Hewlett Packard Enterprise HPE Support Center

HPE StoreEver 1/8 G2 Tape Autoloaders - Troubleshooting

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Overview

This document contains information about various troubleshooting procedures for the HP StorageWorks 1/8 G2 Tape Autoloader.

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.

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SAS installation problems

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.

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 bent pins or debris.
- 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.

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Performance problems

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 as the slowest link in this chain.

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

- Average file size
- File system type
- Connection from the host server to the disks
- Operating system configuration
- Backup server
- Backup type
- Connection from the host server to the Autoloader
- Media

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 *Performance impact of various file sizes*.

Performance impact of various file sizes

Average file size	Performance impact	Recommendations
<64kb: 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 <64kb, 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.
64kb - 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.
>1mb: 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.

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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 *Performance impact of various file systems*

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 improve performance on a disk system, you can use faster disks or add disks. For good performance, each disk should have a sustained read speed of greater than 6 MB/s and there should be one disk per 4 MB/s of native transfer for each tape drive. The recommended number of disks per Ultrium tape drive is: • **Ultrium 448**: 6 • **Ultrium 920**: 15 • **Ultrium 1760**: 20 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.

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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 *Performance impact of various disk connections*.

Performance impact of various disk connections

Connection type	Performance impact	Recommendations
Fibre: 1GB	• **LTO-2**: **GOOD**. When fully used, a 1GB fibre connection can provide enough bandwidth for two LTO-2 tape drives. • **LTO-3, LTO-4**: **POOR**. A 1GB fibre connection is inadequate for an LTO-3 or LTO-4 tape drive.	For good performance, use a faster connection with LTO-3 and LTO-4 tape drives.

Connection type	Performance impact	Recommendations
Fibre: 2GB	**GOOD**. When fully used, a 2GB fibre connection can provide enough bandwidth for the following number of tape drives: • **LTO-2**: **GOOD**. When fully used, a 2GB fibre connection can provide enough bandwidth for 4 LTO-2 tape drives. • **LTO-3**: **GOOD**. When fully used, a 2GB fibre connection can provide enough bandwidth for an LTO-3 tape drive. • **Ultrium 1760**: **GOOD**. When fully used, a 2GB fibre connection can provide enough bandwidth for an Ultrium 1760 tape drive.	For good performance, use a faster connection if you have multiple LTO-3 or LTO-4 tape drives.
Fibre: 4GB	**GOOD**. When fully used, a 4GB fibre connection can provide enough bandwidth for the following number of tape drives: • **Ultrium 448**: 8 • **LTO-3, LTO-4**: 2	
Parallel SCSI: Ultra 320	• **Ultrium 448**: **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 Ultrium 448 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 can provide enough bandwidth for a single LTO-3 or LTO-4 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	• **Ultrium 448**: **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 Ultrium 448 tape drives. • **LTO-3**: **MARGINAL**. An Ultra 160 connection is barely adequate for an Ultrium 920 tape drive. The bus would be saturated when providing 2:1 compressible data to an LTO-3 tape drive. • **Ultrium 1760**: **MARGINAL**. An Ultra 160 connection is barely adequate for an Ultrium 1760 tape drive. The bus would be saturated when providing 2:1 compressible data to an Ultrium 1760 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)	• **Ultrium 448**: **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 Ultrium 448 tape 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 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 Ultrium tape drives.	Upgrade to a faster transport medium, such as Ultra 320 SCSI.
Ethernet: 1 Gigabit	• **Ultrium 448**: **MARGINAL**. A 1 Gigabit Ethernet connection barely provides enough bandwidth for an Ultrium 448 tape drive when two concurrent streams are used. The drawback of using concurrency is that restore operations take longer. • **LTO-3, LTO-4**: **POOR**. A 1 Gigabit Ethernet connection is inadequate for an LTO-3 or LTO-4 tape drive.	Upgrade to Fibre Channel if using LTO-3 or LTO-4 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 tape drives.	Use a dedicated disk array or upgrade to RAID 5.

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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 *Removable Storage service (Figure 1)*.

Figure 1: 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.

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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.

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Backup server

The backup server must have enough RAM and processor power to transfer the files from the disk to the tape drive. See *Backup server requirements* 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.

Backup server requirements

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

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

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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.

Click here to access the HPE Data Availability, Protection and Retention Compatibility Matrix .

If the average file size is less than 64kb 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 64kb, HPE recommends that you use a sequential/image backup that backups 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.

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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 64kb, 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.

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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.

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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.

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Connection from the host server to the autoloader

For the best performance, the connection from the host server to the Autoloader 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 *Performance impact of various Autoloader connections*

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. 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.

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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.

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Service and repair

Removing stuck tapes from slots

NOTE: Contact an HP support representative if a cartridge is stuck in the drive.

In the event of a severe mechanical problem or if circumstances requires removing tape cartridges, perform the following:

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 or the Force Drive to Eject command.
2. Use the magazine removal process to release the magazine and remove it from the device. To use the operator control panel.

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Releasing the magazines manually

If the tape cartridge cannot be removed from 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 2).

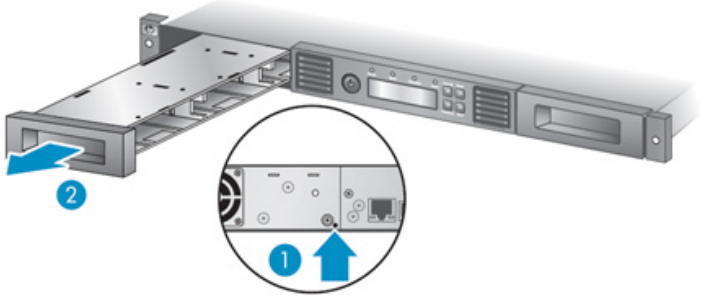
Figure 2: Access holes for the left and right magazine



1 - Right magazine release
2 - Left magazine release

3. To manually release a magazine, push the end of a straightened paper clip into the access hole for a magazine at the back of the device. While holding the paper clip, have a second person attempt to pull the magazine out of the front of the unit (see Figure 3).

Figure 3: Releasing the magazine



1 - Pushing a paper clip into the access hole
2 - Pulling the magazine out of the front of the unit

4. Repeat **Step 4** for the other magazine if necessary.
5. If other tapes are still in the device, or if it is unable to manually remove the magazines and drive, contact HP service for further instructions.

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Error codes

If an error occurs during operation of the device, the device stops the current operation and displays an error code on the LCD screen. Unless otherwise listed in Operation problems, 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.

If the error persists, contact support personnel.

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 *Initial OCP error message (Figure 4)*.

Figure 4: 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 *Error code in the OCP Error Log (Figure 5)*.

Figure 5: Error code in the OCP Error Log



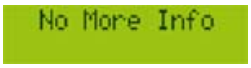
The code **9B** is the main error code, **37** is the error sub-code, and **31** is sub-code specific information for factory use only. When you press **Enter**, the OCP displays the error message, as shown in *Error message in the OCP Error Log (Figure 6)*.

Figure 6: Error message in the OCP Error Log



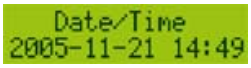
If you press **Next**, the OCP will display additional information, if available, as shown in *No additional information in the OCP error log (Figure 7)*.

Figure 7: 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 *Date and time in the OCP error log (Figure 8)*.

Figure 8: Date and time in the OCP error log



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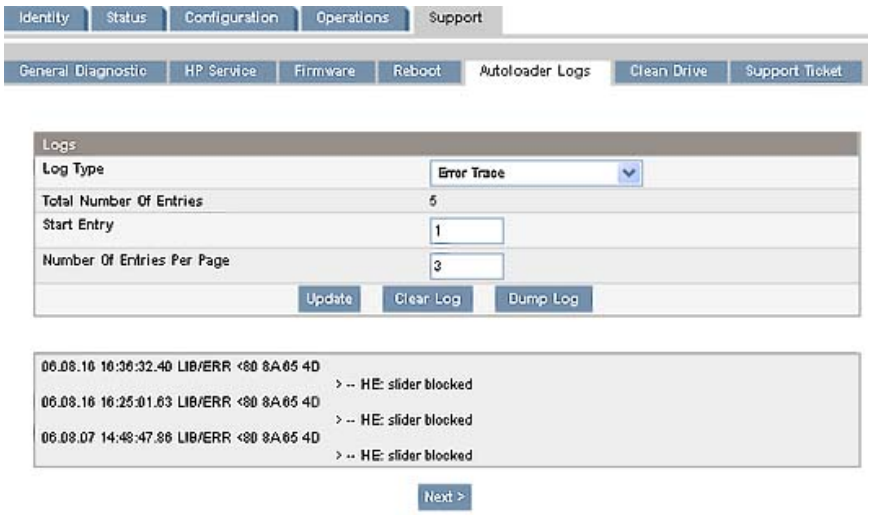
Finding error code information on the RMI

You can find error codes on the RMI *Support: Autoloader logs page (Figure 9)*. 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 for a list of error codes and recovery procedures.
- Third code - the sub-code (62 in this example). See Device error sub-codes for a list of sub-codes.
- Fourth code - sub-code-specific information for factory use only

Figure 9: Support: Autoloader logs page



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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**.

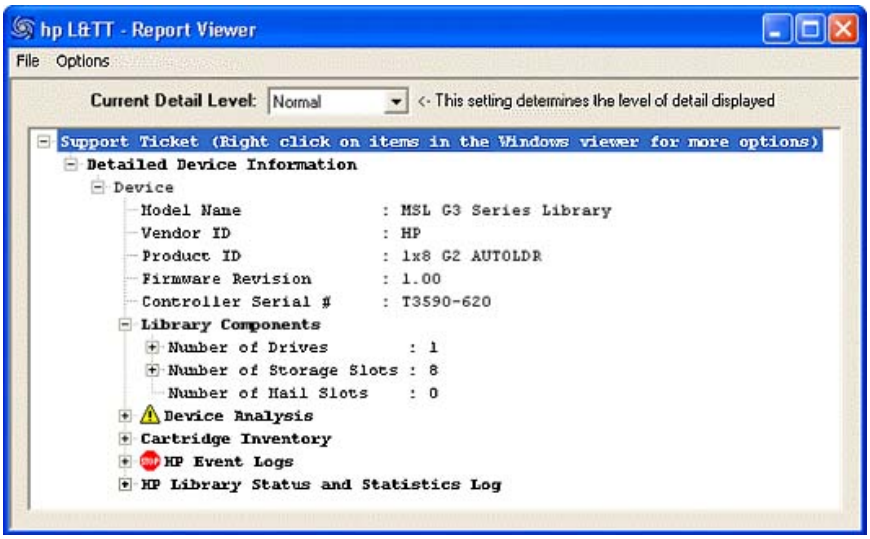
NOTE: The support ticket downloaded from the RMI will only contain information about the Autoloader. To download a support ticket containing drive information, download the support ticket with L&TT.

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 *Support ticket in viewer (Figure 10)*.

Figure 10: Support ticket in viewer



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

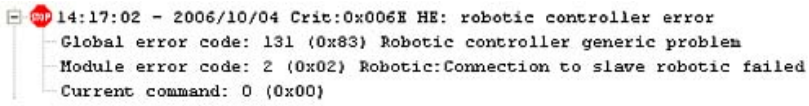
- Events in the last 24 hours
- Events in the last 31 days
- Events older than 31 days

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 *Critical event details (Figure 11)*.

Figure 11: 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.

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Main error code descriptions

The following table lists the main error codes with details and a solution.

Here is a brief description of a few parts listed in the table below:

Gripper: The part of the robotics assembly that pinches media in order to grip it.
Slider: The part of the robotics assembly that plunges in and out for get and put operations.
Elevator: The part of the robotics assembly that moves in the vertical direction.
Rotation: The part of the robotics assembly that turns the robot to face each magazine and the drive.
Sled: The part of the robotics assembly that moves the robot towards the OCP or back towards the drive.

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	
82	No response from EEPROM on robotic controller	
83	Robotic controller generic problem	
84	Setting of gripper motor parameters failed	
85	Setting of slider motor parameters failed	
86	Setting of elevator motor parameters failed	
87	Setting of rotation motor parameters failed	
88	Setting of sled motor parameters failed	
89	Gripper obstructed	Run the wellness test
8A	Slider obstructed	
8B	Elevator obstructed	
8C	Rotation obstructed	
8D	Sled 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. • If the device was moved or shipped with tape cartridges in the magazines, verify that the cartridges did not come out of the magazines to obstruct the drive. • 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 lbs.) 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 plastic 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. • Run the wellness test.
8E	Ends of gripper movement not in expected range	Run the wellness test

8F	Ends of slider 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 is probably at fault. Replace the magazine.
		  ◦ If the failure follows the tape cartridge, the tape cartridge is probably at fault. Replace the tape cartridge.
		• If you are doing 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 movement not in expected range	Run the wellness test
91	Ends of rotation movement not in expected range	
92	Ends of sled movement not in expected range	

Error code	Description	Details and solution
93	Gripper reached a position beyond expected range	
94	Slider reached a position beyond expected range	
95	Elevator reached a position beyond expected range	
96	Rotation reached a position beyond expected range	
97	Sled reached a position beyond expected range	
98	Cartridge present sensor not found	
99	Slider home sensor not found	
9A	Rotation home sensor not found	
9B	Sled position sensor not found	
9C	Gripper range of motion out of specification	
9D	Slider range of motion out of specification	
9E	Elevator range of motion out of specification	
9F	Rotation range of motion out of specification	Run the wellness test
A0	Sled range of motion out of specification	
A1	Open Mail Slot failed	• Retry the operation • If not successful, contact technical support
B0	Command from Autoloader controller to robotics controller did not complete in time allotted	• Reset the unit • Retry the operation • If not successful, contact technical support
B1	Robot controller reported format error on command from Autoloader controller	
B2	Communication to robot from Autoloader controller failed	
B3	Robot stopped due to a released magazine	• Check whether the magazine is completely inserted • Retry the operation • If not successful, contact technical support
B4	"Tape in gripper" sensor did not report the expected value	• Remove and inspect the magazine or drive for a stuck tape • Run the wellness test
B5	Robotic controller not responding to command from Autoloader controller	• Reset the unit • Retry the operation • If not successful, contact technical support
C0	Network initialization failed	• Check network cable • Check the network configuration • Power cycle the unit
C1	Telnet interface initialization failed	
C2	Web server initialization failed	

Error code	Description	Details and solution
C6	Ping command did not reach target	
C7	Cannot upgrade firmware from USB	• Retry firmware upgrade, if not successful, • Attempt a different upgrade method
D0	ROM checksum incorrect	Retry firmware upgrade
D1	RAM error during Power-On-Self-Test	Power-cycle the unit
D2	Read or Write to NVRAM on Autoloader controller failed	
D3	Time controller failed during Power-On-Self-Test	
D4	Internal UART serial communication error	
D5	Communication to display failed	
D6	Autoloader controller memory error	
D7	Fatal system error	
D8	Autoloader controller data base error	
D9	No SCSI IC detected	
DA	When running the wellness test, the bar code did not match the previous value for that tape	• Check the bar code label • Run the wellness test again
DB	External cooling fan error.	Check if the fan is operational and not obstructed
F0	Drive exceeded temperature specification	Check ambient temperature conditions and fans
F1	Autoloader controller lost communication with the drive	Re-seat the tape drive
F2	Drive sled not present	
F3	Drive hardware error	• Cycle power, after several occurrences, • Contact technical support
F4	Time allotted for drive loading exceeded	• Retry the operation, if not successful, • Contact technical support
F5	Time allotted for drive unloading exceeded	• Attempt Force Tape Eject test • Inspect tape for defects after unloading

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Drive error codes

The drive error codes are displayed on the RMI drive status page.

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

Error code	Description
07	Warning that the tape is nearing its end of life

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Error sub-code descriptions

Robotic error sub-codes

The following table lists the robotic error sub-codes.

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 close
05	Error slider home positioning
06	Error elevator home movement
07	Error during sled movement to rotation4 position
08	Error during rotation initialization, get range failed
09	Error elevator init
0A	Error during rotation to far position
0B	Error first sled init, move to sensor failed
0C	Error during sled movement to rotation4 position
0D	Error during rotation to slide position
0E	Error slider init, get range failed
0F	Error during slider forward movement
10	Error gripper init, get range failed
11	Error during slider home movement
12	Error during rotation to FAR position
13	Error sled init, move to sensor failed
20	Error inventory scan
21	Error during gripper close
22	Error slider home movement
23	Error during move gripper to scan pos
24	Error reading bar code label
28	Error Extra inventory scan
29	Error during closing gripper
2A	Error slider preposition movement
2B	Error during opening gripper
2C	Error during sled movement up to sensor
2D	Error slider preposition backwards movement
30	Error slot preposition
31	Error during sled movement in FLMoveRotation
32	Command sending to robotic failed
33	Error during elevator movement in FLMoveRotation function
34	Error during rotation in FLMoveRotation function

Sub-code	Description
35	Error during elevator movement in FLMoveRotation function
36	Error during sled movement in FLMoveSled function
37	Error during sled positioning to mail slot in FLMoveSled function
38	Error during sled positioning to mail slot in FLMoveSled function
39	Error during sled positioning without sensor
40	Movement to/from slot failed
41	Error during first slider movement
42	Error during first gripper movement
43	Error during second slider movement
44	Error during second gripper movement, get range failed
45	Error during third slider movement, move home failed
50	Preposition to drive failed
51	Elevator movement to home sensor failed
52	Sled movement to home sensor failed
53	Error during sled movement to drive position
54	Error during rotation to drive position
55	Error during elevator movement in drive position
60	Move from/to drive failed
61	Error during first slider movement
62	Error during first gripper movement
63	Error during second slider movement
64	Error during second gripper movement, get range failed
65	Error during third slider movement, move home failed
70	Release magazine failed
71	Error during sled movement to rotation4 position
72	Error during rotation to unlock position
73	Error during move sled to block
80	Opening mail slot failed
82	Error during moving back, sensor was found
90	Movement to home position failed
91	Elevator movement to home position failed
92	Error during sled movement to rotation position
93	Error during rotation to home or far position
94	Sled movement to home sensor position failed
95	Sled movement to transport position failed
A0	Movement to mail slot failed
A1	Sled movement to sensor failed
A2	Sled movement to rotation position failed
A3	Elevator movement to home position failed
A4	Error during rotation to far position
A5	Sled movement to mail slot position failed

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Device error sub-codes

The following table lists the device error sub-codes.

Device error sub-codes

Error code	Description
81	Drive wake up failed
88	Error accessing slot status
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

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Warning events

Warning event codes

Event code	Description	Details and Solution
60	Cleaning tape installed.	Complete the cleaning process and retry the operation.
61	Cleaning failure. Cleaning process could not be performed.	A data cartridge may have been loaded instead of a cleaning cartridge. • 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.	• Check the cartridge for damage. It could be a defective cartridge. • Make sure that the cartridge is compatible with the drive. • Verify that the cartridge is not a firmware upgrade tape. Initiate the firmware upgrade process before loading a firmware upgrade tape into the drive.
64	Invalid cleaning cartridge. Drive has rejected the cartridge as invalid.	• Verify that the cartridge is a cleaning cartridge. • Check the cartridge for damage. It could be a defective cartridge. • Make sure that the cartridge is compatible with the drive. • Verify that the cartridge is not a firmware upgrade tape. Initiate the firmware upgrade process before loading a firmware upgrade tape into the drive.
65	Invalid upgrade cartridge. Drive has rejected the cartridge as invalid.	• Verify that the cartridge is a firmware upgrade cartridge, not a data or cleaning cartridge. • Check the cartridge for damage. It could be a defective cartridge. • Make sure that the cartridge is compatible with the drive.
DB	External cooling fan error (fan motion has stopped). The subcode indicates which drive sled fan is affected. Subcode 00: drive sled #1 Subcode 01: drive sled #1	• Verify that the fan for the indicated fan is operational and not obstructed. • If the problem continues, contact HP customer support.
DD	Power supply fan has failed, redundancy may be at risk.	• Verify that the fan for the indicated fan is operational and not obstructed. • Check ambient temperature conditions. • Upgrade the Autoloader firmware to the latest release. • If the problem continues, contact HP customer support.
DE	Power supply has failed. Redundancy is not available.	• Verify that the power supply is inserted correctly and that the thumbscrews are adjusted. • Power cycle the unit. • Upgrade the Autoloader firmware to the latest release. • If the problem continues, contact HP customer support.

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Using HPE Library and Tape Tools to diagnose problems

With HPE Library & Tape Tools installed on the host server, the following tasks can be accomplished:

- Identify all SCSI devices connected to the 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 file that can be e-mailed or faxed to a support representative for analysis.

The HPE Library & Tape Tools diagnostic provides an intuitive graphical user interface with integrated context-sensitive help. It can be downloaded free of charge from HPE website.

Click here to access the HPE Library and Tape Tools website .

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Product related documents

Click here to access the product related documents .

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