



1. INTRODUCTION

The TapeRx diagnostic utility provides basic diagnostic test capabilities, firmware upgrade and, for some tape drives, advanced analysis and configuration. Installation is accomplished simply by copying a single program file to the hard drive. The computer need not be rebooted in order to run it, and the software can be removed simply by deleting it. No changes are made to the Registry or other system files.

Supported operating systems

Windows 98/Me, Windows NT 4.0 and Windows 2000/XP/2003
Red Hat Linux 7, 8 and 9; Enterprise 2.1 (with kernel 2.4.9-e.35), 3.0
NetWare 4, 5 and 6
Solaris 7 and 8

2. INSTALLATION

Installation of the software is very simple: Copy the appropriate executable file for your operating system to the hard drive, then run the program. (You can also run it directly from the Resource CD in most cases.) For installation details and special information for each operating system, see Appendix A.

3. WINDOWS OPERATION

(See Appendix B, Command Line Operation, for Linux, NetWare and Solaris)

To run the Windows version of the diagnostic application, double-click on the desktop icon (if you placed the application on the Windows desktop) or open Explorer, go to the directory in which you placed the application and double-click on **TapeRx.exe**.

The software will search for all the supported tape drives that are directly attached to your computer. Once the search is complete, the diagnostic window will be displayed, showing one tab for each supported tape drive found. Included are the drive type and serial number, logical ID, drive model number and firmware revision level.

Click the tab that represents the tape drive you wish to work on, then select one of the available operations in the left-hand column. The options in the right-hand column will vary depending on your selection and the type of tape drive being accessed.

When a test or operation has been launched, the status, results and error messages will be displayed in the View window, including a date/time stamp and drive details. This information can be saved to disk as a text file by clicking the **Save** button, then opened and printed from Notepad or another word processor. If you save the View window again using the same file name, the new information will be appended to the previous file. Clicking the **Clear** button will erase the information displayed in the View window.

Trace buffer data (if available) and LTO-specific information (cartridge memory and EEPROM data) will be saved to a binary file on disk instead of being displayed in the View window.

To exit the application, click the **Exit** button or the "X" in the upper right corner of the window.

The available operations are as follows (not all operations are available on every drive type):

Tape Operation Tests

Read-Write Test: The program will write the specified amount of repeating-pattern data on a new or scratch tape (the default uncompressed test sizes are 200MB for LTO, 20MB for DAT, 5 MB for Travan), then rewind and read back the data pattern to compare it with the original. The vertical progress bars will show the approximate percentage completed, and an entry will be made in the View window for each action in the test. If the error count does not exceed the acceptable maximum, the drive will be reported as having successfully passed the test. Otherwise, one or more error messages will be displayed in the View window.

Compression Test: The program will perform a read-write test as above, using hardware data compression (if available) to confirm that your tape drive's data compression is functioning properly.

Options:

Retension Tape Before Test: This checkbox enables a retension pass (quickly run the tape from beginning to end) before a Read-Write or Compression test, if the tape drive supports retensioning. This is highly recommended for Travan drives.

Test Size: When using the Read-Write or Compression tests, you can optionally configure the size of the test data set. Enter an integer number in megabytes (there are 1024 megabytes in a gigabyte). If you do not set a size, the data set will automatically be the defaults listed above. The program will not accept any value less than 5 MB.

Electronic Test

This button will test the drive electronics (the same as the Power On Self-Test) and report a pass/fail status in the view window. In the case of the 8-cartridge LTO autoloader, it will cycle through the autoloader's self-test as well.

Retrieve Information

Check the box to select which type of information you want to be retrieved from the drive. Then click the Retrieve button to download the information.

Log Pages: This checkbox enables a text dump of the available log pages from the drive. The information will be displayed in the View window.

Trace Buffer: This checkbox enables a dump of a supported drive's internal trace buffer, showing a history of recent operations. This is a binary file and must be saved to disk. Use the Browse button to select a folder and enter the file name where you want this information to be stored.

Cartridge Memory: This checkbox enables a dump of cartridge memory from the media currently in an LTO drive. This is a binary file and must be saved to disk. Use the Browse button to select a folder and enter the file name where you want this information to be stored.

EEPROM Data: This checkbox enables a dump of an LTO drive's internal EEPROM settings. This is a binary file and must be saved to disk. Use the Browse button to select a folder and enter the file name where you want this information to be stored.

Upgrade Firmware

Firmware is the binary code stored in the tape drive's permanent memory that controls its basic operation. Firmware revisions may be released by the manufacturer to address specific issues discovered after manufacturing.

Click the Browse button to locate the firmware file on your hard drive. Click OK to select it.

IMPORTANT: If your tape drive was purchased as part of a computer system, be sure to check with the system manufacturer before upgrading firmware. You may have a special version of firmware, and replacing it with a standard version may cause incompatibilities.

IMPORTANT: Firmware update to the robotics or controller is not supported on LTO autoloaders.

View/Change Drive Settings (LTO only)

Choose the appropriate LTO drive settings that you want to view or change by clicking the drop-down list box next to each function. When you have completed your selections, click the Apply button to display settings (in the View window) and/or update the tape drive. Available functions are:

Compression Setting: Sets data compression to Enabled or Disabled via the Data Compression Control Page (0Fh).

Compression Control: Sets the default compression mode via the Drive Capabilities Control Mode Page (21h), with the possible values of On, Off and SCSI [default]. This must be set to **SCSI** in order for compression to be controlled via the Compression Setting function.

Tape Speed: Sets the maximum drive speed from highest (7) to lowest. Speed 0 represents automatic speed selection (via FastSense) [default].

Auto Load: Sets the cartridge autoload mode, with the possible values of Off, Hold and On [default]. With *off*, the cartridge cannot be loaded at all; with *hold*, the cartridge will seat but will not thread the tape; with *on*, the cartridge will both seat and thread the tape.

Perform Manual Operations

Click on the button that performs the operation you require. Available functions are:

Retension Tape: This launches a retension pass (quickly run the tape from beginning to end) on the media currently inserted into the tape drive, if the drive supports the retension command.

Park Load Arm (LTO only): This moves the recording head assembly and cartridge carrier into a secure parked position for shipping (IMPORTANT: The media cartridge must be completely removed from the drive before this command is issued, or damage may occur to the drive and cartridge.)

Unpark Load Arm (LTO only): This moves the recording head assembly and cartridge carrier back into the ready position. In normal operation, this command is unnecessary, because the drive will automatically unpark on power-up.

APPENDIX A – INSTALLATION

Windows:

1. Copy the executable *TapeRx.exe* to the Windows desktop or a directory of your choice (you can also run it directly from the CD in most cases).
2. When using TapeRx with an autoloader/changer on Windows XP/2000/2003, the Removable Storage Manager must first be stopped. Autoloaders/changers are not supported on Windows NT. Firmware upgrade is not supported on LTO autoloaders.
3. In rare cases under Windows NT/2000/XP/2003, if the diagnostic software is unable to detect your tape drive, services used by your backup application may need to be manually stopped from Computer Management. Exiting a backup application alone will not always cause the application to release the tape drive.

Linux:

1. Check that the kernel has the SCSI generic driver **sg** installed.
 - Use the command 'find / -name sg -print' to see if the **sg** driver exists in the system.
 - Use the command 'find / -name sg.o -print' to see if the **sg** driver has been compiled into the kernel or as a module.
 - Refer to the systems kernel documentation for more information on obtaining the files if they do not exist in the system.
 - Other helpful information is available at <http://www.torque.net/sg/>.
2. Copy the executable *TapeRx.lx* to a directory of your choice.

Notes:

- Because of Linux driver limitations, the LTO extended sense codes are not supported.
- Firmware upgrade is not supported under Red Hat Linux Enterprise 2.1 except with kernel 2.4.9-e.35.
- Some of the older Linux kernels have a known driver bug that causes SCSI error messages to be displayed to the screen during drive detection. These do not affect operation of the drive nor the diagnostic software and can be ignored. The firmware download option may show a failed status on the console and 'parity errors'. This is due to the **sg** driver not requesting Synchronous Data Transfer immediately after the download completes. The validity of the firmware download is not affected.

Netware:

From a client system, copy *TapeRx.nlm* into the SYS volume directory of the server.

Observe the following requirements and limitations on the NetWare version:

- All TapeRx file access operations require the use of volume names. For example, upgrading firmware on an LTO drive might appear as follows: `TapeRx upgrade -f:SYS:\filename.img -id:0`. Note the '\' after 'SYS:' Both the backslash and the volume name are mandatory.
- You may need to toggle output screens with Alt-Esc to view test results on later versions of NetWare.
- Firmware files must reside on a Netware volume partition due to long filenames. They cannot reside on a DOS partition.
- The following modules must be loaded: `NWASPI.CDM` and `CLIB.NLM`
- Always use full path names for firmware and log files. Never use the `X:\NWSERVER` directory for file access.
- The log files created by the diagnostic will be placed in the server's SYS directory.

- Tape reads and writes are limited to 32K by Nwaspi, so long read-write tests will not always stream on LTO drives.

Note: The diagnostic uses the Nwaspi driver, not the application tape driver, to access the tape drive. If using a commercial backup application, *nwtape.cdm* may need to be unloaded to ensure proper operation.

Solaris:

Copy the executable *TapeRx.sl* to a directory of your choice.

Note: Because of Solaris architecture, on some systems it can take up to 50 seconds to scan through the list of attached devices when executing a command.

If using TapeRx with the 8-cartridge LTO autoloader (Solaris 8 and later only), the **sgen** device driver must be installed to support tape library/changers. Installation is as follows:

1. Edit the sgen.conf file

- Make a backup copy of `/kernel/drv/sgen.conf`
- Using any editor, open `/kernel/drv/sgen.conf`
- Uncomment (delete #) the statement 'device-type-config-list'
- Uncomment the line "changer"
- Add a semicolon after the double-quote of "changer", i.e., "changer";
- Uncomment all lines with: 'name="sgen" class="scsi" target=x lun=x' (where x is 0 – 1016)

2. Run 'drvconfig -i sgen' to load the driver (the autoloader must be attached to the system)

3. Run 'devlinks' to create the appropriate device links. **/dev/scsi/changer** will be created if it doesn't exist and links will be added to it.

Note: On some systems, a reboot ---r or boot -r may be required for the loader to be seen.

APPENDIX B – COMMAND-LINE OPERATION

For Linux, NetWare and Solaris systems only.

IMPORTANT: When using the command line, it is the user's responsibility to make sure that any media used is a scratch tape and not valuable data that could be overwritten. There are no warning messages.

Type the name of the diagnostic executable with parameters and press [Enter]. The software will launch, locate all the supported tape drives, and execute the command you have entered. When it has completed the command, the software will exit and return you to the system prompt. A series of these commands can be assembled into a batch file and run sequentially.

Command Line Syntax

Syntax is as follows (one space between parameters):

<executable> <command> <switch><:value> <path_and_filename>
(Multiple switches can be used as necessary)

Note: On Linux/Unix systems, the syntax is case-sensitive, including the executable name.

Operating System	Example with parameters*
Linux	.TapeRx.lx rwtest -id:0 -ts:12 -o:/tmp/logfile1.txt
Solaris	TapeRx.sl rwtest -id:0 -ts:12 -o:/tmp/logfile1.txt
NetWare	TapeRx rwtest -id:0 -ts:12 -o:SYS:\logfile1.txt

- *Runs a read-write test on a drive with logical ID 0 with a test file size of 12 MB; results are displayed on the screen and also saved to the text file logfile1.txt.*

Basic Commands

A summary help screen of the basic commands and switches is available by typing the executable name followed by the command **help**. If a syntax error occurs, the help screen or a specific error message will automatically be displayed.

Note: Each time a command is executed, the application assigns logical IDs to all the supported tape drives it discovers directly attached to the system, beginning with 0. Before running a test or upgrading firmware, use the **show** command (for example, **TapeRx show**) to determine which logical ID is assigned to which drive. Then use that logical ID with each command during the session.

Commands	
show	Shows all of the supported drives detected by the application, including model number, logical ID, serial number and firmware version. This command must be used initially to determine the logical ID of each device detected by the application, unless only one tape drive is attached to the system.
rwtest	Tape read-write test sends a repeating data pattern to the tape drive, then reads it back and compares it on the host. This test will use the current block size setting on the drive and adjust the length and error calculations accordingly. If no test size value is entered (-ts parameter), the test will be 5MB for Travan, 20MB for DAT and 200MB for LTO (no compression).
ctest	Hardware compression test confirms that hardware data compression is operational on the drive. This test is operationally identical to the read-write test, except that compression is turned on. If no test size value is entered (-ts parameter), the test will be 5MB for Travan, 20MB for DAT and 200MB for LTO (compressed).
upgrade	Upgrades firmware on a supported tape drive. This command must be used with the -f switch to identify the binary file that contains the new firmware.
logpages	Dumps drive log pages in formatted ASCII text. This command should be used with the -o switch to direct output to a text file.
enablecomp	Sets data compression to Enabled via the Data Compression Control Page (0Fh).
disablecomp	Sets data compression to Disabled via the Data Compression Control Page (0Fh).
compstatus	Returns the current data compression setting (Page 0Fh).
retension	Retension the media on drives that support the retension command.
help	Displays the help screen.
trace	Dumps binary trace information. This command must be used with the -f switch to direct output to a binary file on disc.
etest	Internal electronics test. Result is pass or fail.

Basic Switches

Target drive identification (you must use one of the two switches below):

- id: = identifies the drive by logical ID. Use the **show** command (for example, **TapeRx show**) to determine which logical ID is assigned to which drive. Then use that logical ID with each command during the session.
- sn: = drive serial number.

Text (non-binary) output (you may use one of the two optional switches below):

- o: = text output file name, with full path recommended. (NOTE: Spaces are not supported.) Provides ASCII text output to a file as well as the screen. Using an existing filename will result in an append to that file.
- nov: = no screen output (if followed by a filename, output goes to that text file).

General:

- ts: = read-write or compression test size in megabytes (defaults are used unless this switch is present).
- f: = binary file name, with full path included. (NOTE: Spaces are not supported.) Used with the *upgrade* command on a tape drive to specify the firmware file to be loaded and the *trace*, *cmemory* and *eeprom* commands to specify the binary output file.
- fr = full retension of media before executing *rwtest* or *ctest* (on drives that support the retension command)
- i = ignore firmware version on upgrade, allowing downgrade or reinstalling the same version.
- nr = suppress the "Press enter to continue" prompt. Used with batch file operation.

LTO-Specific Commands

park = moves the recording head assembly and cartridge carrier into a secure parked position for shipping (IMPORTANT: The media cartridge must be completely removed from the drive before this command is issued, or damage may occur to the drive and cartridge.)

unpark = moves the recording head assembly and cartridge carrier back into the ready position. In normal operation, this command is unnecessary, because the drive will automatically unpark on power-up.

eeeprom = retrieves the 8K byte EEPROM buffer from the drive. This command must be used with the **-f** switch to direct output to a binary file on disc.

cmemory = retrieves the 4K byte Cartridge Memory data from the cartridge currently inserted in the drive. This command must be used with the **-f** switch to direct output to a binary file on disc.

Advanced LTO Settings

set <switch> = sets one or more of the following LTO virtual switches:

-speed:<value> = Sets the maximum drive speed from highest (7) to lowest. Speed 0 represents automatic speed selection (via FastSense) [default].

-compdefault:<value> = sets the default compression mode via the Drive Capabilities Control Mode Page (21h), with the possible values of **on**, **off** and **scsi** [default]. This must be set to **scsi** in order for compression to be controlled via the *enablecomp/disablecomp* commands.

-load:<value> = sets the cartridge autoloader mode, with the possible values of **off**, **hold** and **on** [default]. With *off*, the cartridge cannot be loaded at all; with *hold*, the cartridge will seat but will not thread the tape; with *on*, the cartridge will both seat and load the tape.

get <switch> = gets the current setting of one or more of the following LTO virtual switches:

-speed

-compdefault

-load

Sample commands

*(Assumes the executable is called **TapeRx** and the drive is at Logical ID 1)*

Display detail and logical IDs of all supported tape drives attached to the system:

TapeRx show

Dump drive log pages to screen:

TapeRx logpages -id:1

Dump drive log pages to screen and a text file:

TapeRx logpages -id:1 -o:c:\temp\text1.txt

Dump drive log pages to a text file only:

TapeRx logpages -id:1 -nov:c:\temp\text1.txt

Upgrade drive firmware to version 13602107:

TapeRx upgrade -id:1 -f:c:\temp\v13602701-000.img

Do a read-write test of 20MB, with results to the screen and a text file:

TapeRx rwtest -id:1 -ts:20 -o:c:\temp\text.txt

Retension the tape (if supported by the drive):

TapeRx retension -id:1

Determine hardware compression setting (if supported by the drive):

TapeRx compstatus -id:1