Hewlett Packard Enterprise HPE Support Center

HPE Library and Tape Tools - Testing: Diagnostic Tests

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Diagnostic tests

Diagnostic tests are divided into four categories as listed below:

- Drive specific tests
- Media specific tests
- Library specific tests
- Other tests

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Drive specific tests

Drive specific tests are further divided into:

- Drive assessment test
- Device analysis test

Drive assessment test

Element	Details/Device Specific Test

Description	The LTO drive assessment test is the most important test in the Library and Tape Tools (L&TT) diagnostics suite. The test is used to assess the health of a tape drive, providing a clear pass or fail result in about 15 minutes and determines if the drive or autoloader is Fit for Purpose (FFP).
	CAUTION: This test is destructive and will overwrite data on the media that is present in the product.
	NOTE:
	• Requires a good tape that is overwritten as part of test.
	• L&TT offers the test applicable to the tape drive. The test fails to run when a tape is partitioned.
	• In the L&TT test menu, the assessment test may be prefixed with the device type. For example: LTO Drive Assessment test.
	• The drive assessment test can be stopped before it completes. To abort the test from the GUI, click **Abort Test**. To abort the test from the CSI, use the `Ctrl-A` key combination.
	• The textual output of the test will give the ultimate summary - **PASS** or **FAIL**. The test results can be emailed to HPE support for confirmation. For instructions on how to perform this test, see
	  ◦ **Running tests anddevice-specific utilities** under **Managing Firmware** section at the link below:
	  Click here to view the Installing: Using L&TT on Windows page for instructions on how to perform the test .
	  ◦ Running the tests and utilities section at the link below:
	  Click here to view the Installing: Using L&TT on Non-Windows Systems page for instructions on how to perform the test .
	  ◦ **Running tests (CLF)** under **Command line functions** section at the link below:
	  Click here to view the Command Line Functionality page for instructions on how to perform the test .
	• Library specific:
	  ◦ If the test is being run on an autoloader or library and the device is configured in circular or stacker mode (dependent on the particular autoloader), when an unload command is received from the host (such as is issued with the assessment test), the autoloader or library moves the next available cartridge into the drive. If the magazine is not loaded with data cartridges and cleaning cartridges in the correct order to meet the needs of the test, the test will fail.HPE recommends using the single cartridge process when running the Assessment test on an autoloader or library.
	  ◦ If the drive to be tested in part of an autoloader or library, the autoloader or library should be in random mode prior to running the test.
	  ◦ If there is an issue with the backup or restore process and the assessment test passes the drive, further diagnostics are needed to find the root cause of the issue elsewhere in the system.

Element	Details/Device Specific Test
Test performed	Requires that a cartridge be already loaded or in the process of loading when the test is started. • Checks whether the drive is requesting cleaning. • Performs an unload/load cycle, checking for any mechanical issues. • Writes two wraps of data using varying tape speeds in both directions measuring write and read-while-write margin.
When to run	• Run this test if suspected a drive has failed. • Should run the media test option if directed to do so by an HPE tool or support.
Duration	• Test times vary greatly depending on drive type, media quality, and options selected. Average time for a healthy drive with good tape can range from 10 to20 minutes. • A marginal drive (or drive with marginal tape) may take substantially longer.
Options	For the LTO test, the following options are available: • **Allow Overwrite (defaults to FALSE)** - set to **TRUE** to avoid the interactive warning about erasing data on the test tape. • **Test Coverage (defaults to DEFAULT, which is two wraps)** - A wrap is one full length of the tape in one direction. **2X** test coverage is twice the default (4 wraps)and **4X** test coverage is four times the default (8 wraps). Typical test times for**Default/2X/4X** test coverage options are 15/30/60 minutes. This option is available for drives till LTO-6.
Results	• If the test reports that the drive is good, the user can be confident that the driveis working as advertised and is not the cause of any backup or restore issues inthe drive. A device that is determined to be FFP performs according to its specification. • If the test fails, HPE support will accept that assessment without further diagnostics,making this a key test for both end users and HPE support. If a device fails the Assessment test, it should be replaced. If it passes, the problem is likely not with the health of that device.
Available for	• LTO-1 (Ultrium 215 and 230), LTO-2 (Ultrium 448 and 460) drives, and LTO-3drives (Ultrium 920 and 960). • LTO-4 (Ultrium 1760 and 1840), LTO-5 (Ultrium 3000 and 3280), LTO-6 (Ultrium6250 and Ultrium 6650). • LTO-7 (Ultrium 16000 and Ultrium 16750).

Device analysis test

Element	Details/Device Specific Test

Description	• The device analysis test runs a device-specific script that carries out a detailed examination of the device.
	• The test examines all available logs from the device to look for any known issues, end user use issues and common error patterns.
	• The test also provides summary information and presents suggestions as to the cause of certain errors and any remedial actions to be taken by the user. This option is particularly useful if a problem is suspected with the device.
	• The device analysis test is executed manually through the tests screen or automatically whenever a support ticket is generated.
	• This test is unique among all the tests offered by L&TT.
	• In addition to performing SCSI operations directly on a device, this test uses a set of predefined, device-specificrules to analyze device logs and configurations.
	• If any known issues are discovered during the analysis, the user is notified of the problem and the program suggests an appropriate course of action.
	• This test automates failure analysis of a device by determining:
	  ◦ Whether a known or unknown problem with a device exists.
	  ◦ If the problem can be resolved in the field through maintenance or simple.
	  ◦ Whether a device needs to be returned or serviced.
	NOTE:
	• Test does not change the configuration of the drive or media.
	• **Command line syntax** - The device analysis test is available from the command line. For more information, see **Running tests (CLF)** under **command line functions** section at the link below:
	Click here to view the Command Line Functionality page

When to run	Run this test when to verify that basic functions of the device are operating properly, not logged any critical errors and to verify that firmware is up to date.
Duration	Less than 1 minute.
Options	None.
Available for	All the devices supported by L&TT.

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Media specific tests

Media specific tests are further divided into:

- LTO media assessment full tape test

- LTO stuck tape test
- LTO media assessment test
- LTO data assessment test

LTO media assessment full tape test

Element	Details/Media Specific Test
Description	• The LTO media assessment test evaluates two aspects of the LTO media - the data stored on the media and the tape cartridge itself. • The default is to perform a read only test, which analyzes the backup currently on the LTO data cartridge to check whether the backup is Fit for Purpose (FFP). • The other test type is an overwritetest, which overwrites the existing data on the LTO data cartridge. • The overwritetest ensures that the media can be successfully written to, which will check whether the media is FFP. **CAUTION: This test is destructive if the Allow Overwrite test option is set asTRUE. The test overwrites the data on the media present in the device.**
When to run	Run this test with the **Allow Overwrite** option set to **TRUE** to check whether a backup is fit for purpose. Run this test with the **Allow Overwrite** option set to **False** to check that a tape cartridge is fit for purpose.
Duration	Approximately 20 minutes using the default test options, depending on the drive type.
Options	HPE Recommends using the default options, which will perform a read only (backup assessment) test and attempt to read two wraps of data from the tape. Use the **Allow Overwrite** and **Amount of Media to Test** options to modify the default behavior of thetest. • **Allow Overwrite (default False)** - To run the read only (backup assessment)test, set the Allow Overwrite option to False, or leave it unset. To run the overwrite(media assessment) test, set the **Allow Overwrite** option to **True**. • **Amount of Media to Test** - The actual amount of data read varies by LTOdrive/tape generation, but is enough for a valid read margin calculation to be performed. Unless EOD (End of Data) is reached during the read of the defaultamount of data, the test will be unable to report that the backup is FFP, but it willbe a very good indication of the health of the backup. To fully test the backup fitness, set the **Amount of Media to Test** option to **Entire Tape**, which will ensure that the data is read from the tape until EOD is reached. The other test options allow the test to be run outside of the standard operation parameters, which are not recommended: ◦ **Enable passive test (default True)** - When this option is set to **True**, the passive stage of the test is run. When this option is set to **False**, the passive stage of the test is not run. There is not benefit to disabling the passive stage of thetest because it runs very quickly and gives useful feedback on the history of the tape. ◦ **Check WORM integrity (default True)** - When this option is set to **True**, the read only test is run on a WORM cartridge, which will check the integrity ofthe WORM media and that the WORM cartridge has not been tampered with.This test does not allow writing to a WORM cartridge. ◦ **Ignore cleaning requests(default False)** - If the tape drive to be tested is requesting cleaning, the drive should be cleaned before running the test.However, if a cleaning cartridge is not available, bypass this check by setting this option to True. In that case, the test will report that non-standard test options were used so the results of the test cannot be guaranteed. **NOTE:** For instructions on how to perform this test, see • **Running tests and device-specific utilities** under **Managing Firmware** section at the link below: Click here to view the Installing: Using L&TT on Windows page . • **Running the tests and utilities** section at the link below: Click here to view the Installing: Using L&TT on Non-Windows Systems page . • Running tests (CLF) under Command line functionality section at the link below: Click here to view the Command Line Functionality page . Test will overwrite all data on the media if the overwrite option is **True**. If the drive to be tested in part of an autoloader or library, the autoloader or library should be in random mode prior to running the test. The test will not run with a tape that has been partitioned.
Available for	• All LTO drives till LTO-6. • HPE recommends using the LTO data assessment test, instead of the LTO media assessment read only test. • If the read only (backup assessment) test fails, the backup needs to be run again,but should run the overwrite test first to check that the media is suitable to continue using for backup operations. • If the overwrite (media assessment) test fails,the media should be retired and no longer used for backup operations (i.e. it is nolonger FFP). • The test makes no attempt to determine the reason for the problem with the media; it is intended only to determine whether it is FFP. • The test also doesa passive analysis of the tape history. In this part of the test, the LTO cartridge memory is analyzed looking for signs of health and usage problems. • The historical information-based status of the tape is reported at the end of the test.

LTO Stuck tape test

Element	Details/Media Specific Test

Element	Details/Media Specific Test
Description	This test tries to determine if the cartridge in the drive is physically stuck, or if it can be unloaded and recovered. **NOTE:** For instructions on how to perform this test, see • **Running tests and device-specific utilities** under **Managing Firmware** section at the link below: Click here to view the Installing: Using L&TT on Windows page . • **Running the tests and utilities** section at the link below: Click here to view the Installing: Using L&TT on Non-Windows Systems page .
When to run	Run this test when the cartridge is suspected as stuck.
Duration	None.
Available for	Standalone LTO drives only.

LTO Media assessment test

Element	Details/Media Specific Test
Description	This test checks the functionality of LTO data cartridge and ensures that it is working correctly. Load the required cartridge before starting the test. Before running this test, ensure that the drives operation is checked using the LTO Drive Assessment test (the test must be passed recently with sufficient margin for the results of this test to be valid). Set the **Allow Overwrite** test option to **TRUE** before starting the test. **CAUTION:** • **This test erases the data already existing on the data cartridge. Ensure that the data cartridge is not write protected.** • **This test is destructive if the Allow Overwrite test option is set asTRUE. The test overwrites the data on the media present in device.**
When to run	Run this test with the **Allow Overwrite** option set to **TRUE** to check whether a backup is fit for the purpose. Run this test with the **Allow Overwrite** option set to **False** to check that a tape cartridge is fit for the purpose.
Duration	Approximately 20 minutes using the default test options, depending on the drive type.
Available for	All LTO drives.

LTO Data assessment test

Element	Details/Media Specific Test

Description	• Data assessment test checks the quality of the data currently on tape. Load the required cartridge before starting the test.
	• Before running this test, ensure that the drives operation has been checked using the LTO drive assessment test (the test will need to have passed recently with sufficient margin for the results of this test tobe valid).
	• HPE recommends using the default options, which will perform a full tape test.
	• The following test options are available:
	  ◦ **Full** - To test the entire tape.
	  ◦ **Quick** - To test two wraps of data.
	  ◦ **Moderate** - To test 20 percent of the total data.

When to run	Run this test on the archived tape if a problem is suspected with the data.

Duration

Tape generation	Test option	Data verified	Time taken (Avg)
LTO-7	Quick	200GB	12 mins
LTO-7	Moderate	1.2TB	50 mins
LTO-7	Full	6TB	5 hrs
LTO-6	Quick	39GB	5 mins
LTO-6	Moderate	500GB	55 mins
LTO-6	Full	2.5TB	5 hrs
LTO-5	Quick	38GB	5 mins
LTO-5	Moderate	300GB	45 mins
LTO-5	Full	1.5TB	4 hrs 30 mins
LTO-4	Quick	30GB	5 mins
LTO-4	Moderate	160GB	26 mins
LTO-4	Full	800GB	2 hrs 20 mins

Element	Details/Media Specific Test			
	LTO-3	Quick	19GB	4 mins
	LTO-3	Moderate	80GB	18 mins
	LTO-3	Full	400GB	1 hr 30 mins
Available for	All LTO drives.			

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Library specific tests

Library specific tests are further divided into the following:

- Library exerciser test
- Library read write test

Library exerciser test

Element	Details/Media Specific Test
Description	• This is a general purpose test of the library • The test exercises the library robotics by moving media to and from all of the selected elements in the library. • There are two versions of this test, depending on the library model. • This test can be stopped before it completes. • To abort the test from the GUI, click **Abort Test**. To abort the test from the CSI, use the `Ctrl-A` key combination. **CAUTION: When run on the MSL, ESL and EML series libraries, this test does not overwrite data. However, on other libraries, this test may overwrite data depending on how the test options are configured.**
When to run	Run this test to verify that the library is functioning properly.
Duration	Highly dependent on the library being tested and the options selected.

Options	The following options are available for this test:
	• **Perform inventory at start of test** - By default, this option is set to **False** because the inventory operation can take a long time on large libraries. If the inventory information needs to be updated, setting this option to **True** causes an **Initialize Element Status** command to be issued to the library at the start of the test.
	• **Test loop count (all operations except inventory)** - Allows multiple loops of thetest to be run. The inventory operation (if selected) only runs prior to the first loop.The default value is 1.
	• **Test drive range (all, x - y, or none)** - Specify the range of drives to be tested.Specify all to test all drive elements. Specify none to skip all drive elements.Specify a single number (5, for example) or a range (2 - 5, for example) to test specific drive elements (numbering starts at 1).
	• **Test import/export range (all, x - y, or none)** - Specify the range of import/export(mail slot) elements to be tested. Specify all to test all import/export elements.Specify none to skip all import/export elements. Specify a single number (5, for example) or a range (2 - 5, for example) to test specific import/export elements(numbering starts at 1).
	• **Test slot range (all, x - y, or none)** - Specify the range of slot (storage) elements to be tested. Specify all to test all storage elements. Specify none to skip allstorage elements. Specify a single number (5, for example) or a range (2 - 5, forexample) to test specific storage elements (numbering starts at 1).
	• **Ignore barcode labels and media types when selecting tapes** -
	  ◦ To ensure that attempted moves are made only to elements that are compatible with the selected media, the test attempts to use bar code label and/or read element status information from the library to determine media types by default.
	  ◦ If bar code labels are missing or incorrect, it may be necessary for this option to be set to **True** to allow the test to run.
	  ◦ This option should only be set to **True** if all of the media inthe selected range is compatible with all of the elements in the selected range.
	  ◦ If this option is set to **True** and more than one drive type is detected in the selected range, the test will exit without moving media.
	  ◦ The range options can be used to select ranges of elements that are known to be compatible.

Available for	Not all libraries are supported by the library exerciser test. If the test is not displayed in the list of tests, then the selected device is not supported.

Using the library exerciser test

There are two versions of the library exerciser test depending on the model of the library or autoloader being tested. The latest version of the library exerciser test is used on the MSL2024,MSL4048, MSL8048, MSL8096 and the 1/8 G2 tape autoloader. Other library models use a previous version of the library exerciser test.

Using the new version

By default, the new version of the library exerciser test verifies that the device robotics can access every drive, storage and mail slot element in the library or autoloader by physically performing media moves to each location. Optionally, a subset of elements can be selected to focus the test on a specific area of the library or autoloader.

The test requires at least one piece of media in the storage and mail slot elements that are selected for test. By default, the test attempts to verify media compatibility, so if multiple tape technologies or generations are present in the library, one cartridge of each applicable type should be present. The MSL2024 and MSL4048 libraries and 1/8 G2 tape autoloader also require at least one empty element in the selected storage and mail slot range.

NOTE:

- Depending on the library model and test options selected, this test may overwrite data. The test will not overwrite data on MSL, ESL, and EML series libraries. For more information,see **Using the original version** below.
- For instructions on how to perform this test, see
  - **Using the Library Exerciser test** above.
  - **Running tests and device-specific utilities** under **Managing Firmware** section at the link below:

    Click here to view the Installing: Using L&TT on Windows page .
  - Running the tests and utilities section at the link below:

    Click here to view the Installing: Using L&TT on Non-Windows Systems page .
- This test can take a long time on very large libraries. If a shorter test is desired, use the testoptions to select a subset of elements to test.

Using the original version

The library exerciser test takes a test cartridge from a mail slot and performs random slot-to-slotmoves. The test then moves the test cartridge into every available drive and performs a short drive test. This test is intended to exercise the robotics and robot drive hardware.

NOTE: Not all libraries are supported by the Library Exerciser test. If the test is not displayedin the list of tests, then the selected device is not supported.

The following options are available for this test:

- **Test Time Limit** - Specify the time limit in minutes. Enter 0 for no time limit. The default setting is 0.
- **Move Command Timeout** - Specify the maximum time allotted, in seconds, for each move command before failure. The default is 600 seconds.
- **Active Slot Range** - Specify a range of slots to be tested. Enter a range of slot numbers separated with a dash (for example: 2 - 5), or enter all to specify all slots. The default is all.
- **Active Drive Range** - Specify a range of drives to be tested. Enter a range of drives separated with a dash (for example: 2 - 5), or enter all to specify all drives. The default is all.
- **Drive Type Option** - Specify the type of drives to be tested (in libraries that have mixed drive types). Enter the type of drive (for example: LTO or DLT), or enter all to test all drive types. The default is all.
- **Check Inventory Mode** - Specify whether to perform an active inventory check at beginning of the test. The active inventory check can take a long time to perform. The defaultis ON.
- **Barcode Mode** - Specify how bar codes are handled. Choose one of the following options:
  - **Show all** - Shows all bar codes.
  - **Show suspect** - Shows only suspect bar codes (default).
  - **Off** - Does not show bar codes.
- **Slot-to-Slot Moves** - Select one of the following options for the slot-to-slot test:
  - **All** - Moves all cartridges
  - **Random** - Moves randomly selected cartridges (default)
  - **Off** - No cartridges are moved
- **Random Coverage** - When **Slot-to-Slot Moves** is set to **Random**, specify the percentageof units covered during random test. The default is 20%.

  Random Coverage - When **Slot-to-Slot Moves** is set to **Random**, specify the percentage of units covered during random test. The default is 20%.
- **Drive Load Mode** - Specify whether or not to perform the drive load test. The default setting is **ON**.
- **Drive Test Option** - If the drive load test is enabled, specify one of the following options:
  - Off
  - Data loop back (default)
  - Read-only
  - Read/write
- **Cartridge Load Test** - Specify one of the following options for the cartridge load test:
  - Off (default)
  - Single drive

- Multiple drives
- All drives

- **CM Integrity Mode** - Specify whether to enable the CM integrity check option for LTO drives. The default setting is **ON**.

Library read write test

Element	Details/Library Specific Test
Description	The library read write test automates the testing of the drives and tapes in a tape library. This test assumes that the library robotics are working properly. To test the library robotics, use **library exerciser test** or **move test**. For instructions on how to perform this test, see • **Running tests and device-specific utilities** under **Managing Firmware** section at the link below: Click here to view the Installing: Using L&TT on Windows page . • **Running the tests and utilities** section at the link below: Click here to view the Installing: Using L&TT on Non-Windows Systems page .
When to run	Run this test to verify that the tapes and drives are functioning properly.
Duration	Highly dependent on the library being tested and the options selected.
Options	• **Allow overwrite (default: FALSE)** - Set to **TRUE** to enable test options which write to the tape. Specifically, if MB to **write** is greater than 0 or **RunLTO drive assessment test** is **TRUE**, the test will only run if **Allowo verwrite** is also true. • **Starting slot (defaults to 1)** - Specifies the number of the slot where the test will start checking for compatible tapes • **Number of test tapes (default: 1)** - Specifies the maximum number of testtapes to be written during the test. If tapes will be written (see **Allow overwrite**),the number of test tapes is limited to the maximum of the number of drives selectedwith **Drive type** and **Drive range**, or 10 tapes, whichever number is larger.For example, if six drives are selected in a 32-drive library and the test is configured to write tapes, then the test will limit the number of test tapes to 10. If there are16 drives in the chosen library, the test will limit the number of test tapes to 16. If **all** is selected, the test tapes will be selected from the **Starting slot** to theend of the library slot range. If tapes will not be written, the maximum does notapply. • **Drive range (default: all)** - Specifies the range of tape drives to be considered for the test. Drive numbering starts at one. This range of drives is checked against the specified **Drive type** to determine which drives will be used. For example,1 - 3 selects drives 1, 2 and 3, 2 selects drive 2, and all selects all drives in thelibrary. • **Drive type (default: same as drive 1)** - Specifies the types of drives to include in the test. The test will exit if the library does not have a drive of the selected type. • **MB to write (default: 0)** - Specifies the amount of data to write to each tape using a random data pattern, 64K block size and data compression enabled. Ifall is specified, the tape will be fully written to EOM (end of media) and the locations for early warning EOM and EOM will be published in the test results.These locations are published as both a block number and a capacity point. • **Run LTO drive assessment test (default FALSE)** - Set to **TRUE** to runthe assessment test. The **Enable passive test**, **Ignore cleaning request** and **Test coverage options** configure the LTO drive assessment portion of the library Read Write test. ◦ **Enable passive test (default: TRUE)** - Specifies whether device analysis will be run from within the drive assessment test. ◦ **Ignore cleaning request (default: FALSE)** - Specifies whether cleaning requests will be checked and used as part of the test criteria. ◦ **Test coverage (default: Default)** - Specifies how much of the test tape will be written during the assessment test. The choices are **Default** and **Entiretape**. **NOTE:** If **Run LTO drive assessment test** is **TRUE** and drive typeis not **LTO**, the test will exit. • **Continue on drive errors (default: TRUE)** - Specifies whether the test should continue when an unexpected drive error occurs. This check does not include some expected drive errors, such as when a drive reaches EOD before reading the specified amount of data. **NOTE:** Robotics errors will always cause the test to fail immediately. • **Test all drive/tape combinations (default: FALSE)** - Determines which tape/drive combinations to test. For example, with four selected drives and four selected tapes, if **Test all drive/tape combinations** is **FALSE**, four tape/drive combinations will be tested, but if **Test all drive/tape combinations** is **TRUE**, 16 tape/drive combinations will be tested. If **Number of test tapes** is set to 1, the test will use all tape/drive combinations, regardless of how the **Test all drive/tape combinations**test option is set so that each of the selected tape drives will be tested. • **Number of iterations (default: 1)** - Specifies the number of times the test sequence will be repeated for each tape/drive combination. • **Ignore barcode labels (default: FALSE)** - Specifies whether the test should use barcode labels to determine which tapes are compatible with a tape drive. • **Skip previously inventoried tapes (default FALSE)** - Specifies whether previously inventoried tapes will be skipped when the test selects the tapes touse for the test run. The information about previously inventoried tapes is kept inthe log file.

Element	Details/Library Specific Test
Other notes	Depending on the library model and test options selected, this test may overwrite data. This test can be stopped before it completes. To abort the test from the GUI, click**Abort Test**. To abort the test from the CSI, use the **Ctrl-A** key combination. In L&TT 4.5 and later, the test keeps a log file that lists of all tapes in the library that have bar code labels. The test will not run with a tape that has been partitioned. The library read write test has several requirements, some of which can be overridden with test options: • Library robotics are working. The test assumes that the library robotics are workingwell enough to move tapes, read barcode Diagnostic tests 123 labels, and keep correct inventory. The test will fail immediately upon the first robotics error. • No tapes in the selected drives. If there are tapes in any of the selected drives,the test will move the tapes back to their source slots at the beginning of the test.A working library should know the source slots for each tape, as long as the library has not been rebooted or power-cycled since the tape was loaded into the drive.If the source slot information is not available in the library, the test will exit withan error message requesting that the user use the front panel to replace the tapes in their storage slots. • Bar code labels are correct. The test uses the bar code labels to determine whether a tape may be used in a specific drive. The sixth and seventh characters in thebar code label designate the type of tape. In addition, cleaning tape bar code labels start with **CLN**, which is used to exclude any cleaning tapes from the test.The test chooses which tapes to include based on the bar code labels of the tapesin the library, along with the option settings for **Drive type**, **Starting slot**,and **Number of test tapes**. The requirement for correct bar code labels may be overridden by setting the**[Ignore barcode labels]** test option to **TRUE**. **NOTE:** The test will not run with the **Ignore barcode labels** test optionset to **TRUE** if the library has mixed drive types because when the library contains mixed drive types it is more likely that some of the tapes in the library are not compatible with the chosen drive type. • Library is configured to show at least seven bar code characters. The library must show at least seven bar code characters for the test to check the bar code labels.The number of bar code characters shown is a configuration setting that differs between libraries. If the library is set to show fewer characters, the test will behave as though none of the tapes in the library are compatible with the chosen tape drive. Starting with L&TT 4.5, the library read write test keeps a log file containing a listof all tapes in the library that were identified during previous test runs. This information is used within the test if the **Skip previously inventoried tapes** test optionis set. The log files are named LTTRootDirectory\logs\ProductID_ProductSN_librw.csv. The list has one entry for each tape, and each entry includes the bar code, slot, and media ID for SDLT tapes or cartridge SNfor LTO tapes. The bar code and slot information will always be present; the mediaID or cartridge SN will only be present if the tape was loaded during any run of the Library Read Write test. The log file may be viewed in Excel. When the Library Read Write test runs, the media ID or cartridge SN from the logfile is combined with any new media information from that run. The log file is then updated to reflect the new media ID or cartridge SN information, as well as the currentlibrary configuration of tape locations. If the library read write test is run after atape is removed from the library, the information about that tape is discarded fromthe log file. **NOTE:** To keep log information about a tape that has been discarded from the library,copy or rename the log file before running the Library Read Write test. The test determines which tapes to use based on the test option settings for**Starting slot**, **Number of test tapes**, **Drive type**, **Ignore barcodelabels**, and whether or not the tapes will be written (see **Allow overwrite**).For example, LTO-1 tapes will not be included in an LTO-3 drive test where tapes are written because LTO-1 tape is not write-compatible with LTO-3 drives. The test determines which drives to use based on the test option settings for **Drivetype** and **Drive range**. The other test options determine the testing sequence for the selected tapes and drives. This testing sequence is always the same for each of the selected drives and tapes. This test can be stopped before it completes. To abort the test from the GUI, click**Abort Test**. To abort the test from the CSI, use the **Ctrl-A** key combination. Slot and drive numbering is one-based (the first slot is 1), which is consistent with L&TT. Some supported libraries use zero-based numbering on the library front panel.In this case, the test numbering will be off by one from the front panel.
Available for	G2 autoloader MSL2024, MSL4048, MSL6480 and ESL G3 libraries.

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Other tests

Other tests includes the following tests:

- Installation check test
- Connectivity test
- LTO cooling check test
- Data compression test
- LTO encryption test
- Device configuration test
- Device self-test
- Move test
- Read/write test

Installation check test

Element	Details/Other Test
Description	• The Installation Check is not executed in the same way as other L&TT tests. Rather,it is run automatically when L&TT starts in Installcheck mode. Installcheck mode isa feature of the Windows version of L&TT. • When run in Installcheck mode, L&TT checks the installation of selected devices. L&TT performs several tests on each selected device to determine if the device is configured optimally. • In addition, L&TT performs connectivity and configuration testson all supported devices that are configured on the system. These tests cannot be overridden. • All of the tests performed during the installation check can also be run manually with L&TT. L&TT displays the results of each test and any recommendations. **NOTE:** When L&TT is run in Installcheck mode, the Installation Check wizard appears. After the selected tests are complete and the results are displayed, the wizard closes, which also closes L&TT. For instructions on how to perform this test, see: • **Running tests and device-specific utilities** under **Managing Firmware** section at the link below: Click here to view the Installing: Using L&TT on Windows page . • **Running the tests and utilities** section at the link below: Click here to view the Installing: Using L&TT on Non-Windows Systems page .
When to run	Run L&TT in Installcheck mode to verify the correct configuration of supported devices.
Duration	None
Available for	The installation check feature is currently supported on HPE Ultrium drive.

Connectivity test

Element	Details/Other Test

Description	Writes data to the internal buffers in the product to verify that the physical connection between the host and the storage device is operational. No media is required.
	NOTE:
	• If no options are specified, by default L&TT runs the test with looping options set to count based loop with a looping value of 1.
	• Test will not overwrite any data on media present in the drive.
	• For instructions on how to perform this test, see:
	  ◦ **Running tests and device-specific utilities** under **Managing Firmware** section at the link below:
	  Click here to view the Installing: Using L&TT on Windows page .
	  ◦ **Running the tests and utilities** section at the link below:
	  Click here to view the Installing: Using L&TT on Non-Windows Systems page .
	• The Connectivity test is available from the command line syntax. For more information, see:
	  ◦ **Running tests (CLF)** under **Command line functions** section at the link below:
	  Click here to view the Command Line Functionality page .

When to run	When there is a question about the integrity of the bus connection from the device to the host computer.
Duration	Less than 1 minute.

Options	• **Looping options**
	Specify count based loop or Time based loop (minute). In either case, the actual value is entered separately using the Looping value parameter.
	Example 1: To set a time-based loop of 10 minutes:
	`testopt="Looping Options:Time based loop(min)"`
	`testopt="Looping value:10"`
	• **Looping value**
	Specify an integer greater than zero.
	Example 2: To set a count-based loop to iterate five times:
	`testopt="Looping Options:Count based loop"`
	`testopt="Looping value:5"`

Available for	LTO-1 to LTO-7 tape drives both standalone and library drives.

LTO cooling check test

Element	Details/Other Test

Element	Details/Other Test
Description	This test monitors the temperature sensors of an LTO drive while writing data toensure that the drive is cooling properly when installed in a server. **NOTE:** For instructions on how to perform this test, see: • **Running tests and device-specific utilities** under **Managing Firmware** section at the link below: Click here to view the Installing: Using L&TT on Windows page . • **Running the tests and utilities** section at the link below: Click here to view the Installing: Using L&TT on Non-Windows Systems page .
When to run	Run this test if thermal problems are suspected with the LTO drive.
Duration	None.
Other notes	This test can be stopped before it completes. To abort the test from the GUI, click**Abort Test**. To abort the test from the CSI, use the `Ctrl-A` key combination.
Available for	LTO drives.

Data compression test

CAUTION: This test is destructive and will overwrite data on the media that is present in theproduct.

Element	Details/Other Test
Description	• Tests the hardware compression capability of the tape drive. • The test writes a data pattern of known compressibility to tape. The test then rewinds the tape and reads the file just written. • The read and write hardware compression ratios are calculatedto as certain that the hardware compression is working. The compression ratios are displayed and should be approximately 2:1. Anything less than 2:1 means that hardware compression is not working. • This test is useful if tape capacity or hardware compression is in doubt. **NOTE:** The data compression test will overwrite all data on the media. For instructions on how to perform this test, see: • **Running tests and device-specific utilities** under **Managing Firmware** section at the link below: Click here to view the Installing: Using L&TT on Windows page . • **Running the tests and utilities** section at the link below: Click here to view the Installing: Using L&TT on Non-Windows Systems page .
When to run	Run this test to verify that data compression is working properly.
Duration	Less than 10 minutes.
Other notes	Test will overwrite all data on the media.
Available for	LTO 1 to LTO-7 tape drives both standalone and within libraries.

LTO encryption test

Element	Details/Other Test
Description	• This test checks that the encryption capabilities of the LTO-4 or LTO-5 drive is working correctly. • Data is written and read using different combinations of encryption mode, decryption mode and using both invalid and valid keys, checking for the correct response from the drive in each case. • The tape is checked at the beginning of the test to insure that it will correctly support encryption and may therefore be used asa test tape. **NOTE:** This test will overwrite all data on the media. For instructions on how to perform this test, see: • **Running tests and device-specific utilities** under **Managing Firmware** section at the link below: Click here to view the Installing: Using L&TT on Windows page . • **Running the tests and utilities** section at the link below: Click here to view the Installing: Using L&TT on Non-Windows Systems page .
When to run	Run this test to insure that encryption is working correctly for the LTO-4or LTO-5 drive.
Duration	2 - 3 minutes.

Element	Details/Other Test
Other notes	This test will overwrite all data on the media.
Available for	LTO-4, LTO-5, LTO-6 and LTO-7 tape drives, both standalone and library drives.

Device configuration test

Element	Details/Other Test
Description	This utility lets to configure the drive to enable or disable data compression and toprevent or allow media removal. **NOTE:** For instructions on how to perform this test, see: • **Running tests and device-specific utilities** under **Managing Firmware** section at the link below: Click here to view the Installing: Using L&TT on Windows page . • **Running the tests and utilities** section at the link below: Click here to view the Installing: Using L&TT on Non-Windows Systems page .
When to run	Run this utility when to configure the drive to enable/disable data compression and to prevent/allow media removal.
Duration	Less than 1 minute.
Options	• **Enable/Disable Data Compression** - Specify **enabled or disabled** to enable or disable data compression on the drive. Specify **leave unchanged** to retain the current data compression setting. • **Prevent/Allow Media Removal** - Specify **prevent or allow** to prevent or allow media removal from the drive. Specify **leave unchanged** to retain the current setting. • **Enable ODBR** - This option is only available for some DDS drives. For DDS,device analysis will indicate whether or not there is a need to enable OBDR using the Device Configuration test.
Available for	LTO-1 to LTO-7 tape drives both standalone and library drives.

Device self-test

Element	Details/Other Test
Description	This test executes the internal self-test of the device and reports any failures. Thistest is useful in confirming that the device itself is operating properly. Not all devices support an internal self-test. **NOTE:** • If no options are specified, L&TT runs the test with looping options set to count based loop with a looping value of 1. • Test will not overwrite any data on media present in the drive. • For instructions on how to perform this test, see: ◦ **Running tests and device-specific utilities** under **Managing Firmware** section at the link below: Click here to view the Installing: Using L&TT on Windows page . ◦ **Running the tests and utilities** section at the link below: Click here to view the Installing: Using L&TT on Non-Windows Systems page . • **Command line syntax** - The device self-test is available from the command line. For more information see: ◦ **Running tests (CLF)** under **Command line functions** section at the link below: Click here to view the Command Line Functionality page .
When to run	Run this test as a quick check of the integrity of the device.
Duration	Less than 1 minute.

Options	• **Looping options** - Specify count based loop or time based loop (minute). In eithercase, the actual value is entered separately using the looping value parameter.
	Example 3: To set a time-based loop of 10 minutes:
	`testopt="Looping Options:Time based loop(min)"`
	`testopt="Looping value:10"`
	• **Looping value** - Specify an integer greater than zero.
	Example 4: To set a count-based loop to iterate five times:
	`testopt="Looping Options:Count based loop"`
	`testopt="Looping value:5"`

Available for	LTO-1 to LTO-7 tape drives both standalone and library drives.

Move test

Element	Details/Other Test
Description	This test performs a move command in a library or autoloader using source and destination elements specified in the test options. When the move command is finished, a second move command returns the cartridge to its original location. This sequence can be repeated using an optional loop count. **NOTE:** For instructions on how to perform this test, see: • **Running tests and device-specific utilities** under **Managing Firmware** section at the link below: Click here to view the Installing: Using L&TT on Windows page . • **Running the tests and utilities** section at the link below: Click here to view the Installing: Using L&TT on Non-Windows Systems page .
When to run	This test is used to verify that the library or autoloader can perform moves to andfrom specific elements. Use this test if a problem is suspected with a particular element in the device or to verify operation after the device is serviced.
Duration	The duration of this test will vary depending on the library or autoloader under test and the specified loop count. A single loop can take from 30 seconds to three minutes depending on the device. It will take longer if errors and recovery steps occur.

Options	• **Loop count** - Specify the number of times the test sequence should be repeated.Each test sequence consists of two moves one from the specified source to the specified destination followed by a second move back to the original source location.
	• **Source address type** - Specify one of the following source element address types:
	  ○ **Storage slot** - The source address is a storage slot number (starting at 1).
	  ○ **Drive** - The source address is a drive number (starting at 1).
	  ○ **Mail slot** - The source address is a mail slot number (starting at 1).
	  ○ **SCSI element address** - The source address is a SCSI element number.
	• **Source address** - A number indicating the source address. The meaning of this number depends on the specified source address type.
	  ○ **Destination address type** - Specify one of the following destination element address types:
	  ▪ **Storage slot** - The destination address is a storage slot number (starting at1).
	  ▪ **Drive** - The destination address is a drive number (starting at 1).
	  ▪ **Mail slot** - The destination address is a mail slot number (starting at 1).
	  ▪ **SCSI element address** - The destination address is a SCSI element number
	  ○ **Destination address** - A number indicating the destination address. The meaning of this number depends on the specified destination address type.

Available for	This test supports many of the libraries and some of the autoloaders supported by L&TT. Check the test list presented by L&TT for the specific device to verify availability.

Read/write test

CAUTION: This test is destructive and will overwrite data on the media that is present in theproduct.

Element	Details/Other Test
Description	• This test performs a self-test on the drive device, then a write-read media test to verify the ability to read and write data to and from the removable media in storage device. • This test also checks error rates and fails if allowable limits are exceeded. • Test options allow the user to select the amount of data or length of test time, the amount of data transferred per command and the data pattern. • The write/read test includes the same parameters as the existing Device Performance test but it should not be used for performance measurements as it does not use the tape driver and runs more slowly. • Please use the device performance test for accurate performance measurements. **NOTE:** For instructions on how to perform this test, see: • **Running tests anddevice-specific utilities** under **Managing Firmware** section at the link below: Click here to view the Installing: Using L&TT on Windows page . • **Running the tests and utilities** section at the link below: Click here to view the Installing: Using L&TT on Non-Windows Systems page .
When to run	Run this test to verify the integrity of a particular piece of media, as written and readby a particular drive and to verify the ability of the drive to read and write data independent of the storage application.
Duration	Less than 10 minutes, using default test options.

Element	Details/Other Test

Options	• **Test Time Limit** - Specify the time limit in minutes. Enter 0 for no time limit.
	• **Data Limit Type** - Specify one of the following options to limit the amount of data written/read in each phase:
	  ◦ **Time** - Limits the amount of data tested based on the time specified in **DataTime Limit**.
	  ◦ **Size** - Limits the amount of data tested based on the size specified in **DataSize Limit**.
	  ◦ **Whole tape** - Limits the amount of data tested based on the size of the tape.
	• **Data Size Limit** - Specify the size limit in megabytes of data to be written/read ineach phase.
	• **Data Time Limit** - Specify the time limit, in minute s, for each phase of the test.
	• **Block Size** - Specify the block size, in kilobytes, to be used in the test. The defaultis 64KB.
	• **Transfer Size Limit** - Specify the maximum data transfer limit, in kilobytes, percommand. The default is 64KB.
	• **Block Transfer Type** - Specify whether to use a fixed or variable block length.
	• **Read and compare after the write operation** - Set this option to true to enable the read phase after the write phase completes. This option is optional and is set to**false** by default. The read phase also compares the buffers written during the write operation to ensure data integrity on the tape.
	• **Retry on read failure** - When **ON**, the test will prompt the user for a cleaning cartridge and a new test cartridge in the case of repeated read failures.
	• **Compression Ratio** - Specify the compression ratio for the test. The test will use a buffer pattern in a pre-specified format to achieve the specified compression ratio.
	• **Write filemarks after every specified amount of data** - Specify whether the test should write a filemark on the tape after every specified amount of data.

Other notes	The test will overwrite all data on the media. This test can be stopped before it completes. To abort the test from the GUI, click **Abort Test**. To abort the test fromthe CSI, use the `Ctrl-A` key combination.
Available for	LTO-1 to LTO-7 tape drives both standalone and library drives.

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Link to the list of available documents

Click here to view a list of documents available for the HPE Library and Tape Tools .

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