is the text description for the error code.
- The error sub-code `(0x02)` is displayed in parenthesis as the **Module error code**. The error sub-codes are described in Error sub-code descriptions. The text after the error sub-code (`Robotic: connection to slave robotic failed` in this example) is name of the component followed by the text description of the error sub-code.
- The **Current command** provides information for factory use only.

Main error code descriptions

Table 32 Main error codes

Error code	Description	Details and solution
80	Cannot initialize bar code reader	Power-cycle the unit and retry the operation.
81	No response from bar code reader	• Power-cycle the unit and retry the operation. • Update the firmware to the latest version.
82	No response from EEPROM on robotic controller	Power-cycle the unit and retry the operation.
84	Setting of gripper[1] motor parameters failed	• Power-cycle the unit and retry the operation. • Update the firmware to the latest version.
85	Setting of slider[2] motor parameters failed	
86	Setting of elevator[3] motor parameters failed	
87	Setting of rotation[4] motor parameters failed	
88	Setting of sled[5] motor parameters failed	

Table 32 Main error codes *(continued)*

Error code	Description	Details and solution
89	Gripper[1] obstructed	• Ensure that nothing is obstructing the gripper. • If the device was moved, verify that each of the tape cartridges is properly seated in a magazine. • Run the wellness test.
8A	Slider[2] obstructed	• If this error occurs with subcode 45 and new media, remove the magazine and manually load and unload the new media five times for each new cartridge to condition the new cartridges. • Update the firmware to the latest version. Many firmware enhancements have been made to reduce the occurrence of this error. • If this error occurs with sub-code 43, it could be the result of a misaligned magazine in combination with failed sensor cable. Ensure that the magazine is fully and correctly inserted, and then check whether the device can detect when the magazine is removed. • Remove all magazines and ensure that nothing is obstructing the robot. With the magazines removed, you can see inside the device with a flashlight. For increased visibility, also remove the tape drive. • If this error occurs on a tape load or unload, power off the tape drive. Remove the drive and inspect the front of the drive for any obstructions, such as an improperly placed label. • Run the wellness test.
8B	Elevator[3] obstructed	• Update the firmware to the latest version. There have been a few firmware enhancements to reduce the occurrence of this error. • Remove all magazines and ensure that nothing, such as a loose tape in the device, is obstructing the raising and lowering movement of the robot. • Run the wellness test.
8C	Rotation[4] obstructed	• If the device was moved or shipped with tape cartridges in the magazines, verify that none of the cartridges is loose, obstructing access to the tape drive. • Remove all magazines and check for any kind of obstruction. • Run the wellness test.
8D	Sled[5] obstructed	• If this error occurs on the first power-on after unpacking or moving the device, or after replacing the chassis, ensure that the shipping lock was removed from the top and stored on the back panel (see Removing the shipping lock (page 23)). • If the device was moved or shipped with tape cartridges in the magazines, verify that the

Table 32 Main error codes *(continued)*

Error code	Description	Details and solution
		cartridges did not come out of the magazines to obstruct the robotic. • Ensure that nothing is stacked on top of the device because any weight on top of the device can bow the top cover down and interfere with the robotics. If the Autoloader has a tabletop conversion cover, verify that no more than 15 kg (33 lb) is on top of the cover. • Ensure that the device is either mounted in a rack with its rack kit or in a tabletop conversion cover. If the Autoloader is not mounted in a rack or in the tabletop conversion cover, ensure that the six support feet are installed and that all of them are standing on a flat surface. The device must be supported under both of its side edges or the bottom can bow and impede robotic movement. • Remove all magazines and look for any obstructions to the robot. • Run the wellness test.
8E	Ends of gripper[1] movement not in expected range	• Remove all magazines and look for any obstructions to the robot. • Run the wellness test.
8F	Ends of slider[2] movement not in expected range	• If the error consistently happens on the same slot, try different tape cartridges in that slot. ◦ If the failure remains with the same slot, the magazine may be at fault. ◦ If the failure follows the tape cartridge, the tape cartridge may be at fault. • If the device is performing an operation that automatically returns a tape cartridge to a certain slot, make sure another tape is not loaded in that slot. • Run the wellness test
90	Ends of elevator[3] movement not in expected range	• Remove all magazines and look for any obstructions to the robot. • Run the wellness test.
91	Ends of rotation[4] movement not in expected range	• Remove all magazines and look for any obstructions to the robot. • Run the wellness test.
92	Ends of sled[5] movement not in expected range	• Remove all magazines and look for any obstructions to the robot. • Run the wellness test.
93	Gripper[1] reached a position beyond expected range	• Remove all magazines and look for any obstructions to the robot. • Run the wellness test.
94	Slider[2] reached a position beyond expected range	

Table 32 Main error codes *(continued)*

Error code	Description	Details and solution
95	Elevator[3] reached a position beyond expected range	
96	Rotation[4] reached a position beyond expected range	
97	Sled[5] reached a position beyond expected range	
98	Cartridge present sensor not found	• Power cycle the device and retry the operation.
99	Slider[2] home sensor not found	
9A	Rotation[4] home sensor not found	
9B	Sled[5] position sensor not found	• Power cycle the device and retry the operation. • Remove the magazines and verify that all the clear plastic inserts in the magazine storage slots, except the mailslots, are present and firmly seated. • Run the wellness test.
9C	Gripper[1] range of motion out of specification	• Remove all magazines and look for any obstructions to the robot. • Update the firmware to the latest version. • Run the wellness test.
9D	Slider[2] range of motion out of specification	• Remove all magazines and look for any obstructions to the robot. • Run the wellness test.
9E	Elevator[3] range of motion out of specification	

Table 32 Main error codes *(continued)*

Error code	Description	Details and solution
9F	Rotation[4] range of motion out of specification	• Remove all magazines and look for any obstructions to the robot. • Run the wellness test.
A0	Sled[5] range of motion out of specification	• Remove all magazines and look for any obstructions to the robot. • Run the wellness test.
A1	Open Mailslot failed	• Retry the operation. • Ensure that nothing is obstructing the opening of the mailslot. • Remove the magazine and check for issues such as a tape label preventing the mailslot from opening.
A2	Error during elevator locking.	• Remove magazines and look for any obstructions to the robot. • Run the wellness test.
B0	Command from the autoloader controller to robotics controller did not complete in time allotted	• Reset the device and retry the operation.
B1	Robot controller reported format error on command from Autoloader controller	• Reset the device and retry the operation.
B2	Communication to robot from Autoloader controller failed	• Update the firmware to the latest version. • Power cycle the device and retry the operation.
B3	Robot stopped due to a released magazine	• Check that all magazines are completely inserted and retry the operation. • If this error was caused by a manual magazine removal, replace the magazine and try the operation again. • In earlier firmware versions, the device could appear unresponsive if a magazine was left out of the device too long. Power cycle the device to restore operation. Update to the latest firmware version to prevent this issue in the future.
B4	"Tape in gripper[1]" sensor did not report the expected value	• Update the firmware to the latest version. • Remove the magazines and inspect them for a stuck tape. If no tapes are stuck in the magazines, shine a light in one of the open magazine bays to see if there is a tape in the robot or drive. If there is a tape in the robot, replace the magazines and power-cycle the device. If there is a tape in a drive, replace the magazines and run the Force Tape Eject operation. (See Forcing the drive to eject a tape (Support > Force Drive To Eject Tape) (page 83)). • Run the wellness test
B5	Robotic controller not responding to command from Autoloader controller	• Update the firmware to the latest version. • Power cycle the device and retry the

Table 32 Main error codes *(continued)*

Error code	Description	Details and solution
		operation.
C0	Network initialization failed	• Check the network cable. • Check that the network configuration is correct. • If DHCP is enabled, ensure that a DHCP server is up an running on the device's network. • Power cycle the device and try again.
C1	Telnet interface initialization failed	• Check the network cable. • Check that the network configuration is correct. • Power cycle the device and try again.
C2	Web server initialization failed	
C3	EEPROM parameter failure	• Power cycle the device and try again.
C4	LAN card initialization failed.	
C5	EEPROM write data to failure.	
C6	Ping command did not reach target	• Check the network cable. • Check that the network configuration is correct. • Power cycle the device and try again.
C7	Cannot upgrade firmware from USB	• Ensure that the correct file was selected. • Retry firmware upgrade. • If not successful, attempt a different firmware upgrade method.
C8	Cannot upgrade firmware from FTP	
C9	Cannot upgrade robotic firmware from Flash.	• Retry firmware upgrade. • If not successful, attempt a different firmware upgrade method. • If still not successful, contact HP customer support.
D0	ROM checksum incorrect	• Retry Autoloader firmware upgrade. • Ensure that the firmware is correct for the device. • If the device continues to fail, contact HPcustomer support.
D1	RAM error during Power-On-Self-Test	Power-cycle the unit.
D2	Read or Write to NVRAM on autoloader controller failed	Power-cycle the unit.
D3	Time controller failed during Power-On-Self-Test	Power-cycle the unit.
D4	Internal UART serial communication error	
D5	Communication to display failed	Power-cycle the unit.
D6	Autoloader controller memory error	

Table 32 Main error codes *(continued)*

Error code	Description	Details and solution
D7	Firmware upgrade error	This error can occur is an attempt is made to upgrade a drive with the wrong personality or version for that drive. • Ensure that the correct drive firmware is being used to update the drive. • If the correct drive firmware is being used, update the Autoloader firmware. • Power cycle the device and attempt the operation again.
D8	Autoloader controller data base error	Power-cycle the unit.

Table 32 Main error codes *(continued)*

Error code	Description	Details and solution
DA	When running the wellness test, the bar code did not match the previous value for that tape	• Check the bar code label for proper application and damage. • Run the wellness test again.
DC	I2C Bus failure.	• Power-cycle the device.
E1	Key server token backup not successful (not enough available space on target token)	• Retry the backup with a token with space for more keys. **NOTE:** Each token can hold 100 keys. Keys cannot be overwritten or deleted; only unique keys will be written to the token.
E2	Unsupported hardware detected. Some hardware that is connected to the Autoloader requires updated Autoloader firmware.	• Update the Autoloader firmware to the current version.
E3	Error during key server token backup; backup process unsuccessful.	• Retry the backup with a different token. • If the error occurs again, contact HP customer support.
E4	Drive firmware does not support encryption.	• Ensure that all tape drives that support encryption (LTO-4 and later generations) are at the minimum firmware required for the Encryption Kit: ◦ Ultrium 1760 SCSI: W22W ◦ Ultrium 1760 SAS: U26W • If necessary, update the tape drive firmware to the current version.
E6	Key Server Token restore process did not complete, Key Server Token restore failed.	• Retry the operation on the same key server token. • Retry the operation on a new key server token.
E7	Incorrect Key Server Toke Type. Token not supported within this device.	• Verify that the USB device is an HP key server token from the HP StorageWorks 1/8 G2 & MSL Encryption Kit. • Retry the operation on a new key server token.
F0	Drive exceeded temperature specification	• Check ambient temperature to ensure that it is within operating specifications. • Check all fans to determine whether they are working properly.
F1	Autoloader controller lost communication with the drive	• Power-cycle the device and retry the operation. • Update Autoloader and drive firmware to the latest versions. • Re-seat the tape drive to ensure a good connection to the device. • If possible, try the drive in another drive bay.
F2	Drive sled[5] not present	

Table 32 Main error codes *(continued)*

Error code	Description	Details and solution
F3	Drive hardware error	• Cycle power, after several occurrences, contact technical support.
F4	Load time-out. The drive has run into a time-out while loading a tape.	• Check that the tape cartridge is supported and has not exceeded its usage life. Inspect it for damage. • Retry the operation. • Clean the drive. • If the issue continues, remove the drive and inspect the opening for any obstructions. • Attempt the Force Tape Eject process. Once the tape cartridge is ejected, unlock the magazine holding the cartridge and inspect the cartridge for damage. Discard the tape cartridge if it is damaged. (See Forcing the drive to eject a tape (Support > Force Drive To Eject Tape) (page 83)).
F5	Time allotted for drive unloading exceeded	• Retry the operation. • Attempt the Force Tape Eject process. Once the tape cartridge is ejected, unlock the magazine holding the cartridge and inspect the cartridge for damage. Discard the tape cartridge if it is damaged. (See Forcing the drive to eject a tape (Support > Force Drive To Eject Tape) (page 83)).
F6	No drive installed. A tape drive has never been installed.	• If a tape drive is installed, re-seat it by removing it and replacing it.
F7	Support ticket download from drive not possible.	• Upgrade the tape drive firmware to the current version and try to download the support ticket again. • Use the OCP or RMI to power cycle the tape drive and then retry the operation. • Attempt to use L&TT to get the tape drive support ticket.
F8	Invalid drive command	• Update the tape drive firmware to the current version. • Try the operation again. • If the error occurs again contact HP customer support.
F9	Invalid drive parameter	
FA	SDCI microcode error	
FB	Drive logged out	• Update the tape drive firmware to the current version. • Try the operation again. • If the error occurs again contact HP customer support.
FC	Internal SCSI command failed with check condition	
FD	Internal SCSI command timeout	

[1]Gripper: The part of the robotics assembly that pinches media in order to grip it.

[2]Slider: The part of the robotics assembly that plunges in and out for **get** and **put** operations.

[3]Elevator: The part of the robotics assembly that moves in the vertical direction.

[4]Rotation: The part of the robotics assembly that turns the robot to face each magazine and the drive.

[5]Sled: The part of the robotics assembly that moves the robot towards the OCP or back towards the drive.

Error sub-code descriptions

Table 33 Robotic error sub-codes

Sub-code	Description
01	Mechanical initialization failure
02	Connection to slave robotic failed
03	Error motor initialization
04	Error during gripper[1] close
05	Error slider[2] home positioning
06	Error elevator[3] home movement
07	Error during sled[5] movement to rotation[4] position
08	Error during rotation[4] initialization, get range failed
09	Error elevator[3] init
0A	Error during rotation[4] to far position
0B	Error first sled[5] init, move to sensor failed
0C	Error during sled[5] movement to rotation[4] position
0D	Error during rotation[4] to slide position
0E	Error slider[2] init, get range failed
0F	Error during slider[2] forward movement
10	Error gripper[1] init, get range failed
11	Error during slider[2] home movement
12	Error during rotation[4] to FAR position
13	Error sled[5] init, move to sensor failed
14	Error during sled move — check shipping lock
20	Error inventory scan
21	Error during gripper[1] close
22	Error slider[2] home movement
23	Error during move gripper[1] to scan pos
24	Error reading bar code label
28	Error Extra inventory scan
29	Error during closing gripper[1]
2A	Error slider[2] preposition movement
2B	Error during opening gripper[1]
2C	Error during sled[5] movement up to sensor
2D	Error slider[2] preposition backwards movement
30	Error slot preposition

Table 33 Robotic error sub-codes *(continued)*

Sub-code	Description
31	Error during sled[5] movement in FLMoveRotation
32	Command sending to robotic failed
33	Error during elevator[3] movement in FLMoveRotation function
34	Error during rotation[4] in FLMoveRotation function
35	Error during elevator[3] movement in FLMoveRotation function
36	Error during sled[5] movement in FLMoveSled function
37	Error during sled[5] positioning to sensor in FLMoveSled function
38	Error during sled[5] positioning to mailslot in FLMoveSled function
39	Error during sled[5] positioning without sensor
3A	Error during elevator movement without sensor
3B	Error slot position sensor not found
40	Movement to/from slot failed
41	Error during first slider[2] movement
42	Error during first gripper[1] movement
43	Error during second slider[2] movement
44	Error during second gripper[1] movement, get range failed
45	Error during third slider[2] movement, move home failed
46	Error during set hold current to avoid torsion
50	Preposition to drive failed
51	Elevator[3] movement to home sensor failed
52	Sled[5] movement to home sensor failed
53	Error during sled[5] movement to drive position
54	Error during rotation[4] to drive position
55	Error during elevator[3] movement in drive position
56	Error during sled[5] movement to rotation position.
57	Error during rotation to end position.
60	Move from/to drive failed
61	Error during first slider[2] movement
62	Error during first gripper[1] movement
63	Error during second slider[2] movement
64	Error during second gripper[1] movement, get range failed
65	Error during third slider[2] movement, move home failed
70	Release magazine failed
71	Error during sled[5] movement to rotation[4] position
72	Error during rotation[4] to unlock position

Table 33 Robotic error sub-codes *(continued)*

Sub-code	Description
73	Error during move sled[5] to block
80	Opening mailslot failed
81	Error during movement to mailslot open position
82	Error during moving back, sensor was found
90	Movement to home position failed
91	Elevator[3] movement to home position failed
92	Error during sled[5] movement to rotation[4] position
93	Error during rotation[4] to home or far position
94	Sled[5] movement to home sensor position failed
95	Sled[5] movement to transport position failed
99	Error during rotation movement to rotation minimum position
A0	Movement to mailslot failed
A1	Sled[5] movement to sensor failed
A2	Sled[5] movement to rotation[4] position failed
A3	Elevator[3] movement to home position failed
A4	Error during rotation[4] to far position
A5	Sled[5] movement to mailslot position failed
A6	Error during elevator movement to position
A7	Error during mailslot detection
B0	EEPROM on robotics controller not accessible or error during read/write operation
B1	Save/restore configuration settings: not enough internal memory available for creating the file and restoring the file respectively
B2	Save/restore configuration settings: restore buffer corrupted, checksum calculation failed
B3	Save/restore configuration settings: database field corrupted
B4	Save/restore configuration settings: invalid personality
B5	Save/restore configuration settings: invalid file
C0	Check on magazine type failed
C1	Rotation[4] movement during check on magazine type failed
C2	Elevator[3] movement during check on magazine type failed
C3	Sled[5] movement during check on magazine type failed
C4	Sled[5] movement to sensor during check on magazine type failed

[1]Gripper: The part of the robotics assembly that pinches media in order to grip it.

[2]Slider: The part of the robotics assembly that plunges in and out for **get** and **put** operations.

[3]Elevator: The part of the robotics assembly that moves in the vertical direction.

[4]Rotation: The part of the robotics assembly that turns the robot to face each magazine and the drive.

[5]Sled: The part of the robotics assembly that moves the robot towards the OCP or back towards the drive.

Table 34 Device error sub-codes

Error code	Description
90	Robotic load not reached Cartridge Present sensor
91	No activity after Load command
92	Time-out while loading tape
93	No activity after load command
94	Time-out drive Unload
95	Drive terminated unsuccessfully
96	Tape not ejected at robot unload
97	Slot not free at robot unload
98	Cartridge not seated in load phase 1

Drive error codes

Table 35 Drive error codes

Error code	Description
01	Drive broken
02	Temperature exceeds limit
03	Tape error
04	Cleaning cartridge is expired
05	Drive needs cleaning
06	Autoloader lost communication with the drive
07	Warning that the tape is nearing its end of life

Warning events

Table 36 Warning event codes

Event code	Description	Details and Solution
30	SCSI: transport element full	The application software made an illegal request.
31	SCSI: all slots empty	
32	SCSI: invalid opcode	
33	SCSI: invalid element address	
34	SCSI: invalid field in CDB	
35	SCSI: invalid drive specified	
36	SCSI: SEND DIAGNOSTIC command: invalid test number	
37	SCSI: invalid LUN	
38	SCSI: parameter list length error	
39	SCSI: parameter list error: invalid field	
3A	SCSI: parameter list error: parameter not supported	
3B	SCSI: parameter value invalid	The application software made an illegal request.
3C	SCSI: saving parameters not supported	
3D	SCSI: invalid ID message	
3E	SCSI: destination element full	
3F	SCSI: source slot or drive empty	
40	SCSI: wrong checksum	
41	SCSI: command sequence error	
42	SCSI: drive disabled	The application software requested to use a drive that is disabled. Check the device configuration.
43	SCSI: mailslot disabled	The application software requested to use the mailslot, but the mailslot is disabled. Check the device configuration.
44	SCSI: flash image does not fit bootcode	Check the version of firmware used for the upgrade. The firmware is incompatible with this device.
45	SCSI: media removal prevented by drive	The application software has locked media removal and either the software or device user interface attempted to remove the media. **NOTE:** This IS NOT a hardware issue. If the issue cannot be resolved with the application software, power off the device, disconnect the data cable, and then power on the device.
46	SCSI: media removal prevented by library	
47	SCSI: flash image does not fit personality	Check the firmware file used for the upgrade. The firmware is incompatible with this device.
48	SCSI: tape drive not supported by this library	The tape drive is not supported by the firmware in this device. Upgrade the device firmware to the most up-to-date version. Verify that the drive has an HP MSL-G3 or 1/8 G2 firmware revision. If firmware is not the correct type, the wrong tape

Table 36 Warning event codes *(continued)*

Event code	Description	Details and Solution
		drive has been installed. Use only HP-approved support to insure that the correct tape drives are used.
49	SCSI: incompatible magazine, magazine not accessible	Verify that a supported magazine for that slot is inserted. If the magazine is in the lower left position, verify that the type of magazine is consistent with the mailslot configuration.
4A	Source not ready	• Retry the operation.
4B	Destination not ready	• Retry the operation.
4C	Reservation failed	The application software made an illegal request.
4D	Library controller busy	Retry the operation.
4E	Invalid robotic request	
4F	Robotic not initialized	
51	Incompatible medium	• Verify that the drives are installed correctly. • Verify that the cartridge and tape drive generation are compatible. See Backward read compatibility (page 33). • Verify that the tape is correct for the operation initiated.
52	All slots full; no movement possible	Remove a cartridge from the device to make a slot available for the move operation.
53	Wellness test: invalid test setup	Load tapes in the four top-level corner slots. SeeThe wellness test (page 102).
55	Invalid license key	• Verify that the correct license key was entered. • Verify that the **Caps Lock** key is not depressed. The key is case sensitive.
56	No decryption key available on token	Ensure that the key server token containing the key used to encrypt the tape is installed in the USB port.
57	Key server token PIN required	Use the RMI to enter the PIN for the key server token that is installed in the USB port. **NOTE:** The PIN is required every time a token is installed in the USB port and every time the Autoloader is powered on.
58	Parity error	• Retry the operation. • If the problem continues, contact HP customer support.
59	Error log overflow	
5A	Unable to downgrade firmware while encryption enabled.	Disable encryption before downgrading firmware.
5B	Invalid cartridge. LTO3 media is not supported with encryption enabled.	• Verify that the tape cartridge is supported. • Update the tape drive firmware to the latest version to use LTO3 media.
5C	IPv6 will not be supported after downgrading firmware.	Change the network settings to IPv4 before downgrading firmware.

Table 36 Warning event codes *(continued)*

Event code	Description	Details and Solution
5D	Wrong drive firmware — invalid drive firmware type.	Drive firmware is specific to the drive model and interface. Select the drive firmware specific to this drive. If the firmware file could have been renamed, obtain a new copy of the firmware file
5F	No firmware downgrade possible.	The device firmware may not be downgraded in cases that would compromise encrypted data, critical component support, or license terms. Check the configuration settings. If the device has been using the Encryption Kit, you may need to disable encryption before downgrading firmware.
60	Cleaning tape installed.	Complete the cleaning process and retry the operation.
61	Cleaning failure. Cleaning process could not be performed.	• Check cleaning tape and exchange if necessary. • Retry the operation.
62	Cleaning tape expired.	Exchange the cleaning tape.
63	Invalid cartridge. Drive has rejected the cartridge as invalid.	• Verify that the cartridge generation and technology are supported by the device. See Tape cartridges (page 30). • Retry the operation. • If problems persist, exchange the data cartridge.
64	Invalid cleaning cartridge. Drive has rejected the cartridge as invalid.	
65	Invalid upgrade cartridge. Drive has rejected the cartridge as invalid.	• Retry the operation. • If problems persist, exchange the data cartridge.
66	Diagnostic tape write protect.	The diagnostic test needs to write data but the tape being used for the test is write protected. Ensure that the device has a tape that is not write protected for use during the diagnostic test.
67	Incompatible medium	The drive tried to read or write data from a tape from an incompatible LTO generation. For compatibility information see Backward read compatibility (page 33).
70	SCSI message error	Check the SCSI cable connection and verify that the maximum cable length is not exceeded. Verify that the SCSI bus is properly terminated.
71	SCSI parity error	
72	SCSI invalid message	
73	SCSI: overlapped command attempt	The application software made an illegal request.
74	SCSI: echo buffer overwritten	
80	Movement retry. Robotics movement did not succeed but was successful on a retry.	Recovered error move operation. No action required. Occasional retries are normal operation.
81	Drive sled fan alert. Fan motion has stopped.	• Check the tape drive fan on the Autoloader back panel to see whether the fan is operational and not obstructed. **NOTE:** Fan only operates when cooling is required.
82	Clean request from the tape drive	Clean the tape drive using a valid cleaning tape.

Table 36 Warning event codes *(continued)*

Event code	Description	Details and Solution
83	Media attention	Evaluate media status using L&TT.
84	Tape drive tape alert; tape drive reported a warning or critical tape alert.	Evaluate drive status using L&TT.
85	DHCP request has failed	• Check the network to ensure connection to the DHCP server. • Check that the network configuration is correct. • If DHCP is enabled, ensure that the DHCP server is up and running on the device's network. • Power cycle the device and retry the operation.
86	Autoclean media warning; not enough media present to support autocleaning.	Insert a valid cleaning cartridge into the Autoloader.
87	Drive not supported; the tape drive was disabled because it cannot be used in this Autoloader.	Replace the drive with a compatible tape drive.
88	Drive firmware revision has not changed after a tape drive firmware upgrade.	• Verify that the firmware image is correct for the tape drive. • Retry the operation. • Retry using an alternate firmware upgrade method.
8C	Invalid robotics code; does not match with the loaded Autoloader firmware.	Install new Autoloader firmware, which will install a compatible robotics firmware version.
8E	Cleaning tape nearly expired. Only one or two cleaning operations remain.	Obtain a new cleaning tape for use when the current cleaning tape expires.
8F	I^2C bus recovery	Contact HP Service if this unexpected condition occurs.
92	VPD data recovery.	Power cycle the device and retry the operation.
DB	External drive cooling fan failure (fan motion has stopped). The subcode indicates which drive sled fan is affected. Subcode 00: drive sled #1 Subcode 01: drive sled #2 etc.	Verify that the fan for the indicated drive sled is operational and not obstructed. **NOTE:** The fan only operates when cooling is required.
F2	Drive sled missing.	• Power cycle the device and retry the operation. • Re-seat the tape drive to ensure a good connection to the device.

Configuration change events

Table 37 Configuration change events

Value	Configuration event	Description
0x41	Drive SCSI changed	Drive SCSI ID has changed
0x42	Library SCSI changed	Library SCSI ID changed (*)
0x43	Drive enable	Drive was enabled
0x44	Drive disable	Drive disabled

Table 37 Configuration change events *(continued)*

Value	Configuration event	Description
0x45	Master drive assigned	Drive master assigned
0x46	Drive sled added	Drive sled added
0x47	Drive sled removed	Drive sled removed
0x48	Library mode changed	Library mode changed (automatic, sequential, random)
0x49	Element address	Element address changed
0x4A	Net parameter	Network parameter has changed
0x4B	Slots reserved	Slots reserved
0x4C	Mailslot support	Mailslot support
0x4D	Admin password	Admin password has changed
0x4E	Date/time set	Date and time of RTC set
0x4F	Barcode format	Barcode format alignment changed
0x50	Default config set	Default configuration set
0x51	FW upgrade Library	Library firmware was upgraded
0x52	FW upgrade drive	Drive firmware was upgraded
0x53	Auto-clean feature set	Auto-cleaning switched on or off
0x54	Drive FC parameters	Drive Fibre Channel parameters changed
0x55	Power supply added	A power supply was added to the system
0x56	Key server token was removed	A key server token was removed
0x57	Key server token was inserted	A key server token was inserted
0x58	Encryption has been enabled	Encryption has been enabled
0x59	Encryption has been disabled	Encryption has been disabled
0x64	Library door lock status change	The status of the Library door lock has changed
0x65	Hostname has been changed	Hostname has been changed
0x66	Database has been restored from robot	The Library configuration has been restored from the robot
0x67	Serial number has been changed	The serial number has been changed
0x68	World wide identifier base has been changed	The world wide identifier base has been changed
0x69	EUI64 identifier has been changed	EUI64 identifier has been changed
0x6E	License key has been added or removed	License key has been added or removed
0x6F	User interface language change	User interface language has changed

Information events

Table 38 Informational events

Value	Informational event	Description
0x01	Move element	Move element command
0x02	Inventory rescan	The inventory was rescanned

Table 38 Informational events *(continued)*

Value	Informational event	Description
0x03	Drive clean	Drive cleaning process
0x04	Mailslot open	Open mailslot command
0x05	Mailslot close	Close mailslot
0x06	Magazine remove	Magazine remove event
0x07	Magazine reinsertion	Magazine insertion event
0x08	Power on	Power on event
0x09	Power off	Power off event
0x0A	User login	User login at interface (RMU, OCP, SERIAL)
0x0B	User logout	User logout at interface (RMU, OCP, SERIAL)
0x0C	System test run	System test run
0x0D	Wellness test run	The wellness test was run
0x0E	Bus reset occurred	A bus reset occurred
0x0F	Device reset	Device reset command
0x10	Abort	SCSI task aborted
0x11	Drive tape alert flag	Drive reported informational tape alert flag
0x12	Power on init done	Power on init completed successful
0x13	Incorrect key server token PIN entered	Incorrect key server token PIN entered
0x14	Backup initiated on key server token	Incorrect key server token PIN entered
0x15	Backup off key server token finished	The backup of the key server token has finished.
0x16	A new write key was automatically generated on the key server token.	A new write key was automatically generated on the key server token.
0x17	A new write key was manually generated on the key server token.	A new write key was manually generated on the key server token.
0x18	More than 5 invalid key server token PIN attempts	More than five attempts were made to set the key server token with invalid PINs.
0x19	Restore initiated on key server token	A restore operation was initiated on the key server token.
0x1A	Restore off key server token finished	A restore operation was completed on the key server token.
0x1B	Key server token is over 90% full	The key server token is over 90% full.
0x1C	Key server token contains keys that have not been backed up.	The key server token contains keys that have not been backed up.

Using HP Library & Tape Tools to diagnose problems

With HP Library & Tape Tools installed on the host server you can:

- Identify all parallel SCSI devices connected to your system.
- View detailed configuration, identification, inventory, and drive information for the device.
- Easily update device and drive firmware.
- Run advanced diagnostic tests, including connectivity, read/write, media validation, and testing the functionality of the device.

- View device and drive error logs.
- Generate a detailed support ticket 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.

To diagnose problems with L&TT:

1. Run L&TT on the host server. You can install L&TT on the host server, or run it from a CD-ROM or USB flash drive on the host server.
2. Pull a support ticket for the device.
3. Look at the device analysis results for additional information about the device's operation.

6 Upgrading and servicing the Tape Autoloader

⚠ **WARNING!** The HP StorageWorks 1/8 G2 Tape Autoloader weighs 11.5 kg (25.4 lb) without media and 13.1 kg (28.9 lb) with media (8 cartridges). When moving the Autoloader, to reduce the risk of personal injury or damage to the Autoloader: 1) observe local health and safety requirements and guidelines for manual material handing, 2) always remove all tapes to reduce the overall weight of the Autoloader, and 3) obtain adequate assistance to lift and stabilize the Autoloader during installation or removal.

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.
- Extend only one rack component at a time. Racks may become unstable if more than one component is extended.

⚠ **CAUTION:** A discharge of static electricity can damage static-sensitive devices or microcircuitry. Proper packaging and grounding techniques are necessary precautions to prevent damage.

To prevent electrostatic damage, observe the following precautions:

- Transport products in static-safe containers such as conductive tubes, bags, or boxes.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free stations.
- Cover the device with approved static-dissipating material. Provide a wrist strap connected to the work surface and properly grounded tools and equipment.
- Keep the work area free of nonconducting materials, such as ordinary plastic assembly aids and foam packing.
- Make sure you are always properly grounded when touching a static-sensitive component or assembly.
- Avoid touching pins, leads, or circuitry.
- Use conductive field service tools.

CAUTION: Before moving the Autoloader, remove all media. During a move, the cartridges could come out of the storage slots and damage the Autoloader.

Possible tools needed

To service the Autoloader you may need one or more of the following tools:

- Flat-blade screwdrivers (large and small)
- Short-handle #1 Phillips screwdriver
- #2 and #3 Phillips screwdrivers
- Ground strap
- Paper clip or pin (for manual magazine removal)
- HP Library and Tape Tools (L&TT) diagnostic software

NOTE: You may use the HP StorageWorks Library and Tape Tools (L&TT) diagnostic utility to perform diagnostic functions for the Autoloader. L&TT is a diagnostic tool designed to aid in the installation and maintenance of HP tape storage products. L&TT includes several features designed for use by both HP storage customers and trained service personnel. L&TT is available for download at the following HP website at no cost: www.hp.com/support/TapeTools. Frequent firmware image updates to the website are released on the Internet. For optimal performance, HP recommends that you update your system periodically with the latest device firmware.

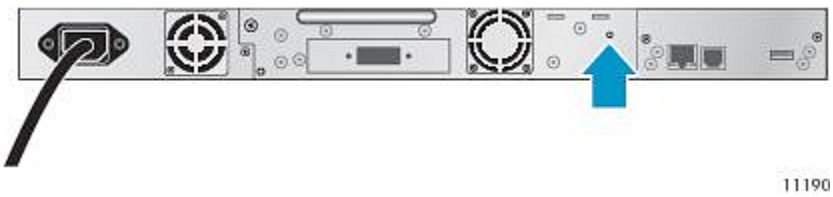
Removing and replacing a tape drive

Install the tape drive from the back of the Autoloader.

To remove a tape drive:

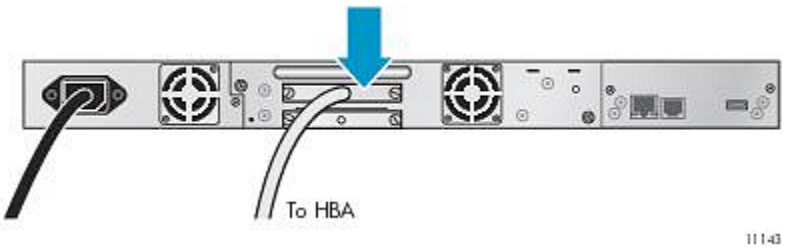
1. Using the remote management interface or the operator control panel, unload any tape cartridge from the tape drive, if present.
2. Power off the drive from the OCP or RMI. (See Powering a drive on or off (Support > Power On/Off Drive) (page 80).)
3. Make sure the LED on the tape drive is off (see Figure 74 (page 129)).

Figure 74 Drive LED



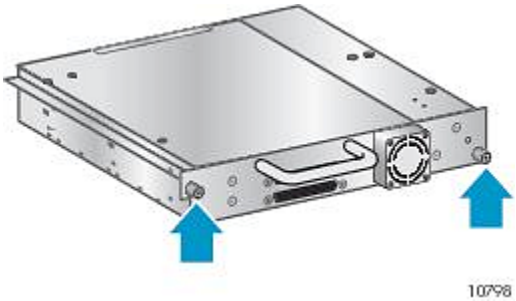
4. Remove the SAS cable from a SAS drive or the parallel SCSI cable and terminator from a parallel SCSI drive (see Figure 75 (page 129)).

Figure 75 Parallel SCSI cable



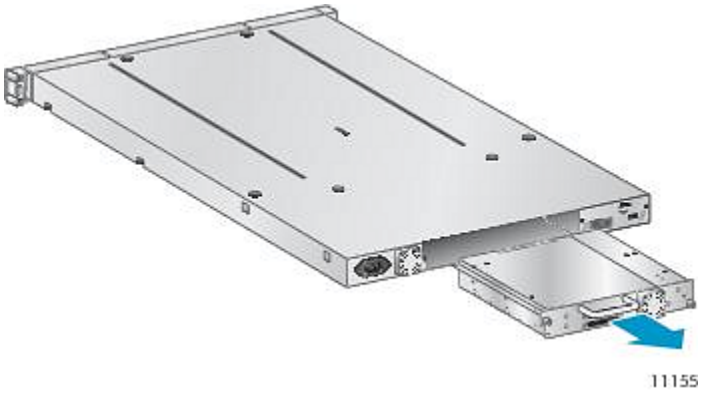
5. Loosen the blue captive thumbscrews on the drive (see Figure 76 (page 129)).

Figure 76 Captive screws on the tape drive



6. Pull straight back on the tape drive handle to remove the tape drive from the Autoloader (see Figure 77 (page 130)).

Figure 77 Removing the tape drive

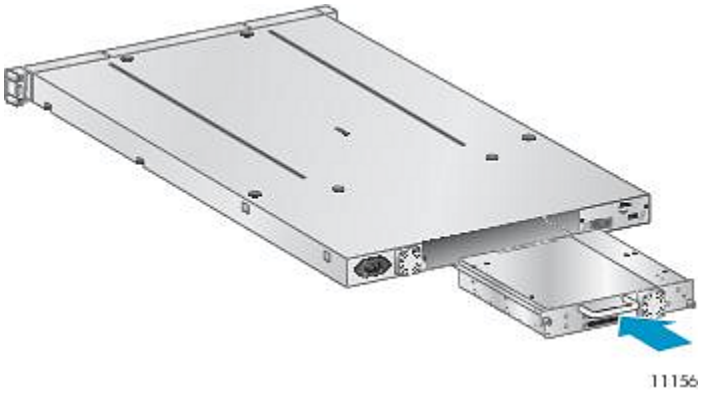


To replace a tape drive:

1. Before installing the new drive, inspect the connectors on the tape drive. Ensure that the connectors are intact, free of any foreign objects, and have no cracks or deformed or bent contacts.
2. Slowly insert the new tape drive into the drive bay, and align the connectors on the Autoloader while supporting the drive assembly until the drive seats itself against the back of the Autoloader (see Figure 78 (page 130)).

CAUTION: Push in on the tape drive handle while supporting the bottom of the tape drive until it is properly seated. Damage to the connector pins may occur if this procedure is not followed.

Figure 78 Installing the tape drive



3. Tighten the blue captive thumbscrews by hand until the drive is secure.
4. Attach the cords and terminator, if necessary, that you removed from the old tape drive.
5. Power on the tape drive.
6. If necessary, upgrade the Autoloader and drive firmware using HP Library & Tape Tools, the RMI, or a USB flash drive.

NOTE: If you are upgrading a parallel SCSI drive, be sure to use supported cabling configurations. See Planning the SCSI configuration (page 18).

NOTE: Use *L&TT* to upgrade the drive to the latest firmware. You can download the latest version of *L&TT* at: www.hp.com/support/TapeTools.

Removing and replacing a magazine

△ **CAUTION:** Only remove a magazine manually in an emergency or if you need to remove the magazines from both sides of the device. Failure to follow normal procedure can cause data loss and equipment damage.

If possible, the magazines should be released using the OCP or RMI. HP recommends that you release the magazines using the OCP or RMI; however, if the OCP process fails, or if a magazine needs to be removed when the power to the device is off, you can release the magazines manually.

Using the operator control panel

Removing magazines requires the administrator password.

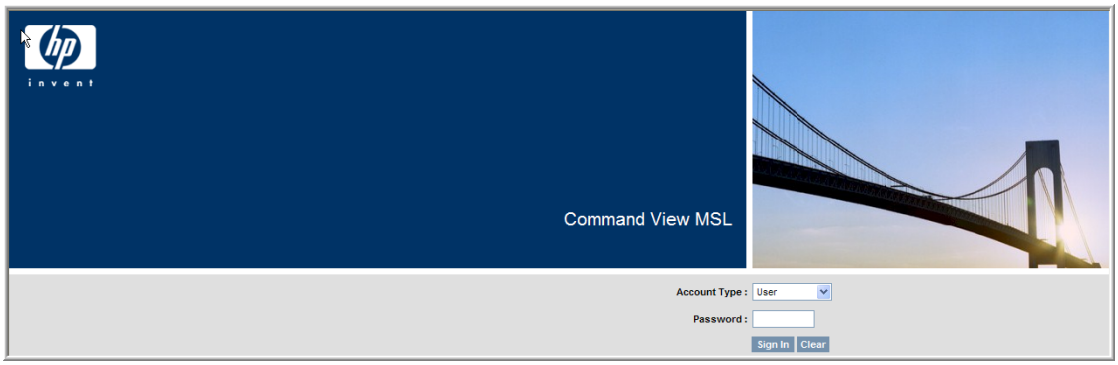
To remove a magazine:

1. From the Home screen, press **Previous** or **Next** until the screen displays **Operations**.
2. Press **Enter** to select.
3. Press **Previous** or **Next** until the screen displays either **Unlock Left Magazine** or **Unlock Right Magazine**.
4. Press **Enter** to select the desired magazine to unlock.
5. Enter the administrator password if requested.
6. The display reads **Left Magazine Unlocked** or **Right Magazine Unlocked**.
7. Pull the released magazine out of the device.
8. The screen displays **Insert Left Magazine** or **Insert Right Magazine**. *The Autoloader cannot perform any other operation until the magazine is replaced.* After exchanging tapes in a magazine, slide the magazine completely into the Autoloader. The magazine locks into place after it is correctly installed and the Autoloader inventories the magazine.

Using the remote management interface

To login, select the Administrator Account Type, enter the administrator password, and press **Sign In.**

Figure 79 RMI login page



Go to the Operations: Magazines page. This page allows you to release the right, left, or both magazines from the Autoloader.

Figure 80 Operations: Magazines page

Using the manual magazine release

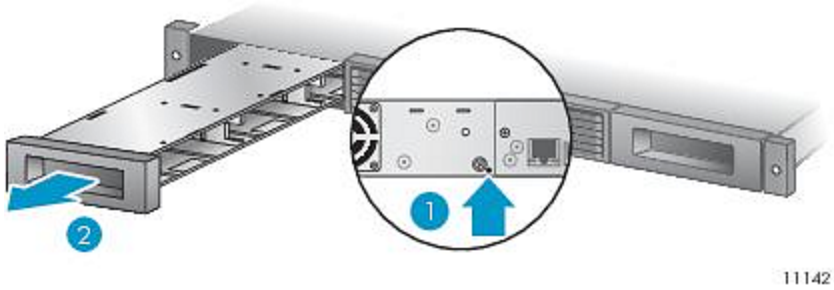
1. From the back of the Autoloader determine which magazine needs to be removed using Figure 81 (page 132).

Figure 81 Manual magazine release holes

1. Right magazine release
2. Left magazine release

2. Push a small metal pin or paper clip about 1.5 cm (0.6 inch) into the appropriate release hole to push on the release latch (see Figure 82 (page 132)) while another person grasps the magazine and removes it from the Autoloader.

Figure 82 Removing the left magazine



1. Insert a pin into access hole
2. Release and remove the magazine

IMPORTANT: Do not force the pin once you encounter resistance. Doing so can damage the Autoloader.

Removing and replacing the base chassis

In this process you will:

- Record configuration settings.
- Remove the tape cartridge from the tape drive.

- Remove the cables, drives, and magazines from the Autoloader.
- Remove the Autoloader from the rack or tabletop conversion cover.
- Replace the base chassis.
- Reinstall the Autoloader into the rack or tabletop conversion cover if the support feet have not been applied.
- Replace the cables, tape drive, and magazines.
- Reconfigure the Autoloader.

⚠ **WARNING!** The HP StorageWorks 1/8 G2 Tape Autoloader weighs 11.5 kg (25.4 lb) without media and 13.1 kg (28.9 lb) with media (8 cartridges). When moving the Autoloader, to reduce the risk of personal injury or damage to the Autoloader: 1) observe local health and safety requirements and guidelines for manual material handing, 2) always remove all tapes to reduce the overall weight of the Autoloader, and 3) obtain adequate assistance to lift and stabilize the Autoloader during installation or removal.

Recording configuration settings

If the OCP or RMI works, save the configuration settings to the USB flash drive from the OCP or to a file from the RMI. You will need these settings to re-configure the Autoloader after replacing the chassis.

Removing the tape cartridge from the tape drive

Before beginning, be sure no cartridges are in the tape drive. To move a cartridge with the OCP, see Moving tapes in the Autoloader (Operations > Move Tape) (page 78). To move a cartridge with the RMI, see Moving media (page 57).

⚠ **CAUTION:** If you cannot remove the tape cartridge from the tape drive, handle the tape drive gently during the rest of the procedure to avoid damaging the tape and losing data.

Removing the cables, magazines, and tape drive

If the OCP or RMI are operational, remove the magazines using the RMI or OCP.

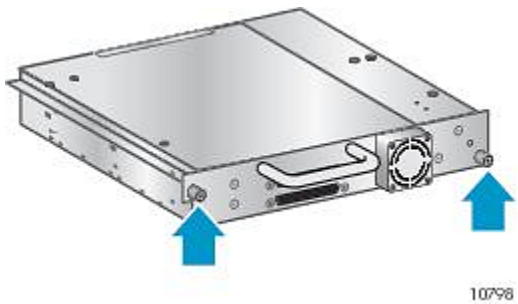
Power off the Autoloader. Remove the power cord and other cables from the Autoloader.

If the magazines have not been removed, remove the magazines from the device using the manual process (see Releasing the magazines manually (page 102)).

To remove the tape drive:

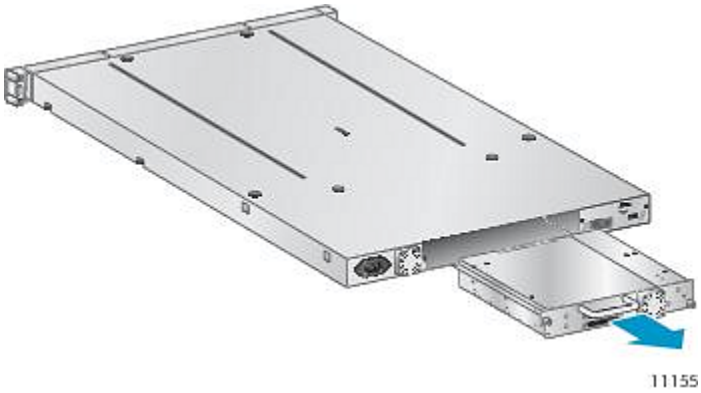
1. Loosen the blue captive thumbscrews on the drive (see Figure 83 (page 133)).

Figure 83 Captive screws on the tape drive



2. Pull straight back on the tape drive handle to remove the tape drive from the Autoloader (see Figure 84 (page 134)).

Figure 84 Removing the tape drive



Removing the base chassis

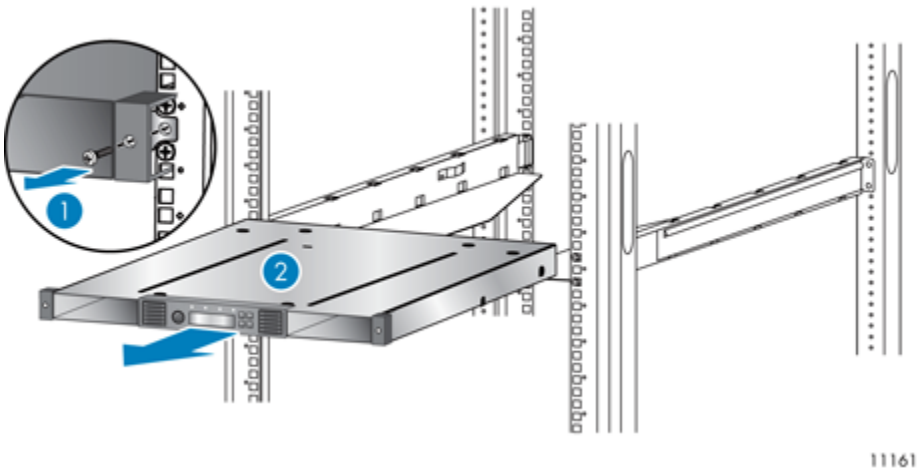
You will need a #2 Phillips screwdriver to remove and replace the base chassis assembly from the rack or cover.

CAUTION: Lift the Autoloader from the side edges. Lifting the Autoloader from the magazine or tape drive openings can damage the Autoloader.

To remove the base chassis from the rack or table top conversion cover:

1. Obtain adequate assistance to lift and stabilize the Autoloader during removal and replacement.
2. If the Autoloader is mounted in a rack or tabletop conversion cover, from the front of the Autoloader (see Figure 85 (page 134), 1) loosen the screws inside the left and right front bezel (these are captive screws and cannot be removed), then 2) slide the Autoloader out of the rack or cover using assistance.

Figure 85 Removing the base chassis from the rack



Unpacking the new chassis

Unpack the new chassis and place it on a sturdy table. Save the packaging materials to return the old chassis.

Replacing the base chassis

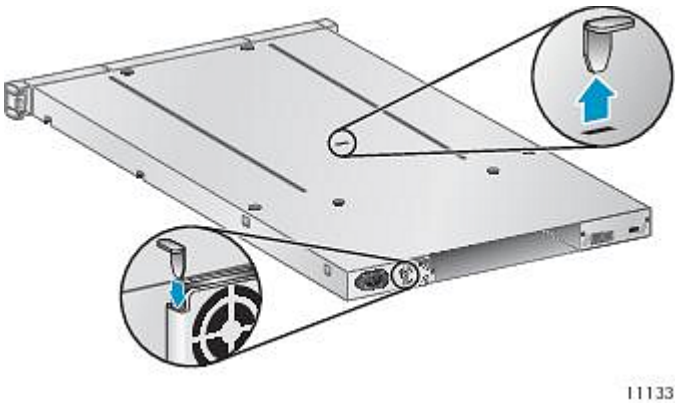
CAUTION: Lift the chassis from the side edges. Lifting the chassis from the magazine openings can damage the chassis.

1. The shipping lock prevents the robotic transport mechanism from moving during shipment. You must remove the shipping lock before powering on the device. The shipping lock is held in place with a piece of tape and is located in the top center of the new chassis. After the shipping lock is removed, it should be stored on the back panel of the chassis for future use.

   To remove and store the shipping lock:

   a. Locate the tape and lock at the top of the chassis (see Figure 86 (page 135)).

   Figure 86 Shipping lock location

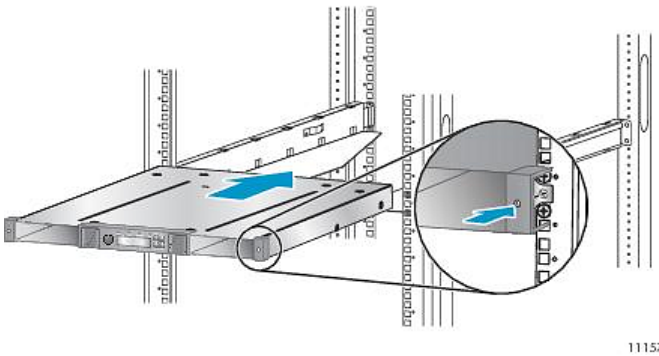
   b. Remove the tape, then remove the lock.
   c. Store the lock on the back panel of the device.

2. Mount the Autoloader in a rack or in the tabletop conversion cover.

   To mount the Autoloader in a rack:

   a. With assistance, slide the Autoloader onto the metal rails that are already in position in the rack.
   b. From the front of the device, secure the front bezel to the rack using a #2 Phillips screw driver placed through the small holes in the mounting bracket to tighten the captive screws on each side of the device.

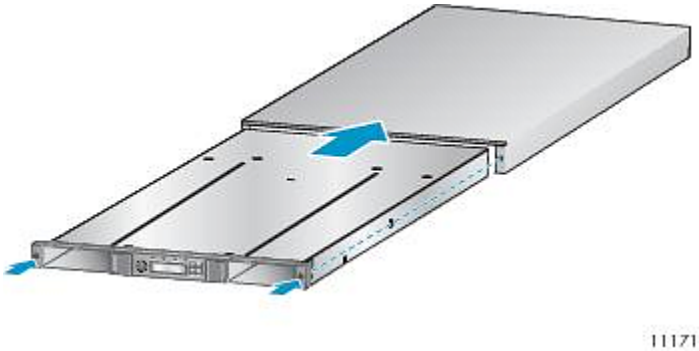
   Figure 87 Securing the Autoloader to the rack

   To replace the tabletop conversion cover:

   a. Set the new base chassis on a sturdy surface in front of the cover.
   b. Slide the chassis into the cover until the front panel of the chassis is aligned with the cover.
   c. Tighten the captive screws on the chassis front panel until the cover is secure.

Figure 88 Sliding the Autoloader into the cover



3. Replace the tape drive.
4. Replace the magazines.
5. Replace the cords and cables.
6. Reconnect the cables and power cord.
7. Power on the Autoloader.
8. Reconfigure the Autoloader.

7 Support and other resources

HP technical support

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

Collect the following information before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Error messages
- Operating system type and revision level
- Detailed questions
- An L&TT Support Ticket, which can be downloaded to a USB drive from the front panel or downloaded to a file with the remote management interface.

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

HP websites

For additional information, see the following HP websites:

- www.hp.com — HP corporate website
- www.hp.com/go/storage — HP storage products
- www.hp.com/go/ebs — compatibility information
- www.hp.com/support — HP Support website
- www.hp.com/support/mslg3tstree — interactive troubleshooting tool
- www.docs.hp.com — documentation about HP products
- www.hp.com/support/tapetools — HP Library & Tape Tools diagnostic software

Typographic conventions

Table 39 Document conventions

Convention	Element
Blue text: Table 39 (page 137)	Cross-reference links and e-mail addresses
Blue, underlined text: www.hp.com	Website addresses
Bold text	• Keys that are pressed • Text entered into a GUI element, such as a box • GUI elements that are clicked or selected, such as menu and list items, buttons, tabs, and check boxes
Italic text	Text emphasis

Table 39 Document conventions *(continued)*

Convention	Element
`Monospace` text	• File and directory names • System output • Code • Commands, their arguments, and argument values
`Monospace, italic` text	• Code variables • Command variables
`Monospace, bold` text	Emphasized monospace text

WARNING! Indicates that failure to follow directions could result in bodily harm or death.

CAUTION: Indicates that failure to follow directions could result in damage to equipment or data.

IMPORTANT: Provides clarifying information or specific instructions.

NOTE: Provides additional information.

TIP: Provides helpful hints and shortcuts.

Customer Self Repair

HP customer self repair (CSR) programs allow you to repair your StorageWorks product. If a CSR part needs replacing, HP ships the part directly to you so that you can install it at your convenience. Some parts do not qualify for CSR. Your HP-authorized service provider will determine whether a repair can be accomplished by CSR. See Table 40 (page 138) for the Customer Self Repair status of replaceable parts for this product.

For more information about CSR, contact your local service provider. For North America, see the CSR website:

http://www.hp.com/go/selfrepair

Table 40 Customer self repair parts

Part	Customer Self Repair Status
Magazine	Mandatory CSR
Media	Mandatory CSR
Tape drive	Mandatory CSR
External cables and SCSI terminator	Mandatory CSR
Chassis	Mandatory CSR
Rack mount kit	Optional CSR
Rack to tabletop conversion kit	Mandatory CSR

Subscription service

HP recommends that you register your product at the Subscriber's Choice for Business website: www.hp.com/go/e-updates.

After registering, you will receive e-mail notification of product enhancements, new driver versions, firmware updates, and other product resources.

HP-authorized reseller

For the name of your nearest HP-authorized reseller:

- In the United States, call 1–800–282–6672
- Elsewhere, visit the HP website: www.hp.com, then click **Contact HP** to find locations and telephone numbers.

A Technical specifications

Physical specifications

Table 41 1/8 G2 Tape Autoloader physical specifications: all models

Characteristics	Product alone	Packaged
Height	44 mm (1.73 inches)	250 mm (9.84 inches)
Width	482 mm (18.98 inches)	580 mm (22.83 inches)
Depth	809 mm (31.85 inches)	990 mm (38.98 inches)
Weight	11.5 kg (25.35 pounds)	25.5 (33.73 pounds)

Environmental specifications

Table 42 Environmental specifications

Characteristic	Specification
Temperature	
Operating	10° to 35° C
Non-operating	-30° to 60° C
Recommended operating temperature	10° to 35° C
Temperature shock immunity - maximum rate of change	10° C per hour
Miscellaneous	
Dust concentration	less than 200 microgram/cubic meter
Altitude	3050 meters (10,000 ft.)
Humidity	
Operating	20% to 80% RH non-condensing
Non-operating	20% to 80% RH non-condensing

B Regulatory compliance and safety

This section contains regulatory notices for the HP StorageWorks 1/8 G2 Tape Autoloader.

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 is not the marketing name or model number of the product.

The Regulatory Compliance label is located on the bottom of the device. To view this information, from the back of the device, tilt the device up until the label is visible.

Product specific information:

Regulatory model number: LVLDC-0501

FCC and CISPR classification: Class A

These products contain laser components. See Class 1 laser statement in the Laser compliance notices section.

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 FCC rating label on the device shows the classification (A or B) of the equipment. Class B devices have an FCC logo or ID on the label. Class A devices do not have an FCC logo or ID on the label. After you determine the class of the device, refer to the corresponding statement.

Class A equipment

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

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 your product, visit www.hp.com.

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
- Or call 1-281-514-3333

Modification

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.

Canadian notice (Avis Canadien)

Class A equipment

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

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

Class B equipment

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

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

European Union regulatory notice

This product complies with the following EU Directives:

- Low Voltage Directive 2006/95/EC
- EMC Directive 89/336/EEC or 2004/108/EC

Compliance with these directives implies conformity to applicable harmonized European standards (European Norms) which are listed on the EU Declaration of Conformity issued by Hewlett-Packard for this product or product family.

This compliance is indicated by the following conformity marking placed on the product:

CE	This marking is valid for non-Telecom products and EU harmonized Telecom products (e.g., Bluetooth).

Certificates can be obtained from http://www.hp.com/go/certificates.
Hewlett-Packard GmbH, HQ-TRE, Herrenberger Strasse 140, 71034 Boeblingen, Germany

Japanese notices

Japanese VCCI-A notice

この装置は、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は適切な対策を講ずるよう要求されることがあります。

VCCI-A

Japanese VCCI-B notice

この装置は、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-B

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。

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

Korean notices

Class A equipment

A급 기기 (업무용 정보통신기기)

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 만약 잘못판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

Class B equipment

B급 기기 (가정용 정보통신기기)

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

Taiwanese notices

BSMI Class A 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

Recovery mark:	Recovery text:
• Four-in-one recycling symbol	• “Please recycle waste batteries”
	廢電池請回收

Laser compliance notices

English laser notice

This device may contain a laser that is classified as a Class 1 Laser Product in accordance with U.S. FDA regulations and the IEC 60825-1. The product does not emit hazardous laser radiation.

⚠ **WARNING!** Use of controls or adjustments or performance of procedures other than those specified herein or in the laser product's installation guide may result in hazardous radiation exposure. To reduce the risk of exposure to hazardous radiation:

- Do not try to open the module enclosure. There are no user-serviceable components inside.
- Do not operate controls, make adjustments, or perform procedures to the laser device other than those specified herein.
- Allow only HP Authorized Service technicians to repair the unit.

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States.

Dutch laser notice

WAARSCHUWING: dit apparaat bevat mogelijk een laser die is geclassificeerd als een laserproduct van Klasse 1 overeenkomstig de bepalingen van de Amerikaanse FDA en de richtlijn IEC 60825-1. Dit product geeft geen gevaarlijke laserstraling af.

Als u bedieningselementen gebruikt, instellingen aanpast of procedures uitvoert op een andere manier dan in deze publicatie of in de installatiehandleiding van het laserproduct wordt aangegeven, loopt u het risico te worden blootgesteld aan gevaarlijke straling. Het risico van blootstelling aan gevaarlijke straling beperkt u als volgt:

- Probeer de behuizing van de module niet te openen. U mag zelf geen onderdelen repareren.
- Gebruik voor de laserapparatuur geen andere knoppen of instellingen en voer geen andere aanpassingen of procedures uit dan die in deze handleiding worden beschreven.
- Alleen door HP geautoriseerde technici mogen het apparaat repareren.

French laser notice

AVERTISSEMENT : cet appareil peut être équipé d'un laser classé en tant que Produit laser de classe 1 et conforme à la réglementation de la FDA américaine et à la norme 60825-1 de l'IEC. Ce produit n'émet pas de rayonnement dangereux.

L'utilisation de commandes, de réglages ou de procédures autres que ceux qui sont indiqués ici ou dans le manuel d'installation du produit laser peut exposer l'utilisateur à des rayonnements dangereux. Pour réduire le risque d'exposition à des rayonnements dangereux :

- Ne tentez pas d'ouvrir le boîtier renfermant l'appareil laser. Il ne contient aucune pièce dont la maintenance puisse être effectuée par l'utilisateur.
- Tout contrôle, réglage ou procédure autre que ceux décrits dans ce chapitre ne doivent pas être effectués par l'utilisateur.
- Seuls les Mainteneurs Agréés HP sont habilités à réparer l'appareil laser.

German laser notice

VORSICHT: Dieses Gerät enthält möglicherweise einen Laser, der nach den US-amerikanischen FDA-Bestimmungen und nach IEC 60825-1 als Laserprodukt der Klasse 1 zertifiziert ist. Gesundheitsschädliche Laserstrahlen werden nicht emittiert.

Die Anleitungen in diesem Dokument müssen befolgt werden. Bei Einstellungen oder Durchführung sonstiger Verfahren, die über die Anleitungen in diesem Dokument bzw. im Installationshandbuch des Lasergeräts hinausgehen, kann es zum Austritt gefährlicher Strahlung kommen. Zur Vermeidung der Freisetzung gefährlicher Strahlungen sind die folgenden Punkte zu beachten:

- Versuchen Sie nicht, die Abdeckung des Lasermoduls zu öffnen. Im Inneren befinden sich keine Komponenten, die vom Benutzer gewartet werden können.
- Benutzen Sie das Lasergerät ausschließlich gemäß den Anleitungen und Hinweisen in diesem Dokument.
- Lassen Sie das Gerät nur von einem HP Servicepartner reparieren.

Italian laser notice

AVVERTENZA: AVVERTENZA Questo dispositivo può contenere un laser classificato come prodotto laser di Classe 1 in conformità alle normative US FDA e IEC 60825-1. Questo prodotto non emette radiazioni laser pericolose.

L'eventuale esecuzione di comandi, regolazioni o procedure difformi a quanto specificato nella presente documentazione o nella guida di installazione del prodotto può causare l'esposizione a radiazioni nocive. Per ridurre i rischi di esposizione a radiazioni pericolose, attenersi alle seguenti precauzioni:

- Non cercare di aprire il contenitore del modulo. All'interno non vi sono componenti soggetti a manutenzione da parte dell'utente.
- Non eseguire operazioni di controllo, regolazione o di altro genere su un dispositivo laser ad eccezione di quelle specificate da queste istruzioni.
- Affidare gli interventi di riparazione dell'unità esclusivamente ai tecnici dell'Assistenza autorizzata HP.

Japanese laser notice

警告：本製品には、US FDA規則およびIEC 60825-1に基づくClass 1レーザー製品が含まれている場合があります。本製品は人体に危険なレーザー光は発しません。

本書およびレーザー製品のインストール ガイドに示されている以外の方法で制御、調整、使用した場合、人体に危険な光線にさらされる場合があります。人体に危険な光線にさらされないため、以下の項目を守ってください。

- モジュール エンクロージャを開けないでください。ユーザーが取り扱えるコンポーネントは含まれていません。
- 本書に示されている以外の方法で、レーザー デバイスを制御、調整、使用しないでください。
- HPの正規サービス技術者のみが本ユニットの修理を許可されています。

Spanish laser notice

ADVERTENCIA: Este dispositivo podría contener un láser clasificado como producto de láser de Clase 1 de acuerdo con la normativa de la FDA de EE.UU. e IEC 60825-1. El producto no emite radiaciones láser peligrosas.

El uso de controles, ajustes o manipulaciones distintos de los especificados aquí o en la guía de instalación del producto de láser puede producir una exposición peligrosa a las radiaciones. Para evitar el riesgo de exposición a radiaciones peligrosas:

- No intente abrir la cubierta del módulo. Dentro no hay componentes que el usuario pueda reparar.
- No realice más operaciones de control, ajustes o manipulaciones en el dispositivo láser que los aquí especificados.
- Sólo permita reparar la unidad a los agentes del servicio técnico autorizado HP.

Recycling notices

English notice

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

This symbol means do not dispose of your product with your other household waste. Instead, you should protect human health and the environment by handing over your waste equipment to a designated collection point for the recycling of waste electrical and electronic equipment. For more information, please contact your household waste disposal service

Bulgarian notice

Изхвърляне на отпадъчно оборудване от потребители в частни домакинства в Европейския съюз

Този символ върху продукта или опаковката му показва, че продуктът не трябва да се изхвърля заедно с другите битови отпадъци. Вместо това, трябва да предпазите човешкото здраве и околната среда, като предадете отпадъчното оборудване в предназначен за събирането му пункт за рециклиране на неизползваемо електрическо и електронно борудване. За допълнителна информация се свържете с фирмата по чистота, чиито услуги използвате.

Czech notice

Likvidace zařízení v domácnostech v Evropské unii

Tento symbol znamená, že nesmíte tento produkt likvidovat spolu s jiným domovním odpadem. Místo toho byste měli chránit lidské zdraví a životní prostředí tím, že jej předáte na k tomu určené sběrné pracoviště, kde se zabývají recyklací elektrického a elektronického vybavení. Pro více informací kontaktujte společnost zabývající se sběrem a svozem domovního odpadu.

Danish notice

Bortskaffelse af brugt udstyr hos brugere i private hjem i EU
Dette symbol betyder, at produktet ikke må bortskaffes sammen med andet husholdningsaffald. Du skal i stedet den menneskelige sundhed og miljøet ved at afl evere dit brugte udstyr på et dertil beregnet indsamlingssted for af brugt, elektrisk og elektronisk udstyr. Kontakt nærmeste renovationsafdeling for yderligere oplysninger.

Dutch notice

Inzameling van afgedankte apparatuur van particuliere huishoudens in de Europese Unie
Dit symbool betekent dat het product niet mag worden gedeponeerd bij het overige huishoudelijke afval. Bescherm de gezondheid en het milieu door afgedankte apparatuur in te leveren bij een hiervoor bestemd inzamelpunt voor recycling van afgedankte elektrische en elektronische apparatuur. Neem voor meer informatie contact op met uw gemeentereinigingsdienst.

Estonian notice

Äravisatavate seadmete likvideerimine Euroopa Liidu eramajapidamistes
See märk näitab, et seadet ei tohi visata olmeprügi hulka. Inimeste tervise ja keskkonna säästmise nimel tuleb äravisatav toode tuua elektriliste ja elektrooniliste seadmete käitlemisega egelevasse kogumispunkti. Küsimuste korral pöörduge kohaliku prügikäitlusettevõtte poole.

Finnish notice

Kotitalousjätteiden hävittäminen Euroopan unionin alueella
Tämä symboli merkitsee, että laitetta ei saa hävittää muiden kotitalousjätteiden mukana. Sen sijaan sinun on suojattava ihmisten terveyttä ja ympäristöä toimittamalla käytöstä poistettu laite sähkö- tai elektroniikkajätteen kierrätyspisteeseen. Lisätietoja saat jätehuoltoyhtiöltä.

French notice

Mise au rebut d'équipement par les utilisateurs privés dans l'Union Européenne
Ce symbole indique que vous ne devez pas jeter votre produit avec les ordures ménagères. Il est de votre responsabilité de protéger la santé et l'environnement et de vous débarrasser de votre équipement en le remettant à une déchetterie effectuant le recyclage des équipements électriques et électroniques. Pour de plus amples informations, prenez contact avec votre service d'élimination des ordures ménagères.

German notice

Entsorgung von Altgeräten von Benutzern in privaten Haushalten in der EU
Dieses Symbol besagt, dass dieses Produkt nicht mit dem Haushaltsmüll entsorgt werden darf. Zum Schutze der Gesundheit und der Umwelt sollten Sie stattdessen Ihre Altgeräte zur Entsorgung einer dafür vorgesehenen Recyclingstelle für elektrische und elektronische Geräte übergeben. Weitere Informationen erhalten Sie von Ihrem Entsorgungsunternehmen für Hausmüll.

Greek notice

Απόρριψη άχρηστου εξοπλισμού από ιδιώτες χρήστες στην Ευρωπαϊκή Ένωση
Αυτό το σύμβολο σημαίνει ότι δεν πρέπει να απορρίψετε το προϊόν με τα λοιπά οικιακά απορρίμματα. Αντίθετα, πρέπει να προστατέψετε την ανθρώπινη υγεία και το περιβάλλον παραδίδοντας τον άχρηστο εξοπλισμό σας σε εξουσιοδοτημένο σημείο συλλογής για την ανακύκλωση άχρηστου ηλεκτρικού και ηλεκτρονικού εξοπλισμού. Για περισσότερες πληροφορίες, επικοινωνήστε με την υπηρεσία απόρριψης απορριμμάτων της περιοχής σας.

Hungarian notice

A hulladék anyagok megsemmisítése az Európai Unió háztartásaiban
Ez a szimbólum azt jelzi, hogy a készüléket nem szabad a háztartási hulladékkal együtt kidobni. Ehelyett a
leselejtezett berendezéseknek az elektromos vagy elektronikus hulladék átvételére kijelölt helyen történő
beszolgáltatásával megóvja az emberi egészséget és a környezetet.További információt a helyi köztisztasági
vállalattól kaphat.

Italian notice

Smaltimento di apparecchiature usate da parte di utenti privati nell'Unione Europea
Questo simbolo avvisa di non smaltire il prodotto con i normali rifi uti domestici. Rispettare la salute umana e l'ambiente conferendo l'apparecchiatura dismessa a un centro di raccolta designato per il riciclo di apparecchiature elettroniche ed elettriche. Per ulteriori informazioni, rivolgersi al servizio per lo smaltimento dei rifi uti domestici.

Latvian notice

Europos Sąjungos namų ūkio vartotojų įrangos atliekų šalinimas
Šis simbolis nurodo, kad gaminio negalima išmesti kartu su kitomis buitinėmis atliekomis. Kad apsaugotumėte žmonių sveikatą ir aplinką, pasenusią nenaudojamą įrangą turite nuvežti į elektrinių ir elektroninių atliekų surinkimo punktą. Daugiau informacijos teiraukitės buitinių atliekų surinkimo tarnybos.

Lithuanian notice

Nolietotu iekārtu iznīcināšanas noteikumi lietotājiem Eiropas Savienības privātajās mājsaimniecībās
Šis simbols norāda, ka ierīci nedrīkst utilizēt kopā ar citiem mājsaimniecības atkritumiem. Jums jārūpējas par cilvēku veselības un vides aizsardzību, nododot lietoto aprīkojumu otrreizējai pārstrādei īpašā lietotu elektrisko un elektronisko ierīču savākšanas punktā. Lai iegūtu plašāku informāciju, lūdzu, sazinieties ar savu mājsaimniecības atkritumu likvidēšanas dienestu.

Polish notice

Utylizacja zużytego sprzętu przez użytkowników w prywatnych gospodarstwach domowych
w krajach Unii Europejskiej
Ten symbol oznacza, że nie wolno wyrzucać produktu wraz z innymi domowymi odpadkami. Obowiązkiem użytkownika jest ochrona zdrowa ludzkiego i środowiska przez przekazanie zużytego sprzętu do wyznaczonego punktu zajmującego się recyklingiem odpadów powstałych ze sprzętu elektrycznego i elektronicznego. Więcej informacji można uzyskać od lokalnej firmy zajmującej wywozem nieczystości.

Portuguese notice

Descarte de equipamentos usados por utilizadores domésticos na União Europeia
Este símbolo indica que não deve descartar o seu produto juntamente com os outros lixos domiciliares. Ao invés disso, deve proteger a saúde humana e o meio ambiente levando o seu equipamento para descarte em um ponto de recolha destinado à reciclagem de resíduos de equipamentos eléctricos e electrónicos. Para obter mais informações, contacte o seu serviço de tratamento de resíduos domésticos.

Romanian notice

Casarea echipamentului uzat de către utilizatorii casnici din Uniunea Europeană
Acest simbol înseamnă să nu se arunce produsul cu alte deşeuri menajere. În schimb, trebuie să protejaţi sănătatea umană şi mediul predând echipamentul uzat la un punct de colectare desemnat pentru reciclarea echipamentelor electrice şi electronice uzate. Pentru informaţii suplimentare, vă rugăm să contactaţi serviciul de eliminare a deşeurilor menajere local.

Slovak notice

Likvidácia vyradených zariadení používateľmi v domácnostiach v Európskej únii
Tento symbol znamená, že tento produkt sa nemá likvidovať s ostatným domovým odpadom. Namiesto toho by ste mali chrániť ľudské zdravie a životné prostredie odovzdaním odpadového zariadenia na zbernom mieste, ktoré je určené na recykláciu odpadových elektrických a elektronických zariadení. Ďalšie informácie získate od spoločnosti zaoberajúcej sa likvidáciou domového odpadu.

Spanish notice

Eliminación de los equipos que ya no se utilizan en entornos domésticos de la Unión Europea
Este símbolo indica que este producto no debe eliminarse con los residuos domésticos. En lugar de ello, debe evitar causar daños a la salud de las personas y al medio ambiente llevando los equipos que no utilice a un punto de recogida designado para el reciclaje de equipos eléctricos y electrónicos que ya no se utilizan. Para obtener más información, póngase en contacto con el servicio de recogida de residuos domésticos.

Swedish notice

Hantering av elektroniskt avfall för hemanvändare inom EU
Den här symbolen innebär att du inte ska kasta din produkt i hushållsavfallet. Värna i stället om natur och miljö genom att lämna in uttjänt utrustning på anvisad insamlingsplats. Allt elektriskt och elektroniskt avfall går sedan vidare till återvinning. Kontakta ditt återvinningsföretag för mer information.

Turkish notice

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Battery replacement notices

Dutch battery notice

Verklaring betreffende de batterij

WAARSCHUWING: dit apparaat bevat mogelijk een batterij.

- Probeer de batterijen na het verwijderen niet op te laden.
- Stel de batterijen niet bloot aan water of temperaturen boven 60° C.
- De batterijen mogen niet worden beschadigd, gedemonteerd, geplet of doorboord.
- Zorg dat u geen kortsluiting veroorzaakt tussen de externe contactpunten en laat de batterijen niet in aanraking komen met water of vuur.
- Gebruik ter vervanging alleen door HP goedgekeurde batterijen.

Batterijen, accu's en accumulators mogen niet worden gedeponeerd bij het normale huishoudelijke afval. Als u de batterijen/accu's wilt inleveren voor hergebruik of op de juiste manier wilt vernietigen, kunt u gebruik maken van het openbare inzamelingssysteem voor klein chemisch afval of ze terugsturen naar HP of een geautoriseerde HP Business of Service Partner.

Neem contact op met een geautoriseerde leverancier of een Business of Service Partner voor meer informatie over het vervangen of op de juiste manier vernietigen van accu's.

French battery notice

Avis relatif aux piles

AVERTISSEMENT : cet appareil peut contenir des piles.

- N'essayez pas de recharger les piles après les avoir retirées.
- Évitez de les mettre en contact avec de l'eau ou de les soumettre à des températures supérieures à 60°C.
- N'essayez pas de démonter, d'écraser ou de percer les piles.
- N'essayez pas de court-circuiter les bornes de la pile ou de jeter cette dernière dans le feu ou l'eau.
- Remplacez les piles exclusivement par des pièces de rechange HP prévues pour ce produit.

Les piles, modules de batteries et accumulateurs ne doivent pas être jetés avec les déchets ménagers. Pour permettre leur recyclage ou leur élimination, veuillez utiliser les systèmes de collecte publique ou renvoyez-les à HP, à votre Partenaire Agréé HP ou aux agents agréés.

Contactez un Revendeur Agréé ou Mainteneur Agréé pour savoir comment remplacer et jeter vos piles.

German battery notice

Hinweise zu Batterien und Akkus

VORSICHT: Dieses Produkt enthält unter Umständen eine Batterie oder einen Akku.

- Versuchen Sie nicht, Batterien und Akkus außerhalb des Gerätes wieder aufzuladen.
- Schützen Sie Batterien und Akkus vor Feuchtigkeit und Temperaturen über 60°.
- Verwenden Sie Batterien und Akkus nicht missbräuchlich, nehmen Sie sie nicht auseinander und vermeiden Sie mechanische Beschädigungen jeglicher Art.
- Vermeiden Sie Kurzschlüsse, und setzen Sie Batterien und Akkus weder Wasser noch Feuer aus.
- Ersetzen Sie Batterien und Akkus nur durch die von HP vorgesehenen Ersatzteile.

Batterien und Akkus dürfen nicht über den normalen Hausmüll entsorgt werden. Um sie der Wiederverwertung oder dem Sondermüll zuzuführen, nutzen Sie die öffentlichen Sammelstellen, oder setzen Sie sich bezüglich der Entsorgung mit einem HP Partner in Verbindung.

Weitere Informationen zum Austausch von Batterien und Akkus oder zur sachgemäßen Entsorgung erhalten Sie bei Ihrem HP Partner oder Servicepartner.

Italian battery notice

Istruzioni per la batteria

AVVERTENZA: Questo dispositivo può contenere una batteria.

- Non tentare di ricaricare le batterie se rimosse.
- Evitare che le batterie entrino in contatto con l'acqua o siano esposte a temperature superiori a 60° C.
- Non smontare, schiacciare, forare o utilizzare in modo improprio la batteria.
- Non accorciare i contatti esterni o gettare in acqua o sul fuoco la batteria.
- Sostituire la batteria solo con i ricambi HP previsti a questo scopo.

Le batterie e gli accumulatori non devono essere smaltiti insieme ai rifiuti domestici. Per procedere al riciclaggio o al corretto smaltimento, utilizzare il sistema di raccolta pubblico dei rifiuti o restituirli a HP, ai Partner Ufficiali HP o ai relativi rappresentanti.

Per ulteriori informazioni sulla sostituzione e sullo smaltimento delle batterie, contattare un Partner Ufficiale o un Centro di assistenza autorizzato.

Japanese battery notice

バッテリに関する注意

警告:本製品はバッテリを内蔵している場合があります。

- バッテリを取り外している場合は、充電しないでください。
- バッテリを水にさらしたり、60°C (140°F) 以上の温度にさらさないでください。
- バッテリを誤用、分解、破壊したり、穴をあけたりしないでください。
- 外部極を短絡させたり、火や水に投棄しないでください。
- バッテリを交換する際は、HP指定の製品と交換してください。

バッテリ、バッテリ パック、蓄電池は一般の家庭廃棄物と一緒に廃棄しないでください。リサイクルまたは適切に廃棄するため、公共の収集システム、HP、HPパートナー、またはHPパートナーの代理店にお送りください。

バッテリ交換および適切な廃棄方法についての情報は、HPのサポート窓口にお問い合わせください。

Spanish battery notice

Declaración sobre las baterías

ADVERTENCIA: Este dispositivo podría contener una batería.

- No intente recargar las baterías si las extrae.
- Evite el contacto de las baterías con agua y no las exponga a temperaturas superiores a los 60 °C (140 °F).
- No utilice incorrectamente, ni desmonte, aplaste o pinche las baterías.
- No cortocircuite los contactos externos ni la arroje al fuego o al agua.
- Sustituya las baterías sólo por el repuesto designado por HP.

Las baterías, los paquetes de baterías y los acumuladores no se deben eliminar junto con los desperdicios generales de la casa. Con el fin de tirarlos al contenedor de reciclaje adecuado, utilice los sistemas públicos de recogida o devuélvalas a HP, un distribuidor autorizado de HP o sus agentes.

Para obtener más información sobre la sustitución de la batería o su eliminación correcta, consulte con su distribuidor o servicio técnico autorizado.

Power cords

The power cord set must meet the requirements for use in the country where the product was purchased. If the product is to be used in another country, purchase a 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, and the length of the cord must be between 1.8 m (6 ft) and 3.6 m (12 ft). 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.

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 include:

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.

Glossary

B

barcode reader A component of the robot that is used for cartridge identification and position calibration.

C

cartridge The plastic housing around a cartridge tape. A plastic leader block is attached to the tape for automatic threading when loaded in transport. The spine of the cartridge contains a label listing the volume identification number.

cell The slot in the magazine that is used to store a tape cartridge.

Class A digital device Class A equipment is intended for commercial installation.

Class I laser product Class 1 lasers are products where the power of the laser beam produced (the accessible emission) is always below the Maximum Permissible Exposure value. Therefore, for Class 1 lasers the output power is below the level at which it is believed eye damage will occur. Exposure to the beam of a Class 1 laser will not result in eye injury. Class 1 lasers may therefore be considered eye safe.

cleaning cartridge A tape cartridge that contains special material to clean the tape path in a transport or drive. Ultrium cleaning cartridge labels have a CLN prefix.

CLI Command Line Interface

D

daisy chaining Parallel SCSI peripherals can be daisy chained together. Each device has a second port used to connect the next device in line. The last device in the chain must be terminated.

data cartridge A term used to distinguish a cartridge onto which a tape drive may write data from a cartridge used for cleaning purposes.

drive The device that the device uses to record data onto tapes.

drive bay The space where the drive module resides.

drive cleaning A device feature that uses a cleaning cartridge to clean a tape drive.

drive module The entire assembly that houses the drive, including the metal housing and connectors.

E

encryption The process of changing data into a form that cannot be read until it is deciphered, protecting the data from unauthorized access and use.

ESD Electrostatic discharge. The release of static electricity from one conductor to another.

Ethernet A local-area, packet-switched network technology. Originally designed for coaxial cable, it now also runs over shielded, twisted-pair cable. Ethernet is a 10 or 100 Megabytes-per-second LAN.

event A significant device occurrence (such as drive errors, online/offline transition, drive cleaning, and other information) that is listed in an automated log.

export The action in which the device places a cartridge into the mailslot so that the operator can remove the cartridge. Also called eject.

G

G Gigabyte. A unit of storage, abbreviated as G or GB, equal to 1,024 Megabytes.

get An activity in which a robot obtains a cartridge from a slot or drive.

GUI Graphical user interface. Software that allows the user to control the device through visual screens.

H

HBA An acronym for host bus adapter, an interface card which plugs into the computer's bus and connects it to the network.

host One or more computers that generate and communicate data to the device.

hot-plug, hot swap The plugging in or removal of a drive into a system with the power turned on.

HVDS High voltage differential signaling, also called differential SCSI. HVDS supports cable lengths up to 25 meters.

I

import The process of placing a cartridge into the cartridge access port so that the robot can insert it into a storage slot.

inventory The process of reading and storing in memory the bar code identification and locations of all cartridges in the Autoloader.

L

LAN Local Area Network. A computer network covering a local area, such as a home, office, or small building, that is usually based on Ethernet technology.

LCD Liquid crystal display. A type of display that uses two sheets of polarizing material with a liquid crystal solution.

LED Light emitting diode. An electronic device that lights up when electricity is passed through it.

LTO An acronym for Linear Tape-Open technology. An “open format” technology, which means that users will have multiple sources of products and media.

LUN Logical Unit Number. An address for a component of a SCSI device, similar to an apartment number. In this device, the host computer sends the SCSI commands for the Autoloader to LUN 1 of the Master tape drive and sends SCSI commands for the tape drive itself to LUN 0.

LVDS Low Voltage Differential Signaling. A low noise, low power, low amplitude method for high-speed (gigabits per second) data transmission over copper wire.

M

MAC address Media Access Control address. A unique identifier attached to most forms of networking equipment, which is part of the Ethernet specification.

magazine A removable array that holds cartridges and is placed into the load port of the Tape Autoloader.

mailslot Part of the left magazine used to import cartridges into the Autoloader

Megabyte A unit of storage abbreviated as M or MB, equal to 1,024 x 1,024 = 1,048,576 bytes.

MIB Management Information Base. A type of database used to manage the devices in a communications network.

P

parallel SCSI A suite of closely related standards in which parallel SCSI devices are connected in parallel to form busses. Each parallel SCSI standard has its own bus width, clock speed, maximum throughput, maximum cable length, and maximum number of devices on the bus.

parallel SCSI devices External parallel SCSI devices with two ports, one for the incoming cable and another for the outgoing cable to the next device. (see daisy chaining).

put An activity in which a robot places a cartridge into a slot or drive.

R

RAID Redundant Array of Inexpensive Disks. A group of disks that work together to improve performance. RAID 5 provides some parity protection in case one of the disks fails.

RMI Remote Management Interface. A web-based interface used to monitor and control the device. The RMI is a website that is hosted on the device.

robot An electro-mechanical device that transports tape cartridges to and from the magazines and drives.

robotics unit The unit that includes the robotic components and that controls the movement of the robot between storage slots, drives, and load ports.

S

SAS Serial Attached SCSI. A computer bus technology and serial communication protocol for direct attached storage devices, including disk drives and high-performance tape drives.

SCSI Pronounced *scuzzy*, an acronym for Small Computer System Interface, a standard interface and command set for transferring data between mass storage and other devices. The host computer uses SCSI commands to operate the device. Depending on the model, the physical connection between the host computer and the tape drives will use a parallel SCSI or SAS interface.

SCSI address See SCSI ID.

SCSI devices Computer devices with a SCSI interface. In this document, *SCSI devices* refers to devices with a parallel SCSI interface.

SCSI ID Each device on a parallel SCSI bus is identified by its SCSI ID, which is a number in the range 0–7 on a narrow bus and 0–15 on a wide bus.

SE Single Ended SCSI. The original SCSI bus technology, which uses single ended signaling — where the signal is referenced to ground. SE SCSI busses have lower signal rates and much shorter allowed cable lengths. SE SCSI should not be used with Ultrium tape drives.

slot The location in the magazine in which a tape cartridge is stored. Also called a cell.

T

tape cartridge A container holding magnetic tape that can be processed without separating the tape from the container. The device uses data and cleaning cartridges. These cartridges are not interchangeable.

tape drive An electro-mechanical device that moves magnetic tape and includes mechanisms for writing and reading data to and from the tape.

Terabyte A unit of storage, abbreviated as T or TB, equal to 1,024 Gigabytes.

terminator The last device at the end of a parallel SCSI chain must be terminated by terminator into the connector. An appropriate terminator is shipped with parallel SCSI devices.

U

U A measure of chassis height. 1U in rack measurement is 44.45 millimeters (1.75 inches).

USB Universal Serial Bus. A serial bus standard used to interface devices.

W

World Wide Identifier A unique identifier in a Fiber Channel or SAS storage network, also called a World Wide Name (WWN). The first three bytes are derived from an IEEE Organizationally Unique Identifier (OUI), which identifies the manufacturer or vendor. The remaining five bytes are assigned by the vendor.

WORM An acronym for Write Once Read Many times, a class of optical recording systems that allow recording and adding data, but not altering recorded data.

Index