IBM TS3310 Tape Library with LTO Ultrium 8 drives deliver increased capacity and performance for MES or upgrade only

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At a glance

The TS3310 Tape Library combines IBM(R) tape automation, reliability, and scalability at open systems prices. Features include:

- A space-efficient design with modular, stackable growth expansion to 41U
- Improved Ultrium(TM) 8 tape drive for MES or upgrade only, delivering up to 360 MBps native data transfer rate as compared to Linear Tape-Open(TM) Ultrium 7 at 300 MBps native
- Support for LTO Generation 8 media specification tape cartridge compressed capacity of up to 30 TB with 2.5 to 1 compression
- 8 Gbps native switched fabric Fibre Channel attachment Ultrium 8 tape drives (feature number 8542)
- Support for two encryption management methods: Application managed and library managed; Library-managed encryption management is available through the LTO Library Managed Encryption feature
- Support for media partitioning and self-describing tape
- Support for mixed generations of Ultrium tape drives and media
- Adherence to LTO Generation 8 media specification
- Support for Ethernet connections between the library and each LTO Ultrium 5 or newer tape drive for reducing the time required to obtain logs and update drive firmware
- Optional path failover for control and data paths
- Rack-mount option
- Capacity on Demand expansion units
- Dual power (additional power supply)
- Support for IBM TS3310 command-line interface (CLI) program

Overview

The IBM TS3310 Tape Library consists of IBM TS3310 Tape Library Model L5B and IBM TS3310 Tape Library Model E9U.

The TS3310 Tape Library now incorporates the new IBM LTO Ultrium 8 full-high, 8 Gbps, dual-port Fibre Channel tape drives (feature number 8542), for MES or upgrades only, to enhance drive performance over the previous generation IBM LTO Ultrium 7 tape drives with a native data transfer rate of up to 360 MBps. Mixed
Ultrium generations and attachment tape drive types are supported where drive space is available.

IBM Ultrium 8 Fibre Channel tape drives are encryption capable. The TS3310 Tape Library incorporates IBM multipath architecture with logical libraries equal to the number of drives installed.

The TS3310 Tape Library supports the LTO Generation 8 media specification of double the compressed capacity of up to 30 TB with 2.5 to 1 compression (up to 12 TB native capacity) compared to previous LTO 7 compressed capacity of up to 15 TB with 2.5 to 1 compression (up to 6 TB native capacity) per tape cartridge. IBM Ultrium 8 tape drives can read and write LTO Ultrium 8 and 7 data cartridges.

Note: Actual degree of compression achieved is highly sensitive to the characteristics of the data being compressed.

IBM Ultrium 8 features that help improve capacity and performance include:

- LTO Generation 8 media specification native data transfer rate of up to 360 MBps
- Support for LTO Generation 8 media specification tape cartridge compressed capacity of up to 30 TB with 2.5 to 1 compression per cartridge
- A 1 GB internal buffer
- Support for media partitioning and self-describing tape
- LTO Ultrium 8 encryption support

A dual-stage 32-channel head actuator is designed to provide precision head alignment to help support higher track density and improved data integrity. Track following skew actuator supports flangeless tape guide rollers and dynamic skew to enable the head to follow skew tape motion and improve linear actuation.

The Ultrium 8 Tape Drive uses Statistical Analysis and Reporting System (SARS) to help isolate failures between media and hardware. SARS uses the cartridge performance history saved in the cartridge memory module and the drive performance history kept in the drive flash to help.

The IBM TS3310 Tape Library is extremely modular with physical scalability varying from the 5U Model L5B base library to four additional Model E9U expansion units. This automated tape library is designed to deliver:

- Space-efficient design with a modular, stackable Model E9U Expansion Frame option providing growth, scalability, and flexibility
- IBM LTO Ultrium 8 Fibre Channel dual-port tape drive support and integration
- Support for LTO Ultrium 8 data and WORM tape cartridges
- Support for two encryption management methods:
  - Application managed and library managed
  - Library managed encryption is available through the LTO Library Managed Encryption feature
- Support for media partitioning and self-describing tape
- Support for mixed generations of Ultrium tape drives and media
- Path failover, optional for both control paths and data paths
- Capacity on Demand growth options for its expansion modules
- Stand-alone library (up to 14U) or optional rack mounting in an industry-standard 19-inch rack

IBM TS3310 Tape Library Model L5B is a 5U base library unit which contains the library control module, fixed tape cartridge storage of 35 slots, a configurable I/O station with six slots, a touchscreen display, cartridge handling robotics, and up to two LTO Ultrium 8, Ultrium 7, Ultrium 6, or Ultrium 5 tape drives.
IBM TS3310 Tape Library Model E9U is an optional 9U expansion module. Each E9U expansion module can accommodate up to four LTO Ultrium 8, Ultrium 7, Ultrium 6, or Ultrium 5 tape Drives, additional storage slots, and a configurable I/O station of twelve slots. Up to four TS3310 Model E9U tape expansion modules can be added to the TS3310 Model LSB Tape Library, either at the time of purchase or as a follow-on upgrade to fill a full 41U rack. For configurations of 23U and above, the TS3310 Tape Library and expansion modules must be installed in a rack. Rack doors are required for any library that has more than 14 drives installed.

Management software options

**IBM Spectrum Archive™:** TS3310 leverages IBM Spectrum Archive for direct, intuitive, and graphical access to data stored in IBM tape drives and libraries by incorporating the IBM LTFS format standard. LTFS compatibility allows tape-stored data to be accessed as if it were on disk or flash storage.

IBM Spectrum Archive allows users of LTO Ultrium 8 tape library systems to inventory cartridges and read, write, and search data on any cartridge, enabling writing of metadata and tagging of individual files for easy and fast access to files stored on cartridges.

**IBM Spectrum Protect™:** Spectrum Protect enables users to create, manage, and optimize archives, and provides management of concurrent copies of content, plus active, inactive, and off-site content.

Key prerequisites

Appropriate levels of host software are required to attach the TS3310 Tape Library with IBM LTO Ultrium tape drives to select IBM System Servers, UNIX®, Linux®, and Microsoft® Windows® servers.

A current list of supported open system configurations is available at the IBM System Storage® Interoperation Center (SSIC).

Planned availability date

December 8, 2017

Description

IBM TS3310 is a highly modular tape library with physical scalability varying from the base library 5U control module to additional expansion units of 9U height each. This automated tape library is designed to deliver:

- A space-efficient design with modular, stackable growth options, as well as Capacity on Demand growth options
- 8 Gbps switched fabric Fibre Channel IBM Ultrium 8 tape drives
- Support for two encryption management methods: Application managed and library managed (library-managed encryption management is available through the LTO Library Managed Encryption feature)
- IBM-patented multipath architecture with logical library support for single or multiserver attachment of homogeneous or heterogeneous systems or applications
- Optional path failover for both control paths and data paths
- Capacity on Demand growth options in its expansion modules
- Local user interface support with a color touchscreen
• Stand-alone free-standing library or optional rack mounting in an industry-standard 19-inch rack

The TS3310 Tape Library is an excellent choice, if you are:

• Experiencing growth in online storage requirements
• Considering a tape automation solution for your data storage needs
• Considering an Ultrium tape solution
• Requiring an encryption secured tape solution

IBM TS3310 Tape Library is designed to offer high performance and capacity to help address the heavy demands of tape storage. This automated tape library incorporates high-performance IBM LTO Ultrium 8 tape drives for midrange to enterprise open systems environments. The LTO Generation 8 media specification tape cartridge physical capacity is up to 30 TB compressed physical capacity, double the Ultrium 7 Data Cartridge, and drive performance is up to 360 MBps native data transfer rate with the IBM LTO Ultrium 8 tape drives. IBM LTO Ultrium 8 tape drives can read and write original LTO Ultrium 8 and Ultrium 7 data cartridges. The LTO Ultrium 8 tape drives in the TS3310 Tape Library also support LTO Ultrium 8 and 7 WORM cartridges.

Data cartridges are sold separately and subject to availability.

Note: Actual degree of compression achieved is highly sensitive to the characteristics of the data being compressed.

IBM TS3310 Tape Library Model L5B

IBM TS3310 Tape Library Model L5B is the 5U base library unit which contains the library control module, fixed tape cartridge storage of up to 35 slots, a configurable I/O station of up to 6 slots, a touchscreen display, cartridge handling robotics, and up to two LTO Ultrium Tape Library models support LTO Ultrium 8 tape drives with 8 Gbps dual-port Fibre Channel for connection to a wide spectrum of open system servers.

In addition to LTO Ultrium 8 drive features, the TS3310 delivers:

• Ultrium 8 media and Ultrium 8 WORM media support
• IBM Multi-Path Architecture for single or multiserver attachment of homogeneous or heterogeneous systems or applications
• Optional path failover function for both control paths and data paths
• Standard bar code reader and remote management unit
• Capacity on Demand expansion units
• Support for a local user interface with a color touchscreen
• Free-standing library or optional rack mounting in an industry-standard 19-inch rack
• Support for two encryption management methods: Application managed and library managed (library-managed encryption is available through the LTO Library Managed Encryption feature)
• Support for Ethernet connections between the library and each LTO Ultrium 5 or newer tape drive for reducing the time required to obtain logs and update drive firmware

The TS3310 Tape Library is suitable for use in network-attached storage implementations, such as backups and mass storage archives where multiterabyte capacities are required. Storage and tape management for the TS3310 is provided by software such as IBM Spectrum Protect and other compatible offerings.

The TS3310 is designed for stand-alone operation, but an optional rack-mounting kit allows installation into an ANSI/EIA standard 19-inch rack. If you require extra redundancy in your storage operations, an additional DC power supply option is
available. A remote manager unit is designed to enable network control of the TS3310 Tape Library operations.

The IBM LTO Ultrium 8 tape drive supports the LTO Generation 8 media specification 12 TB data cartridge, designed for increased tape speeds and high-density data recording.

**Ultrium 8 tape drives**

The TS3310 Tape Library supports the IBM LTO Ultrium 8 Tape Drive. The IBM LTO 8 Tape Drive is the eighth-generation LTO Ultrium tape drive in the IBM LTO Ultrium family of products. Ultrium 8 tape drives and LTO 8 cartridges can be resident in the same TS3310 Tape Library with Ultrium 7, Ultrium 6, and Ultrium 5 tape drives and with Ultrium 7, Ultrium 6, and Ultrium 5 data cartridges. The Ultrium 8 Tape Drive provides several significant improvements over the Ultrium 7 Tape Drive.

**Increased performance:** Maximum tape drive throughput native data rate performance is up to 360 MBps. Data tracks are written 32 at a time. IBM LTO 8 tape drives can read and write LTO Ultrium 7 data cartridges at Ultrium 7 capacities and rates.

**Note:** Although the Ultrium 8 Tape Drive provides the capability for excellent tape performance, other components of the system may limit the actual performance achieved. Also, although the compression technology used in the tape drive can typically double the amount of data that can be stored on the media, the actual degree of compression achieved is highly sensitive to the characteristics of the data being compressed.

**Increased tape cartridge capacity:** The TS3310 Tape Library supports the LTO Generation 8 media specification tape cartridge physical capacity of up to 30 TB compressed physical capacity, double that of the Ultrium 7 Data Cartridge. This is achieved by increasing the linear density, and track density. The IBM Ultrium 8 tape itself is an advanced Barium Ferrite tape developed to help provide durability and capacity.

Data cartridges are sold separately and subject to availability.

**Note:** Actual degree of compression achieved is highly sensitive to the characteristics of the data being compressed.

**Encryption:** The IBM TS3310 Tape Library will support data encryption on the base Ultrium 8, Ultrium 7, Ultrium 6, or Ultrium 5 drive with Ultrium 8, Ultrium 7, Ultrium 6, or Ultrium 5 media, meeting LTO Generation 8 media specification and application-managed encryption. Library-managed encryption is supported with the LTO Library Managed Encryption feature (feature number 5900). IBM Security Key Lifecycle Manager V1 is required with this feature.

**Attachment options:** The Ultrium 8 Tape Drive comes with 8 Gbps Fibre Channel attachments for connection to a wide spectrum of open system servers. The dual-ported IBM LTO Ultrium 8 Fibre Channel Tape Drive comes with two LC Duplex connectors.

**WORM media support:** IBM 3589 LTO 8 WORM tape cartridges are designed for archiving and data retention applications, as well as those applications requiring an audit trail, supporting LTO Generation 8 media specification compressed capacity of up to 30 TB. These cartridges work with the IBM LTO Ultrium 8 Tape Drive to help prevent the alteration or deletion of user data. IBM LTO 8 WORM tape cartridges can be ordered as unique 3589 models with the following features:

- Color coding and prelabeling with the ability to specify a starting volume serial number
- Packaging in individual jewel cases or in bulk
- Cartridge memory built into every cartridge to enhance functionality and media reliability by storing access history and media performance information for use by the tape drive every time the cartridge is accessed
- Half-inch Barium Ferrite tape with a 30 TB WORM compressed capacity in a single cartridge
Larger internal data buffer: There is a 1 GB internal data buffer in the Ultrium 8 Tape Drive.

Digital speed matching: The Ultrium 8 Tape Drive is designed to perform dynamic speed matching ranging from 112 MBps to up to 360 MBps to adjust the drive’s native data rate as closely as possible to the net host data rate (after data compressibility has been factored out). This helps reduce the number of backhitch repositions and improve throughput performance. This delivers an improvement versus the 100 MBps to 300 MBps on Ultrium 7.

Tunnel magnetoresistive (TMR) head design: LTO 8 has TMR head technology used for first time in LTO drives. Use of flat lap head technology in TMR heads from the Enterprise Tape Drives for Ultrium 8 helps minimize contact, edge damage, debris accumulation, and wear on the tape as it moves over the read/write heads.

Dual-stage 32-channel head actuator: The actuator is designed to provide precision head alignment to help support higher track density and improved data integrity. Track following skew actuator supports flangeless tape guide rollers and dynamic skew to enable the head to follow skew tape motion and improve linear actuation.

Power management: The Ultrium 8 Tape Drive power management function is designed to control the drive electronics to be either completely turned off or in low-power mode when the circuit functions are not needed for drive operation.

Proven IBM LTO Ultrium features in the IBM LTO Ultrium 8 Tape Drive include:

- Independent tape loader, threader motors, and positive pin retention: These are designed to help improve the reliability of loading and unloading a cartridge, and to retain the pin even if tension is dropped. An independent loader motor, coupled with the positive pin retention, is designed to cause the tape to thread with a higher level of reliability.

- Graceful dynamic braking: In the event of a power failure, reel motors are designed to maintain tension and gradually decelerate instead of stopping abruptly, helping reduce tape breakage, stretching, or loose tape wraps during a sudden power outage.

- Servo and track layout technology: There are 6,656 data tracks in Ultrium 8 versus 3,584 data tracks in Ultrium 7. The high-bandwidth servo system features a low-mass servo to help more effectively track servo bands and improve data throughput with damaged media in less-than-optimal shock and vibration environments.

- Surface Control Guiding Mechanism: The Surface Control Guiding Mechanism patented by IBM is designed to guide the tape along the tape path in the Ultrium 8, 7, 6, and 5 tape drives. This method uses the surface of the tape, rather than the edges, to control tape motion. This helps reduce tape damage (especially to the edges of the tape) and tape debris, which comes from the damaged edges and can accumulate in the head area.

- Robust drive components optimized for automation environments: Using some of the most robust components available, steel ball bearings in loader, robust leader block design, and single circuit card, these Ultrium features help to enhance reliability and prolong the life of drives.

- Adaptive read equalization: This feature is designed to automatically compensate for dynamic changes in readback signal response.

- Dynamic amplitude asymmetry compensation: This is designed to optimize readback signals for linear readback response from MR read head transducers.

- Separate writing of multiple filemarks: This is designed to cause any write command of two or more filemarks to cause a separate data set to be written containing all filemarks after the first. This feature helps improve performance if a subsequent append overwrites somewhere after the first filemark.

LTO Data Compression (LTO-DC): The Ultrium 8 uses LTO-DC which is an implementation of a Lempel-Ziv class 1 (LZ-1) data compression algorithm. LTO-DC is an extension of Adaptive Lossless Data Compression (ALDC) and an improvement over previous IBM lossless compression algorithms. IBM patented "Scheme-Swapping" compression is designed to look ahead at incoming data and determine...
the most efficient storage method (either ALDC or pass-thru mode) to help provide optimal data compression and increase data throughput. The compression ratio for LTO Ultrium 8 is 2.5 to 1.

**LTO Cartridge Memory (LTO-CM):** Contained within the LTO Ultrium data cartridge is the LTO-CM, which is a passive, contactless silicon storage device that is physically a part of the cartridge. The LTO-CM is designed to hold information about that specific cartridge, the media in the cartridge, and the data on the media. The storage capacity of the Generation 8 LTO-CM is 16,320 bytes. Communication between the drive and the LTO-CM is via a low-level radio frequency field transmitted by the drive to the cartridge.

**SARS:** The Ultrium 8 Tape Drive uses SARS to help isolate failures between media and hardware. SARS uses the cartridge performance history saved in the cartridge memory module and the drive performance history kept in the drive flash to help determine the most likely cause of failure. SARS is designed to cause the drive to request a cleaner tape, to mark the media as degraded, and to indicate that the hardware has degraded.

**Highly integrated electronics using IBM-engineered copper technology:** This technology is designed to reduce the total number of components in the drive, help lower chip temperatures, and reduce power requirements, helping to provide for a more reliable drive. The eight-generation drive electronics are designed to provide error correction of soft errors in the memory arrays in data and control paths.

**Multipath support:** The multipath architecture of the TS3310 Tape Library supports sharing of the library robotics. This is accomplished by partitioning the library into multiple logical libraries, and providing each logical library its own separate and distinct drives, storage slots, and control paths. You can partition the library into as many logical libraries as there are drives in the library. Each logical library must contain at least one drive.

**Note:** This type of partitioning is designed to allow heterogeneous applications to share the library robotics independent of each other. Cartridges under library control are not shared between logical libraries, nor allowed to be moved between logical libraries. An example of heterogeneous sharing is a Microsoft Windows application using the drive and storage slots of one logical library while a UNIX application uses the drive and slots of another logical library.

**Path failover:** The TS3310 Tape Library may use the optional path failover feature to help enhance availability. This optional feature is designed to provide automatic control path failover to a preconfigured redundant control path in the event of a loss of a host adapter or control path drive, without aborting the current job in progress. Support is provided under select operating systems when the IBM tape device driver is used.

Data path failover and load balancing support native Fibre Channel Ultrium 5, 6, 7, and 8 tape drives in the TS3310 Tape Library using the IBM tape device driver for IBM System p, Linux, and Windows. Data path failover is designed to provide a failover mechanism in the IBM device driver to enable configuration of multiple redundant paths in a SAN environment. In the event of a path or component failure, the failover mechanism is designed to automatically provide error recovery to retry the current operation using an alternate, preconfigured path without aborting the current job in progress. This helps enable flexibility in SAN configuration, availability, and management.

When accessing a tape drive device that has been configured with alternate pathing across multiple host ports, the IBM device driver is designed to automatically select a path through the host bus adapter (HBA) that has the fewest open tape devices, and assign that path to the application. This autonomic, self-optimizing capability is called load balancing. Dynamic load balancing support is designed to optimize resources for devices that have physical connections to multiple HBAs in the same machine. The device driver is designed to dynamically track the usage on each HBA as applications open and close devices, balancing the number of applications using each HBA in the machine. This may help optimize HBA resources and improve overall performance. Data path failover is designed to provide autonomic, self-healing capabilities similar to control path failover, and is designed to failover to an
alternate data path in the event of a failure in the primary host-side path. Data path failover and load balancing for Ultrium tape drives requires the optional path failover feature.

**Capacity on Demand:** The Capacity Expansion feature (#1640), ordered against the TS3310 Model L5B base library, enables a user to activate the unused storage slots within an expansion library through a firmware license key.

**I/O station features:** The I/O station can be defined as I/O slots or data storage, and the definition affects the number of cartridges available for data storage. See the table below for the various combinations and resulting data capacities.

<table>
<thead>
<tr>
<th>Library configuration</th>
<th>Available storage slots</th>
<th>Available I/O slots</th>
<th>Total available slots</th>
</tr>
</thead>
<tbody>
<tr>
<td>L5B</td>
<td>35</td>
<td>6</td>
<td>41</td>
</tr>
<tr>
<td>L5B + E9U without Capacity on Demand (COD) Feature</td>
<td>76,70* or 64*</td>
<td>6,12* or 18*</td>
<td>82</td>
</tr>
<tr>
<td>L5B + E9U w/1 COD Features</td>
<td>127,121*, or 115*</td>
<td>6,12* or 18*</td>
<td>133</td>
</tr>
<tr>
<td>L5B + E9U + E9U w/1 COD Features</td>
<td>168*,162*,156*,150*, or 144*</td>
<td>6,12*,18*,24*, or 30*</td>
<td>174</td>
</tr>
<tr>
<td>L5B + E9U + E9U w/2 COD Features</td>
<td>219,213*,207*,201*, or 195*</td>
<td>6,12*,18*,24*, or 30*</td>
<td>225</td>
</tr>
<tr>
<td>L5B + E9U + E9U + E9U w/2 COD Features</td>
<td>258*,252*,246*,240*,234*,228*, or 222*</td>
<td>6,12*,18*,24*,30*,35*,36*, or 42*</td>
<td>264</td>
</tr>
<tr>
<td>L5B + E9U + E9U + E9U w/3 COD Features</td>
<td>311,305*,299*,293*, or 275*</td>
<td>289*,281*,269*,261*,24*,30*,35*,317*, or 42*</td>
<td>356</td>
</tr>
</tbody>
</table>

**Note:** * The E9U I/O station contains 12 slots, which can be configured as either I/O or storage slots. If the E9U I/O slots are configured as I/O, the L5B I/O slots can only be configured as storage slots.

**Ethernet expansion blade:** An additional enhancement for the TS3310 Tape Library reduces the time required to obtain logs and update drive firmware for LTO Ultrium 5 and newer tape drives. The web user interface enables transfer of drive logs and drive firmware at very high speeds over an internal Ethernet interface. For tape drives in the base module TS3310 Model L5B, library-to-drive Ethernet cables are required. For tape drives in each expansion module TS3310 Model E9U, an Ethernet Expansion Blade is required.

**IBM TS3310 CLI:** The IBM TS3310 CLI program can be used to access the TS3310 library from a CLI. This is in addition to the TS3310 web user interface. To get the CLI, go to Fix Central, search for TS3310 CLI or click on the following link including the search results

**Management software options**

**IBM Spectrum Archive:** TS3310 leverages IBM Spectrum Archive for direct, intuitive, and graphical access to data stored in IBM tape drives and libraries by incorporating the IBM LTFS format standard. LTFS compatibility allows tape-stored data to be accessed as if it were on disk or flash storage.

IBM Spectrum Archive allows users of LTO Ultrium 8 tape library systems to inventory cartridges and read, write, and search data on any cartridge, enabling writing of metadata and tagging of individual files for easy and fast access to files stored on cartridges.
**IBM Spectrum Protect**: Spectrum Protect enables users to create, manage, and optimize archives, and provides management of concurrent copies of content, plus active, inactive, and off-site content.

**Accessibility by people with disabilities**

A US Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be found on the [IBM Accessibility](https://www.ibm.com/accessibility) website.

**Reference information**

For the IBM statement on compliance with European Union Directive on Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment (2002/95/EC) (RoHS), see the [IBM and the Environment](https://www.ibm.com/environment) website.

**Product number**

<table>
<thead>
<tr>
<th>Description</th>
<th>Machine type</th>
<th>Model</th>
<th>Feature number</th>
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<tr>
<td>Ultrium 8 Fibre Channel Tape Drive</td>
<td>3576</td>
<td>LSB, E9U</td>
<td>8542</td>
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</table>

**Business Partner information**

If you are a Direct Reseller - System Reseller acquiring products from IBM, you may link directly to Business Partner information for this announcement. A PartnerWorld® ID and password are required (use IBMid).

[BP Attachment for Announcement Letter 117-081](#)

**Education support**

IBM Global Services, IT Education Services, supports many IBM offerings.

See the [IBM Training and Skills](https://www.ibm.com/training) website.

For descriptions of courses for IT professionals and managers, go to the [IBM Training and Skills](https://www.ibm.com/training) website.

Questions? Contact 800-IBM-TEACH (426-8322).

**Publications**

The following publications are shipped with the products.

<table>
<thead>
<tr>
<th>Title</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>IBM TS3310 Tape Library Setup and Operator Guide</em></td>
<td>GA32-0477</td>
</tr>
<tr>
<td><em>IBM TS3310 Tape Library Maintenance Information for IBM Service Personnel</em></td>
<td>GA32-0478</td>
</tr>
<tr>
<td><em>IBM TS3310 Tape Library Hardware Installation Quick Reference</em></td>
<td>GA32-0592</td>
</tr>
<tr>
<td><em>IBM Tape Device Drivers Installation and User’s Guide</em></td>
<td>GC27-2130</td>
</tr>
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IBM Knowledge Center provides you with a single point of reference where you can access product documentation for IBM systems hardware, operating systems, and server software. Through a consistent framework, you can efficiently find...
information and personalize your access by going to IBM Knowledge Center for all your product information needs.

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To access the IBM Publications Center Portal, go to the IBM Publications Center website.

The Publications Center is a worldwide central repository for IBM product publications and marketing material with a catalog of 70,000 items. Extensive search facilities are provided. A large number of publications are available online in various file formats, which can currently be downloaded.

**Services**

**IBM Systems Lab Services**

IBM Systems Lab Services offers a wide array of services available for your enterprise. It brings expertise on the latest technologies from the IBM development community and can help with your most difficult technical challenges.

IBM Systems Lab Services exists to help you successfully implement emerging technologies so as to accelerate your return on investment and improve your satisfaction with your IBM systems and solutions. Services examples include initial implementation, integration, migration, and skills transfer on IBM systems solution capabilities and recommended practices. IBM Systems Lab Services is one of the service organizations of IBM’s world-renowned IBM Systems Group development labs.

For details on available services, contact your IBM representative or go to the Lab Services website.

**Global Technology Services**

IBM services include business consulting, outsourcing, hosting services, applications, and other technology management.

These services help you learn about, plan, install, manage, or optimize your IT infrastructure to be an on-demand business. They can help you integrate your high-speed networks, storage systems, application servers, wireless protocols, and an array of platforms, middleware, and communications software for IBM and many non-IBM offerings. IBM is your one-stop shop for IT support needs.

For details on available services, contact your IBM representative or go to the IBM Global Technology Services® website.

For details on available IBM Business Continuity and Recovery Services, contact your IBM representative or go to the Resiliency Services website.

Details on education offerings related to specific products can be found on the IBM authorized training website.

**Technical information**

**Specified operating environment**

**Physical specifications**
**3576-L5B:**
- Width: 443.2 mm (17.45 in.)
- Depth: 801.4 mm (31.55 in.)
- Height: 219.7 mm (8.65 in.)
- Weight: 38.6 kg (85 lb) maximum configuration (two drives, two power supplies)

**3576-L5B with E9U:**
- Width: 443.2 mm (17.45 in.)
- Depth: 801.4 mm (31.55 in.)
- Height: 620.8 mm (24.44 in.)
- Weight: 88.5 kg (195 lb) maximum configuration (six drives, four power supplies)

To assure installability and serviceability in non-IBM industry-standard racks, review the installation planning information for any product-specific installation requirements.

**Operating environment**

**Models L5B and E9U**
- Temperature: 10°C to 38°C (50°F to 100°F)
- Relative humidity: 20% - 80%
- Wet bulb (caloric value): 26°C, 79°F
- Electrical power: 0.2 kVA
- Capacity of exhaust: 54 cfm for 5U, 148 cfm for 9U
- Caloric Value: 0.68 kBTU/hr
- Sound Power Level (LwAd): 6.2 Bels idle, 6.7 Bels operating
- Leakage current: 0.75 mA at 212 V AC per power supply

**Hardware requirements**
The TS3310 Tape Library can be attached to a selected wide spectrum of IBM System Servers and open system servers that support those interface the specifications. A current list of supported open system configurations is available at IBM SSIC website.

TS3310 Model L5B initially comes with the capability to access up to 35 cartridge slots. Each Model E9U has approximately half of its storage slots enabled by default. The capability to access the remaining cartridge slots of an attached Model E9U requires the addition of the Capacity Expansion feature (#1640).

Each model comes with one power supply, and an additional power supply can be added by ordering the Additional Power Supply feature (#1900).

In the Model L5B plus Model E9U configuration, if a second power supply is added to one model, it is recommended that it be added to both models. If ordered as an MES, feature #1900 will come with a power cord based on the original order. If the Additional Power Supply feature #1900 is ordered, then two power cords will be supplied based on the power cord feature ordered.

**Path failover**

This optional feature is designed to provide automatic control path failover and data path failover for tape drives in the TS3310 Tape Library. The data path failover is designed to provide a failover mechanism for configuring multiple redundant paths in select SAN environments. This capability is ordered with the Path Failover feature (#1682).
**Ethernet expansion blade**

An additional enhancement for the TS3310 Tape Library reduces the time required to obtain logs and update drive firmware for LTO Ultrium 5 and newer tape drives. The web user interface enables transfer of drive logs and drive firmware at very high speeds over an internal Ethernet interface. For tape drives in the base module TS3310 Model L5B, library-to-drive Ethernet cables are required. For tape drives in the expansion module TS3310 Model E9U, an Ethernet Expansion Blade is required.

**Ultrium 8 tape drives**

At least one IBM LTO Ultrium 8 Tape Drive can be ordered with each TS3310 Tape Library. The TS3310 L5B can have one or two tape drives, and the TS3310 E9U can have up to four additional tape drives. A Fibre Channel Ultrium 8 tape drive can be ordered with feature #8542 (LTO Ultrium 8 Fibre Tape Drive - 8 Gbps) to install one IBM LTO Ultrium 8 Tape Drive with a dual-port 8 Gbps Fibre Channel attachment interface.

Using the 1-Cleaning Cartridge feature (#8002), additional cleaning cartridges for the tape drives can be ordered with a new TS3310 Tape Library.

**Cables**

A Fibre Channel cable is required to attach the TS3310 Tape Library to the server HBA with the Ultrium 8 Tape Drive. Customers are responsible for selecting and ordering the correct cables and interposers to match the IBM LTO Ultrium 8 Fibre Channel interface and the server or network controller Fibre Channel interface.

*Fibre Channel cables:* A Fibre Channel cable is required to attach a TS3310 Tape Library with the LTO Ultrium 8 Fibre Tape Drive (8 Gb) feature (#8542) to host Fibre Channel adapters, Fibre Channel switches, or other Fibre Channel components. At least one Fibre Channel cable is recommended to be specified on the initial plant order for feature #8542. The IBM LTO Ultrium 8 Fibre Tape Drive comes with an LC Duplex connector. Features available for Fibre Channel cables, and their respective lengths, are as follows:

- 13-meter LC-LC Fibre Channel Cable (feature #6013)
- 25-meter LC-LC Fibre Channel Cable (feature #6025)
- 10-meter OM3 Fiber Cable (LC) (feature #AGK1)
- 25-meter OM3 Fiber Cable (LC) (feature #AGK2)

See the *Specify or Special Features* section of the Sales Manual for a detailed description of the above features.

**Software requirements**

For a current list of host software versions and release levels that support the TS3310, go to the IBM SSIC website.

IBM Spectrum Protect and other compatible software offerings provide storage and tape management software for the 3576 or TS3310 family of products. Supporting software and applications must be obtained separately from IBM, IBM Business Partners, or independent software vendors (ISVs). A list of compatible software is available from your IBM representative or go to the Tape Storage website.

Select *Compatibility Information*, then *Independent Software Vendor Matrix (ISV) for LTO and 3592 Tape Drive* to view supported operating systems.

IBM continues to work together with the ISVs to support the TS3310 Tape Library. Individual application vendors should be contacted for specific information and availability dates.

**Note:** All new IBM tape device drivers will be posted to the web through the Fix Central download portal. IBM maintains the latest levels of Storage tape drive and
library device drivers and documentation on the Internet. Utilize the Fix Central download portal.

There are a few pull down menus to navigate to the correct download as follows:
1. In the first pull down menu labeled **Product Group**, select **System Storage**.
2. In the next pull down menu that appears which is labeled **Product Family**, select **Tape Systems**.
3. With the next pull down menu, **Product Type**, select **Tape drivers and software**.
4. This will bring up the **Product** menu, which provides selections for **Platform drivers, Tools, or Software**.
5. In order to download your driver, select the correct operating system under **Platform drivers**.
6. Two more pull down menus will appear with information. Click **Continue**.
7. The next screen can be used to narrow the search, however just click **Continue** to view what is available.

The **IBM Tape Device Drivers Installation and User's Guide** can be found at the IBM support website.

**Compatibility**

IBM Ultrium 8 tape drives can read and write LTO Ultrium 8 or 7 data cartridges. The LTO Generation 8 media specification 12 TB native data cartridges can only be used on the new IBM LTO Ultrium 8 tape drives.

**Limitations**

With a data rate of 8 Gbps, Fibre Channel cable lengths are limited to 150 meters (492 feet) using an OM3 cable.

The TS3310 operating environment must not conflict with media operating and storage requirements. If media is stored in the TS3310 for more than ten hours, the media storage temperature must be met.

For LTO Ultrium 8, 7, 6, and 5, the IBM Security Key Lifecycle Manager V1.0 or V2.0 is required for enabling system-managed and library-managed encryption.

For configurations of 23U and above, the TS3310 Tape Library and expansion modules must be installed in a rack. Rack doors are required for any library that has more than 14 drives installed.

Path Failover is not supported on AIX(R) attachment to SAS device.

**Planning information**

**Customer responsibilities**

Physical planning is a customer responsibility. Detailed planning information is in the **IBM TS3310 Tape Library Setup and Operator Guide** (GA32-0477). The TS3310 Tape Library is designated as a customer setup unit (CSU). It is the customer’s responsibility to install the unit.

Customers can download the latest level of firmware from the Tape storage website.

**Note:** All new IBM tape device drivers will only be posted to the web through the Fix Central download portal and not through the ftpsite. IBM maintains the latest levels of System Storage tape drive and library device drivers and documentation on the Internet. Utilize the Fix Central download portal.

You are responsible for downloading or obtaining from IBM, and installing designated Machine Code (microcode, basic input/output system code (called BIOS), utility programs, device drivers, and diagnostics delivered with an IBM machine) and other software updates in a timely manner from an IBM internet website or from other
electronic media, and following the instructions that IBM provides. You may request
IBM to install Machine Code changes; however, you may be charged for that service.

**Cable orders**

Cables are required to attach tape drives in the TS3310 Tape Library to each server
connection (up to the number of tape drives installed).

An interposer may also be required for attachment to various server adapters. One
or more of the following Fibre Channel cables should be specified on the TS3310.

**Fibre Channel cables:** A Fibre Channel cable is required to attach a TS3310 Tape
Library with the Ultrium 8 Fibre Drive feature (#8542) to host Fibre Channel
adapters, Fibre Channel switches, or other Fibre Channel components. At least
one Fibre Channel cable should be specified on the initial plant order. The IBM LTO
Ultrium 8 Fibre Tape Drive (#8542) comes with an LC Duplex connector.

See the **Cables** section at the end of **Hardware requirements** for a list of available
cables and interposers.

See the **Specify or Special Features** section of the Sales Manual for a detailed
description of the above features.

**Installability**

Installation time for the TS3310 Tape Library Model L5B, when rack-mounted,
is approximately 8 to 10 hours, and is approximately 6 to 8 hours for non-rack-
mounted models. Installation time for each tape drive installed in the TS3310 Tape
Library is approximately one hour. See the **IBM TS3310 Tape Library Setup and
Operator Guide** (GA32-0477) for installation instructions.

**Security, audibility, and control**

This product uses the security and auditability features of host hardware, host
software, and application software.

The customer is responsible for evaluation, selection, and implementation of security
features, administrative procedures, and appropriate controls in application systems
and communications facilities.

**IBM Systems Lab Services**

For details on available services, contact your IBM representative or go to the **Lab
Services** website.

**IBM Electronic Services**

IBM has transformed its delivery of hardware and software support services to
help you achieve higher system availability. Electronic Services is a web-enabled
solution that offers an exclusive, no-additional-charge enhancement to the service
and support available for IBM servers. These services are designed to provide
the opportunity for greater system availability with faster problem resolution
and preemptive monitoring. Electronic Services comprises two separate, but
complementary, elements: Electronic Services news page and Electronic Services
Agent.

The Electronic Services news page is a single internet entry point that replaces the
multiple entry points traditionally used to access IBM Internet services and support.
The news page enables you to gain easier access to IBM resources for assistance in
resolving technical problems.

The Electronic Service Agent™ is no-additional-charge software that resides on
your server. It monitors events and transmits system inventory information to IBM
on a periodic, client-defined timetable. The Electronic Service Agent automatically reports hardware problems to IBM. Early knowledge about potential problems enables IBM to deliver proactive service that may result in higher system availability and performance. In addition, information collected through the Service Agent is made available to IBM service support representatives when they help answer your questions or diagnose problems. Installation and use of IBM Electronic Service Agent for problem reporting enables IBM to provide better support and service for your IBM server.

To learn how Electronic Services can work for you, go to the IBM Electronic Support website.

**Terms and conditions**

**MES discount applicable**

No

**Field installable feature**

Yes

**Warranty period**

One year

To obtain copies of the IBM Statement of Limited Warranty, contact your reseller or IBM.

An IBM part or feature installed during the initial installation of an IBM machine is subject to the full warranty period specified by IBM. An IBM part or feature that replaces a previously installed part or feature assumes the remainder of the warranty period for the replaced part or feature. An IBM part or feature added to a machine without replacing a previously installed part or feature is subject to a full warranty. Unless specified otherwise, the warranty period, type of warranty service, and service level of a part or feature are the same as those for the machine in which it is installed.

**Customer setup**

Yes

**Machine code**

Same license terms and conditions as base machine.

**Prices**

<table>
<thead>
<tr>
<th>Description</th>
<th>Machine type</th>
<th>Model</th>
<th>Feature number</th>
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<td>Ultrium 8 Fibre Channel Tape Drive</td>
<td>3576</td>
<td>LSB, E9U</td>
<td>8542</td>
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<table>
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<th>Machine type</th>
<th>Model</th>
<th>Feature number</th>
<th>Install type</th>
<th>MES removal</th>
<th>Cables required</th>
<th>CSU</th>
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<tr>
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<td>LSB, E9U</td>
<td>8542</td>
<td>Field</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

*Install type
- "Plant" denotes plant installation only
- "Field" denotes field installation only
- "Both" denotes both plant and field installation
CSU = Customer setup

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IBM United States

**Corrections**

*(Corrected on November 6, 2017)*

A statement about data cartridge availability was added to the Description section.