

## IBM TS3100 and TS3200 Tape Library models support LTO full-high and half-high tape drives to deliver enhanced tape performance for the demands of backup tape storage

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### At a glance



TS3100 and TS3200 Tape Libraries combine IBM® tape and automation reliability at open system prices. Both libraries are designed to support entry-level, unattended backup, open system attachment flexibility, and enhanced capacity and performance.

The TS3100 and TS3200 Tape Libraries include support for:

- IBM Linear Tape-Open™ (LTO™) Ultrium™ 6 half-high 6 Gb SAS and 8 Gb Fibre Channel, and full-high 8 Gb Fibre Channel drives with a native data transfer rate up to 160 MB/sec
- LTO Generation 6 media tape cartridge with compressed capacity of up to 6.25 TB with 2.5 to 1 compression
- IBM LTO Ultrium 5 half-high and full-high 6 Gb SAS and 8 Gb Fibre Channel drives
- A maximum data transfer rate of up to 140 MB/sec native for each Ultrium 5 drive
- Up to 1.5 TB native physical capacity per cartridge (3.0 TB with 2 to 1 compression) with Ultrium 5 1.5 TB media
- LTO Ultrium 4 LVD SCSI Tape Drive, 4 Gbps Fibre Channel Tape Drive, 3 Gbps dual-port SAS Tape Drive with maximum data transfer rate of up to 120 MB/sec native as compared to LTO Ultrium 3 for each Ultrium 4 drive
- Up to 400 GB native physical capacity per cartridge (800 GB with 2 to 1 compression) with Ultrium 4 800 GB media
- Encryption on LTO Ultrium 6, 5, and 4 SAS Tape Drives
- Adherence to LTO specifications

The TS3100 can accommodate up to two Ultrium half-high tape drives or one Ultrium full-high tape drive with 24 cartridge slots in two removable magazines,

including a standard one-cartridge I/O station, a remote management unit, and barcode reader.

The TS3200 can accommodate up to four Ultrium half-high tape drives or two Ultrium full-high tape drives with 48 data cartridge slots in four removable magazines, including a standard three-cartridge I/O station and barcode reader.

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## Overview

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IBM TS3100 Tape Library Model L2U (machine type 6173, SEO #61732UL) and IBM TS3200 Tape Library Model L4U (machine type 6173, SEO #61734UL) incorporate the new LTO Ultrium 6 full-high 8 Gb Fibre Channel, half-high 6 Gb SAS, and half-high 8 Gb Fibre Channel tape drives, enhancing tape performance over the previous generation of IBM LTO Ultrium 5 tape drives with a native data transfer rate of up to 160 MB/sec.

IBM TS3100 Tape Library Model L2U (machine type 6173, SEO #61732UL) and IBM TS3200 Tape Library Model L4U (machine type 6173, SEO #61734UL) also incorporate LTO Ultrium 5 and LTO Ultrium 4 Tape Drives. Available drives include LTO Ultrium 5 full-high and half-high Fibre Channel, LTO Ultrium 5 full-high and half-high SAS tape drives, along with LTO Ultrium 4 full-high and half-high Fibre Channel, LTO Ultrium 4 full-high and half-high SAS, and LTO Ultrium 4 full-high SCSI tape drives.

Mixed LTO Ultrium generations and attachment tape drive types are supported where drive space is available. Ultrium 6, Ultrium 5, and Ultrium 4 SAS and Fibre Channel tape drives are encryption capable.

The TS3100 and TS3200 Tape Libraries incorporate IBM Multi-Path Architecture with logical libraries equal to the number of drives installed. Ultrium 6, Ultrium 5, and Ultrium 4 tape drives for the TS3100 and TS3200 Tape Libraries are ordered separately as features or with their own SEO option number.

LTO Ultrium 6 tape drives support the LTO Generation 6 media specification of more than double the compressed capacity of up to 6.25 TB with 2.5 to 1 compression (up to 2.5 TB native capacity) compared to previous LTO 5 compressed capacity of up to 3.0 TB with 2 to 1 compression (up to 1.5 TB native capacity) per tape cartridge. IBM Ultrium 6 tape drives can read and write LTO Ultrium 5 and 6 data cartridges, and can read LTO Ultrium 4 data cartridges.

IBM TS3100 Tape Library Model L2U can accommodate up to two LTO Ultrium half-high tape drives or one LTO Ultrium full-high tape drive, and comes standard with two removable cartridge magazines, one on the left side (12 data cartridge slots) and one on the right (12 data cartridge slots). The left magazine includes a single cartridge I/O station designed to allow for continuous library operation while importing or exporting media. A remote management unit and a barcode reader are standard in the library, enabling the library to run in sequential or random access mode. Optional available features include a rack mount kit, additional attachment cables, transparent LTO encryption, path failover, additional drives, interposers, and power cords.

IBM TS3200 Tape Library Model L4U can accommodate up to four LTO Ultrium half-high tape drives or two LTO Ultrium full-high tape drives. The TS3200 comes standard with four removable cartridge magazines, providing 48 data cartridge slots and a three-slot I/O station. A remote management unit and a barcode reader are standard in the library, allowing the library to run in sequential or random access mode.

Optional features available include a rack mount kit, an additional power supply, additional removable cartridge magazines, transparent LTO encryption, path failover, additional drives, attachment cables, interposers, and power cords.

The TS3100 and TS3200 Tape Libraries also support IBM Linear Tape File System™ (LTFS) and IBM LTFS Storage Manager software for IBM Ultrium 6 and 5 tape drives.

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## Key prerequisites

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Appropriate levels of host software are required to attach and support the TS3100 or TS3200 Tape Library with IBM LTO Ultrium 6, 5, or 4 tape drives to a wide range of environments and servers. Refer to the [Technical information](#) section for details.

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## Planned availability date

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October 10, 2014

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## Description

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The TS3100 and TS3200 Tape Libraries are external, stand-alone or rack-mountable units that contain LTO Ultrium tape drives designed for the heavy demands of backup tape storage.

### IBM TS3100 Tape Library Model L2U

TS3100 has the capacity for 24 tape cartridges and supports a combination of up to a maximum of one IBM LTO Ultrium full-high tape drive or up to a maximum of two IBM LTO Ultrium half-high tape drives.

IBM TS3100 Tape Library Model L2U offers the following significant improvements over existing 2U tape libraries:

- **Increased cartridge capacity:** The TS3100 is configured to hold two removable magazines, one on the left side (11 slots plus 1) and one on the right side (12 slots) for a total of 24 data cartridges.
- **Standard barcode reader:** With the addition of the standard bar code reader, the TS3100 can be operated as a random access tape library with labeled media. Labeled Ultrium media can be ordered as a feature at the time of purchase.
- **I/O station:** Standard on the TS3100 is a single-cartridge I/O station on the left cartridge magazine, designed to allow for continuous library operation during import or export of data cartridges.
- **Removable cartridge magazines:** The TS3100 has two removable magazines that house 24 data cartridges. This enables quick population of the tape library and simplified storage for media. Additional magazines may be ordered as an option.
- **Customer replacement units (CRUs):** Drives, power supply, and cartridge magazines are customer replacement parts.

### IBM TS3200 Tape Library Model L4U

The TS3200 has the capacity for 48 tape data cartridges and supports a combination of up to a maximum of two IBM LTO Ultrium full-high tape drives or up to a maximum of four IBM LTO Ultrium half-high tape drives. IBM TS3200 Tape Library

Model L4U offers the following significant improvements over existing 4U tape libraries:

- **Increased cartridge capacity:** The TS3200 is configured to hold four removable magazines, providing 48 data cartridges, including a three-slot I/O station.
- **Standard barcode reader:** With the addition of the standard bar code reader, the TS3200 can be operated as a random access tape library with labeled media. Labeled Ultrium media can be ordered as a feature at the time of purchase.
- **I/O station:** Standard on the TS3200, a three-slot I/O station on the lower-left cartridge magazine is designed to allow for continuous library operation during import or export of data cartridges.
- **Removable cartridge magazines:** The TS3200 has four removable magazines to enable quick population of the tape library and simplified storage for media. Additional magazines may be ordered as an option.
- **Customer replacement units (CRUs):** Drives, power supply, and cartridge magazines are customer replacement parts.

### IBM TS3100 and TS3200 Tape Libraries

The IBM LTO Ultrium 6 tape drive is the sixth-generation LTO Ultrium tape drive in the IBM LTO Ultrium family of products. The Ultrium 6 tape drive in the TS3100 and TS3200 offers the following significant improvements over the Ultrium 5 tape drive:

- **Increased performance:** Maximum tape drive throughput native data rate performance is up to 160 MB/sec. Data tracks are written 16 at a time. IBM LTO6 Tape Drives can read and write LTO Ultrium 5 Data Cartridges at Ultrium 5 capacities and rates, and read LTO Ultrium 4 Data Cartridges at Ultrium 4 capacities and rates.  
  
**Note:** Although the Ultrium 6 Tape Drive provides the capability for excellent tape performance, other components of the system may limit the actual performance achieved. 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 LTO Generation 6 media specification tape cartridge physical capacity is up to 6.25 TB compressed physical capacity, more than double that of the Ultrium 5 Data Cartridge. This is achieved by increasing the linear density, track density, and media length. The IBM Ultrium 6 tape itself is an advanced Barium Ferrite tape developed to help provide durability and increased capacity.
- **Encryption:** The LTO Ultrium 6 Tape Drive supports data encryption on the base drive with Ultrium 6 or Ultrium 5 media. System Managed and Library Managed Encryption and associated IBM Security Key Lifecycle Manager access are all available as a chargeable licensed key (feature number AS18 or SEO 00NA083, Transparent LTO Encryption) under the IBM System Storage® TS3100 and TS3200 Tape Libraries. IBM Security Key Lifecycle Manager is required with this feature.
- **Attachment options:** The LTO Ultrium 6 Tape Drive comes with 8 Gbps Fibre Channel dual-ported attachment models for connection to a wide spectrum of open system servers.
- **WORM media support:** LTO Generation 6 with media specification provides up to 2.5 TB native capacity, up to 6.25 TB in compressed mode, and up to 160 Mbps native data rate. IBM Ultrium 6 WORM Tape Cartridges are designed for archiving and data retention applications, including those applications requiring an audit trail. These cartridges work with the IBM LTO Ultrium 6 Tape Drive to help prevent the alteration or deletion of user data. IBM LTO 6 WORM Tape Cartridges can be ordered through IBM as unique 3589 models with the following features:
  - Prelabeling with the ability to specify a starting volume serial and color coding
  - Packaging in individual jewel cases or in bulk

- Cartridge memory, built into every cartridge, enhances 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 particle tape with up to 6.25 TB WORM compressed capacity in a single cartridge
- **Larger internal data buffer:** There is a 1 GB internal data buffer in the Ultrium 6 full-high tape drive and a 512 MB internal data buffer in the Ultrium 6 half-high tape drive.
- **Digital speed matching:** The Ultrium 6 Tape Drive is designed to perform dynamic speed matching (at one of fourteen speeds (160.0, 150.8, 141.5, 132.3, 123.1, 113.8, 104.6, 95.4, 86.2, 76.9, 67.7, 58.5, 49.2 or 40.0 MB/s) 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 repetitions and improve throughput performance. Speed matching on Ultrium 6 ranges from 40 to 160 MB/sec versus 40 to 140 MB/sec on Ultrium 5.
- **Giant Magneto Resistive (GMR) head design:** Use of flat lap head technology in GMR heads from our Enterprise Tape Drives for Ultrium 6 helps minimize contact, edge damage, debris accumulation, and wear on the tape as it moves over the read/write heads.
- **Dual-stage 16-channel head skew 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 6 Tape Drive power management function is designed to control the drive electronics to be either completely turned off or in a low-power mode when the circuit functions are not needed for drive operation. Improvements specifically in idle mode are improved over Ultrium 5.

The following IBM LTO Ultrium features have been enhanced in the IBM LTO Ultrium 6 tape drive:

- **Independent tape loader and 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 positive pin retention, is designed to thread the tape with a higher level of reliability.
- **Graceful dynamic braking:** In the event of 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 2,176 data tracks in Ultrium 6 versus 1,280 data tracks in Ultrium 5. 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 patented Surface Control Guiding Mechanism from IBM is designed to guide the tape along the tape path in the Ultrium 6, 5, and 4 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, such as an all metal clutch, steel ball bearings in the loader, robust leader block design, and a single circuit card, enhances 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 feature optimizes readback signals for linear readback response from MR read head transducers.
- **Separate writing of multiple filemarks:** Separate writing of multiple filemarks 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. A write of multiple filemarks typically indicates a point where an append operation might occur after the first of these filemarks, and this change helps prevent having to rewrite datasets containing customer data and the first filemark, if such an append occurs.

- **LTO Data Compression (LTO-DC):** The Ultrium 6 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. Scheme-Swapping compression, patented by IBM, 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 6 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 a physical 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 6 LTO-CM is 16320 bytes, double the capacity of Generation 5 and 4 LTO-CM 8160 bytes. Communication between the drive and the LTO-CM is through a low-level RF field transmitted by the drive to the cartridge.
- **Statistical Analysis and Reporting System (SARS):** The Ultrium 6 Tape Drive uses SARS to help isolate failures between media and hardware. SARS uses the cartridge performance history saved in the CM module and the drive performance history kept in the drive flash EEPROM 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 to deliver a more reliable drive. The sixth-generation drive electronics are designed to provide error correction of soft errors in the memory arrays in data and control paths.

## Ultrium 6 Data Cartridge

The LTO Generation 6 media specification tape cartridge physical compressed capacity of the LTO 6 Data Cartridge has more than doubled the capacity of the IBM Ultrium 5 Data Cartridge with a capacity of up to 6.25 TB with 2.5 to 1 compression. IBM LTO Ultrium 6 Tape Drives can read and write Ultrium 5 data cartridges, and read Ultrium 4 data cartridges.

These cartridges have been designed to provide several enhancements over previous tape technologies. They are designed to work with tape drives that have increased tape speeds and high-density data recording. The case is specially designed for use in automated libraries and is designed for repeated, unattended handling.

The IBM LTO Ultrium 5 tape drive is the fifth-generation LTO Ultrium tape drive in the IBM LTO Ultrium family of products. The Ultrium 5 tape drive in the TS3100 and TS3200 offers the following significant improvements over the Ultrium 4 tape drive:

- **Increased performance:** Maximum tape drive throughput native data rate performance is up to 140 MB/sec. Data tracks are written 16 at a time. IBM LTO5 Tape Drives can read and write LTO Ultrium 4 Data Cartridges at Ultrium 4 capacities and rates, and read LTO Ultrium 3 Data Cartridges at Ultrium 3 capacities and rates.

**Note:** Although the Ultrium 5 Tape Drive provides the capability for excellent tape performance, other components of the system may limit the actual performance achieved. 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 LTO Generation 5 media specification tape cartridge physical capacity is up to 3.0 TB compressed physical capacity, more than double that of the Ultrium 4 and 5 Data Cartridge. This is achieved by increasing the linear density, track density, and media length. The IBM Ultrium 5 tape itself is an advanced Barium Ferrite tape developed to help provide durability and increased capacity.
- **Encryption:** The LTO Ultrium 5 Tape Drive supports data encryption on the base drive with Ultrium 5 or Ultrium 4 media. System Managed and Library Managed Encryption and associated IBM Security Key Lifecycle Manager access are all available as a chargeable licensed key (feature number AS18 or SEO 00NA083, Transparent LTO Encryption) under the IBM TS3100 and TS3200 Tape Libraries. IBM Security Key Lifecycle Manager is required with this feature.
- **Attachment options:** The LTO Ultrium 5 Tape Drive comes with 8 Gbps Fibre Channel dual-ported attachment models for connection to a wide spectrum of open system servers.
- **WORM media support:** LTO Generation 5 with media specification provides up to 1.5 TB native capacity, up to 3.0 TB in compressed mode, and up to 140 Mbps native data rate. IBM Ultrium 5 WORM Tape Cartridges are designed for archiving and data retention applications, including those applications requiring an audit trail. These cartridges work with the IBM LTO Ultrium 5 Tape Drive to help prevent the alteration or deletion of user data. IBM LTO 5 WORM Tape Cartridges can be ordered through IBM as unique 3589 models with the following features:
  - Prelabeling with the ability to specify a starting volume serial and color coding
  - Packaging in individual jewel cases or in bulk
  - Cartridge memory, built into every cartridge, enhances 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 particle tape with up to 3.0 TB WORM compressed capacity in a single cartridge
- **Larger internal data buffer:** There is a 512 MB internal data buffer in the Ultrium 5 Tape Drive.
- **Digital speed matching:** The Ultrium 5 Tape Drive is designed to perform dynamic speed matching 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. Speed matching is 40 to 140 MB/sec on Ultrium 5.

IBM LTO Ultrium features enhanced in the IBM LTO Ultrium 5 Tape Drive include:

- **Independent tape loader and 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 thread the tape with a higher level of reliability.
- **Graceful dynamic braking:** In the event of 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 1,280 data tracks in Ultrium 5. 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 patented Surface Control Guiding Mechanism from IBM is designed to guide the tape along the tape path in the Ultrium 5 and 4 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, such as an all metal clutch, steel

ball bearings in the loader, robust leader block design, and a single circuit card, enhances 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 feature optimizes readback signals for linear readback response from MR read head transducers.
- **Separate writing of multiple filemarks:** Separate writing of multiple filemarks 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. A write of multiple filemarks typically indicates a point where an append operation might occur after the first of these filemarks, and this change helps prevent having to rewrite datasets containing customer data and the first filemark, if such an append occurs.
- **LTO-DC:** The Ultrium 5 uses LTO-DC, which is an implementation of a Lempel-Ziv class 1 (LZ-1) data compression algorithm. LTO-DC is an extension of ALDC and an improvement over previous IBM lossless compression algorithms. Scheme-Swapping compression, patented by IBM, 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 5 is 2 to 1.
- **LTO-CM:** Contained within the LTO Ultrium data cartridge is the LTO-CM, which is a passive, contactless silicon storage device that is a physical 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 5 and 4 LTO-CM is 8160 bytes. Communication between the drive and the LTO-CM is through a low-level RF field transmitted by the drive to the cartridge.
- **SARS:** The Ultrium 5 Tape Drive uses SARS to help isolate failures between media and hardware. SARS uses the cartridge performance history saved in the CM module and the drive performance history kept in the drive flash EEPROM 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 to deliver a more reliable drive. The fifth-generation drive electronics are designed to provide error correction of soft errors in the memory arrays in data and control paths.

## Ultrium 5 Data Cartridge

The LTO Generation 5 media specification tape cartridge physical compressed capacity of the LTO 5 Data Cartridge has more than doubled the capacity of the IBM Ultrium 4 Data Cartridge with a capacity of up to 3.0 TB with 2 to 1 compression. IBM LTO Ultrium 5 Tape Drives can read and write Ultrium 4 data cartridges, and read Ultrium 3 data cartridges.

These cartridges have been designed to provide several enhancements over previous tape technologies. They are designed to work with tape drives that have increased tape speeds and high-density data recording. The case is specially designed for use in automated libraries and is designed for repeated, unattended handling.

LTO tape drives read and write non-WORM media so that you can load WORM-capable firmware on your tape drives and use any media that is supported by these drives. In this case, only the data that is written on WORM media is treated as WORM data. Data that is written on other types of media can be overwritten.

The LTO tape drives can read tapes that were written by non-IBM LTO drives. They also write to tapes that can be read by non-IBM LTO drives.

All supported generations of LTO tape drives and cartridges can reside in the same frame.



When a cartridge is labeled according to IBM bar code label specifications, the last character of its VOLSER number indicates the generation of the medium. For example, a cartridge with a VOLSER of 000764L6 is an LTO 6 cartridge and a cartridge with a VOLSER of 000764L5 is an LTO 5 cartridge.

To enhance library performance, the LTO tape drives include speed matching, channel calibration, and power management. Speed matching dynamically adjusts the drive's native (uncompressed) data rate to the slower data rate of a server. Channel calibration customizes each read and write data channel for optimum performance. The customization enables compensation for variations in the recording channel transfer function, media characteristics, and read/write head characteristics. Power management reduces the drive's power consumption during idle power periods.

To ensure that your tape drive conforms to IBM specifications for reliability, use only IBM LTO tape cartridges.

### **Encryption**

The LTO 5 and later LTO tape drives are encryption capable, which means they can convert data into a cipher for data security. To perform encryption, the drive must be encryption enabled by your selection of one of three methods of encryption management. Two of these methods, system-managed and library-managed encryption, require the purchase of key feature number AS18 or SEO 00NA083, (Transparent LTO Encryption). A key is required to encrypt and decrypt the data. How a key is generated, maintained, controlled, and transmitted depends on the operating environment where the tape drive is installed. Some data management applications are capable of performing key management. For an alternative solution, IBM provides a key manager that works in conjunction with the keystore of your choice to perform all necessary key management tasks. There is no recovery for lost encryption keys. Also refer to the IBM Encryption Key Manager and IBM Security Key Lifecycle Manager (formerly Tivoli® Key Lifecycle Manager) publications.

### **Path failover option**

With the introduction of IBM LTO Ultrium 6 tape drive support, the TS3100 and TS3200 Tape Libraries will support Control Path Failover and Data Path Failover for all generations of IBM LTO Ultrium half-high tape drives.

### **Multi-Path support**

The Multi-Path feature of the libraries supports sharing of the library robotics. The library can be partitioned into one or two logical libraries, and can provide 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.

### **Accessibility by people with disabilities**

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A US Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be requested at

[http://www.ibm.com/able/product\\_accessibility/index.html](http://www.ibm.com/able/product_accessibility/index.html)

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## **Product positioning**

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As you compare competitive tape solutions, consider the following factors:

- Server environment attachment
- Capacity and performance requirements
- Data protection, reliability, and availability
- Data integrity, security, and encryption
- Storage usage and application requirements
- Affordability
- Loyalty to legacy or existing tape formats
- Work environment that has limited space

The TS3100 and TS3200 and storage management applications help address these requirements and constitute a functionally rich tape storage solution incorporating LTO Ultrium tape technology. This solution is designed to give you flexibility of tape library management and unattended save and restore operations. The TS3100 or TS3200 are excellent solutions if you use tape or require a larger capacity or higher performance tape backup with or without random access. They are excellent choices for tape automation for open systems servers.

The TS3200 supports IBM LTO Ultrium Tape Drives and 48 cartridge slots, including three configurable I/O slots.

The TS3100 and TS3200 can be the answers to growing storage requirements and shrinking backup windows and are a part of a family of IBM System Storage LTO Ultrium tape products. These products constitute excellent tape storage solutions if you have an existing digital linear tape experience or require high-performance automated tape backup.

For lower capacity requirements than the TS3100 or TS3200 Tape Libraries, the IBM TS2900 Tape Autoloader and the IBM TS2260 or TS2360 tape drive should be considered.

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## Product number

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Description	SEO/Part number
IBM TS3100 Tape Library Model L2U	61732UL
IBM TS3200 Tape Library Model L4U	61734UL

The following are newly announced features on the specified models of the IBM TS3100 Tape Library and IBM TS3200 Tape Library 6173 machine type:

Description	MT	Model	Feature
IBM TS3100 Tape Library Model L2U	6173	L2U	
IBM TS3200 Tape Library Model L4U	6173	L4U	
2 m SAS/Mini-SAS 1x Cable (host SFF-8470 to target SFF-8088)	6173	L2U L4U	5402
25 m LC-LC Fibre Cable	6173	L2U L4U	6025
6173 Path Failover	6173	L2U L4U	AS0R
Additional Power Supply for TS3200	6173	L4U	AS0W
SAS/Mini-SAS 4x Interposer	6173	L2U L4U	AS0X
Mini-SAS/Mini-SAS 4x Interposer	6173	L2U L4U	AS0Y
2 m Mini-SAS/Mini-SAS 1x Cable (host SFF-8088 to target SFF-8088)	6173	L2U L4U	AS0Z
4.5 Meter VHDCI/HD68 SCSI Cable	6173	L2U L4U	AS14
10 Meter VHDCI/HD68 SCSI Cable	6173	L2U L4U	AS15
6173 Transparent LTO Encryption	6173	L2U	AS18

13 Meter LC/LC Fibre Channel Cable	6173	L4U L2U	AS1A
6173 Rack Mount Kit	6173	L4U L2U	AS1B
Ultrium Cleaning Cartridge L1 UCC	6173	L4U L2U	AS1E
6173 Right Side Tape Magazine	6173	L4U L2U	AS1F
6173 Left Upper 4U Tape Magazine	6173	L4U	AS1G
6173 Left Lower 4U Tape Magazine	6173	L4U	AS1H
6173 Left Side 2U Tape Magazine	6173	L2U	AS1J
6173 LTO Ultrium 4 LVD SCSI Drive Sled	6173	L4U L2U	AS1L
6173 LTO Ultrium 4 Fibre Channel Drive Sled	6173	L4U L2U	AS1M
6173 LTO Ultrium 4 SAS Drive Sled	6173	L4U L2U	AS1N
6173 LTO Ultrium 4 Half High Fibre Channel Drive Sled	6173	L4U L2U	AS1P
6173 LTO Ultrium 4 Half High SAS DriveV2 Sled	6173	L4U L2U	AS1Q
6173 LTO Ultrium 5 Fibre Channel Drive	6173	L4U L2U	AS1S
6173 LTO Ultrium 5 SAS Drive Sled	6173	L4U L2U	AS1T
6173 LTO Ultrium 5 Half High SAS Drive Sled	6173	L4U L2U	AS1U
6173 LTO Ultrium 5 Half High Fibre Drive Sled	6173	L4U L2U	AS1W
6173 LTO Ultrium 6 Fibre Channel Drive	6173	L4U L2U	AS1Y
6173 LTO Ultrium 6 Half High SAS Drive Sled	6173	L4U L2U	AS1Z
6173 LTO Ultrium 6 Half High Fibre Drive Sled	6173	L4U L2U	AS21
Ultrium 4 Data Cartridges 5-Pack	6173	L4U L2U	AS22
Ultrium 5 Data Cartridges 5-Pack	6173	L4U L2U	AS23
Ultrium 6 Data Cartridges 5-Pack	6173	L4U L2U	AS24
2.8m, 10A/120V, C13 to NEMA 5-15P (US) Line Cord	6173	L4U L2U	AS29
2.8m, 10A/230V, C13 to CEE7-VII (Europe) Line Cord	6173	L4U L2U	AS2A
2.8m, 10A/230V, C13 to DK2-5a (Denmark) Line Cord	6173	L4U L2U	AS2B
2.8m, 10A/230V, C13 to BS 1363/A (UK) Line Cord	6173	L4U L2U	AS2C
2.8m, 10A/230V, C13 to SI 32 (Israel) Line Cord	6173	L4U L2U	AS2D
2.8m, 10A/230V, C13 to SEV 1011-S24507 (Sws) Line Cord	6173	L4U L2U	AS2E
2.8m, 10A/230V, C13 to SABS 164 (South Africa) Line Cord	6173	L4U L2U	AS2F
2.8m, 10A/230V, C13 to CEI 23-16 (Italy) Line Cord	6173	L4U L2U	AS2G
2.8m, 10A/230V, C13 to AS/NZS 3112 (Aus/NZ) Line Cord	6173	L4U L2U	AS2H
2.8m, 10A/208V, C13 to NEMA 6-15P (US) Line Cord	6173	L4U L2U	AS2J
2.8m, 10A/220V, C13 to IRAM 2073 (Argentina) Line Cord	6173	L4U L2U	AS2K
2.8m, 10A/220V, C13 to CNS 10917-3 (Taiwan) Line Cord	6173	L4U L2U	AS2L
2.8m, 10A/220V, C13 to GB 2099.1 (China) Line Cord	6173	L4U L2U	AS2M
2.8m, 10A/110V, C13 to CNS 10917-3 (Taiwan) Line		L4U	

Cord	6173	L2U L4U	AS2N
2.8m, 12A/100V, C13 to JIS C-8303 (Japan) Line Cord	6173	L2U L4U	AS2P
2.8m, 12A/220V, C13 to KSC 8305 (S. Korea) Line Cord	6173	L2U L4U	AS2Q
2.8m, 10A/240V, C13 to IS 6538 (India) Line Cord	6173	L2U L4U	AS2R
2.8m, 10A/220V, C13 to NBR 6147 (Brazil) Line Cord	6173	L2U L4U	AS2T
2.8m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	6173	L2U L4U	AS2U
EMEA Long Leadtime Configurations	6173	L2U L4U	1763
Hungary CHW plant 9SH	6173	L2U L4U	1764
Guad CHW plant 9KQ	6173	L2U L4U	1765
ISTC CHW 9K2	6173	L2U L4U	1766
RTP CHW 9NR	6173	L2U L4U	1767
Offload Manufacturing to ISTC	6173	L2U L4U	1770
Capacity Scheduling Service	6173	L2U L4U	1772
Custom SLA Scheduling Service	6173	L2U L4U	1796
Consolidate Shipment	6173	L2U L4U	8031
TAA Compliant Order	6173	L2U L4U	8067
Custom Unit Carton Label	6173	L2U L4U	2220
Request for a new Vendor Logo Hardware	6173	L2U L4U	2247
Request for a Classic RPQ	6173	L2U L4U	2248
IBM TS3100 Tape Library Model L2U	6173	L2U	AS5W
IBM TS3200 Tape Library Model L4U	6173	L4U	AS5X

#### Single Entity Offerings (SEO)

Description	SEO number
IBM TS3100 Tape Library Model L2U	61732UL
IBM TS3200 Tape Library Model L4U	61734UL

#### **Business Partner information**

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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 IBM ID).

<https://www.ibm.com/partnerworld/mem/sla.jsp?num=114-127>

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## Publications

The following publications are shipped with the products, as appropriate. Additional copies are available. To order, contact your local Lenovo representative.

Title	Order number
IBM System Storage TS3100/TS3200 Tape Library Setup, Operator and and Service Guide	GA32-0545

The preceding publication and the following publications are also available at

<http://www.ibm.com/storage/tape/lto>

Title	Order number
IBM System Storage TS3100/TS3200 Tape Library Installation Quick Reference	GA32-0546
IBM System Storage TS3100/TS3200 Tape Library SCSI Reference	GA32-0547
IBM Tape Device Driver Programming Reference	GC32-0566
IBM Tape Device Driver Installation and Users Guide	GC27-2130

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## Technical information

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### **Specified operating environment**

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#### ***Physical specifications***

##### **6173 Model L2U:**

- Width: Rack mount 447.5 mm (17.6 in), stand-alone 447.5 mm (17.6 in)
- Depth: Rack mount 740 mm (29.13 in), stand-alone 810 mm (31.9 in)
- Height: Rack mount 87.6 mm (3.44 in), stand-alone 97.6 mm (3.84 in)
- Maximum weight: 15 kg (33 lb) without rack mount

##### **6173 Model L4U:**

- Width: Rack mount 447.5 mm (17.6 in), stand-alone 447.5 mm (17.6 in)
- Depth: Rack mount 740 mm (29.13 in), stand-alone 810 mm (31.9 in)
- Height: Rack mount 175.2 mm (6.9 in), stand-alone 185.2 mm (7.3 in)
- Maximum weight: 21.3 kg (47 lb) without rack mount

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

#### ***Operating environment***

##### **6173 Model L2U:**

- Temperature: 10°C to 35°C (50°F to 95°F)
- Relative humidity: 15 to 80 percent RH (noncondensing)
- Wet bulb (caloric value): 26°C (79.0°F) maximum
- Voltage: 100 to 240 V ac, 50 to 60 Hz auto-ranging
- Electrical power:
  - 4.0 amps at 100 V ac, 2.0 amps at 240 V ac
  - 0.1 KVA
- Maximum acoustical noise sound power levels LwAd in bels: 6.6/6.8
- Heat output: 100 watts (86 KCal/hr.)

## **6173 Model L4U:**

- Temperature: 10°C to 45°C (50°F to 113°F)
- Relative humidity: 10 to 80 percent RH (noncondensing)
- Wet bulb (caloric value): 26°C (79.0°F) maximum
- Voltage: 100 to 240 V ac, 50 to 60 Hz auto-ranging
- Electrical power:
  - 4.0 amps at 100 V ac, 2.0 amps at 240 V ac
  - 0.1 KVA
- Maximum acoustical noise sound power levels LwAd in bels: 6.6/6.8
- Heat output: 100 watts (86 KCal/hr.)

### ***Homologation***

This product is not certified for direct connection by any means whatsoever to interfaces of public telecommunications networks. Certification may be required by law prior to making any such connection. Contact your local Lenovo representative or reseller for any questions.

### ***Hardware requirements***

The IBM TS3100 and TS3200 Tape Libraries come with raven black covers.

IBM TS3100 Tape Library Model L2U and IBM TS3200 Tape Library Model L4U support attachment to servers that support the Ultrium 6, Ultrium 5, and Ultrium 4 half-high SAS and Fibre Channel drives, full-high SAS and Fibre Channel tape drives, and Ultrium 4 full-high SCSI tape drives interface specifications.

A power cord feature number, if applicable, should also be specified.

The TS3200 comes with one power supply and an additional power supply can be added with the Additional Power Supply (feature #AS0W or SEO # 00NA071) feature.

If ordered as an option, the additional power supply will come with a power cord based on the original order. If the Additional Power Supply feature is ordered, then two power cords will be supplied based on the power cord feature ordered.

### **Cables**

Cables are required to attach tape drives in the TS3100 or TS3200 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 or SAS cables should be specified on the TS3100 or TS3200.

*Fibre Channel cables:* A Fibre Channel cable is required to attach a TS3100 or TS3200 Tape Library with Fibre Channel Ultrium tape drives 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 Fibre Channel drive plant order. The IBM Ultrium 5 or 6 (8 Gbps) Fibre drive comes with an LC duplex connector.

Features for specifying Fibre Channel cables and their respective lengths are as follows:

- Feature AS1A or SEO 00NA085 - 3 m LC-LC Fibre Channel Cable
- Feature 6025 or SEO 00NA087 - 25 m LC-LC Fibre Channel Cable

## SAS cables

A SAS cable is required to attach a TS3100 or TS3200 to the server host bus SAS adapter. SAS/Mini-SAS cables provide attachment from HBA with SFF-8470 to drives with SFF-8088 (Feature 5402 or SEO 00NA007). Mini-SAS/Mini-SAS cables provide attachment from HBA SFF-8088 to drives with SFF-8088 (Feature AS0Z or SEO 00NA009). At least one SAS cable should be specified on the initial plant order.

The following cable options are available for SAS attachment:

- 2.0 m SAS/Mini-SAS 1x Cable (from HBA with SFF-8470 to drive with SFF-8088) (Feature 5402 or SEO 00NA007)
- 2.0 m Mini-SAS/Mini-SAS 1x Cable (from HBA with SFF-8088 to drive with SFF-8088) (Feature AS0Z or SEO 00NA009)

## SAS Interposers

A 1x4 interposer with either SAS/Mini-SAS or Mini-SAS/Mini-SAS connectors is available for connecting up to four Mini-SAS/Mini-SAS 1x cables and their respective SAS drives to a single host bus adapter port. Mini-SAS/Mini-SAS 1x cable (feature AS0Z) connect the interposer to the drive, and needs to be ordered separately.

The following interposers are available:

- SAS/Mini-SAS 4x Interposer (from HBA with SFF-8470 to maximum four cables with SFF-8088) (Feature AS0X or SEO 00NA075)
- Mini-SAS/Mini-SAS 4x Interposer (from HBA with SFF-8088 to maximum four cables with SFF-8088) (Feature AS0Y or SEO 00NA077)

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

## Software requirements

IBM Tivoli Storage Manager and other compatible software offerings can provide storage and tape management software for the TS3100 or TS3200. 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 at

<http://www-03.ibm.com/systems/storage/tape/library.html#compatibility>

Select *Compatibility Information*, then *ISV matrix for LTO* for the product.

IBM continues to work together with the ISVs to support the TS3100 and TS3200. 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 System Storage tape drive and library device drivers and documentation on the Internet. Utilize the Fix Central download portal by accessing the following website

<http://www.ibm.com/support/fixcentral>

There are several menus to navigate to the correct download as follows:

1. On the first menu item Click **Select Product** > **Product Group** > *System Storage*
2. Expand **Select from System Storage** > *Tape Systems*
3. Expand **Select from Tape systems** > *Tape drivers and software*
4. Expand **Select from Tape drivers and software** > *user product*
5. Expand **Platform** > *user operating system*
6. Click **Continue** to view what drivers are available

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

<http://www-01.ibm.com/support/docview.wss?rs=577&uid=ssg1S7002972>

## **LTO Ultrium Encryption**

Encryption for the TS3100/TS3200 Tape Library, with SAS and Fibre Channel versions of the IBM LTO Ultrium 6, Ultrium 5, or Ultrium 4 tape drives is provided in several operating system environments.

The installation of an Ultrium 6, Ultrium 5, or Ultrium 4 Tape Drives with encryption may require code updates for and supported open systems device drivers or storage management software. An update of the open systems device drivers can be obtained from the Fix Central download portal by accessing the following website

<http://www.ibm.com/support/fixcentral>

For details on supported software versions and release levels for the Ultrium 6, 5, and 4 Tape Drives, including hardware support information, refer to the following website

<http://www.ibm.com/storage/tape>

Three modes of encryption management are supported:

- System Managed (available for AIX®, Linux™, Oracle, Windows)
- Library Managed (available for OS/400®, i5/OS™, AIX, Linux, HP-UX, Oracle, and Windows)
- Application Managed (IBM Tivoli Storage Manager)

## **Compatibility**

The IBM LTO Ultrium 6 tape drives can read and write IBM LTO Ultrium 5 or 6 data cartridges, and read IBM LTO Ultrium 4 data cartridges.

The LTO Ultrium 6 tape drives support the LTO Generation 6 media specification.

The IBM LTO Ultrium 5 tape drives can read and write IBM LTO Ultrium 5 or 4 data cartridges, and read IBM LTO Ultrium 3 data cartridges.

The IBM LTO Ultrium 4 tape drives can read and write IBM LTO Ultrium 4 or 3 data cartridges, and read IBM LTO Ultrium 2 data cartridges.

## **Limitations**

SAS cable lengths are limited to a maximum of 6 meters (20 ft).

Fibre Channel cable lengths are limited to 500 meters (1650 ft).

IBM Ultrium 5 tape cartridges can be used with the IBM Ultrium 6 tape drives.

For LTO Ultrium 6 and 5, IBM Security Key Lifecycle Manager V1.0 or V2.0 is required for enabling System Managed and Library Managed Encryption.

Some Control Path Failover environments are not supported at this time.

## **Planning information**

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### **Customer responsibilities**

Physical planning and installation is a customer responsibility. Detailed planning information is in the *IBM System Storage TS3100/TS3200 Tape Library Setup, Operator, and Service Guide (GA32-0545)*. The TS3100 and TS3200 Tape Libraries are designated as a customer setup unit (CSU).



It is the customer's responsibility to install and service, if required, the unit. Customers are responsible for obtaining the appropriate adapters, cables, and interposers (if required) for system attachment. Customers are also responsible for ordering media. For optimum performance, the customer must obtain the latest level of firmware prior to installing the unit and must update the unit as new firmware release become available. Customers can download the latest level of drive and library firmware from the LTO website

<http://www.ibm.com/storage/tape/lto>

**Note:** Lenovo offers Lenovo Installation and Maintenance support at an additional cost if the customer does not wish to install or maintain the IBM TS3100 Tape Library Model L2U or IBM TS3200 Tape Library Model L4U.

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 Lenovo to install Machine Code changes; however, you may be charged for that service.

### **Cable orders**

A SAS cable for IBM Ultrium SAS tape drives is required to attach the TS3100 or TS3200 to the server. At least one cable should be specified on the initial plant order with the SAS drive feature. An interposer or interposers may be required for attachment to various server adapters. Customers are responsible for selecting and ordering the correct cables and interposers to match the IBM LTO Ultrium tape drive interface and the server interface.

A Fibre Channel cable is required to attach a TS3100 or TS3200 Tape Library with Fibre Channel Ultrium tape drives 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 Fibre Channel drive plant order. The IBM Ultrium 6 (8 Gbps) Fibre drive comes with an LC duplex connector. Refer to the **Cables** section at the end of [Hardware requirements](#) section for a list of available cables and interposers. Refer to the **Specify or Special Features** section of the TS3100 or TS3200 Sales Manual for a detailed description of the cables and interposers available.

### **Packaging**

Product	Shipment group	Number of boxes
IBM TS3100 Tape Library Model L2U (P/N 61732UL)	One IBM LTO Ultrium Data Cartridge One IBM Ultrium Cleaning Cartridge (universal) Quality Hotline Card IBM System Storage TS3100/TS3200 Tape Library Setup, Operator, and Service Guide Quick Reference card Warranty information China RoHS Statement Device Driver readme sheet Safety Pointer multi-language readme sheet License Agreement for Machine Code	1
IBM TS3200 Tape Library Model L4U (P/N 61734UL)	One IBM LTO Ultrium Data Cartridge One IBM Ultrium Cleaning Cartridge (universal) Quality Hotline Card IBM System Storage TS3100/TS3200 Tape Library Setup, Operator, and	1

Service Guide  
Quick Reference card  
Warranty information  
China RoHS Statement  
Device Driver readme sheet  
Safety Pointer multi-language readme  
sheet  
License Agreement for Machine Code

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## **Security, auditability, and control**

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This product uses the security and auditability features of host hardware, host software, and/or application software to which is attached.

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

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## **Terms and conditions**

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### **Products - terms and conditions**

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

In the United States write to:

Warranty Information  
1009 Think Place B1/4B23  
Morrisville, NC 27560  
Attn: Lenovo Services

### **Lenovo Financial Services**

We are dedicated to delivering a positive finance experience for customers like you who want to maximize your purchase power by obtaining the technology you need today, protect against technology obsolescence, and preserve your capital for other uses.

We work with businesses, non-profit organizations, governments and educational institutions to finance their entire technology solution (e.g. hardware, software and services) from Lenovo and other leading manufacturers and resellers. We focus on making it easy to do business with us and providing customers with a positive experience. Contact your Lenovo sales representative or visit

<http://www.lenovoFS.com>

### **Warranty period**

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- Three years, IBM Ultrium media is warranted separately

A Lenovo part or feature installed during the initial installation of a Lenovo machine is subject to a full warranty effective on the date of installation of the machine. A Lenovo part or feature which replaces a previously installed part or feature assumes the remainder of the warranty period for the replaced part or feature. A Lenovo part or feature added to a machine without replacing a previously installed part or feature is subject to a full warranty effective on its date of installation. Unless specified otherwise, the warranty period, type of warranty service, and service level of a part or feature is the same as the machine it is installed.

### **Warranty service**

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If required, Lenovo provides repair or exchange service, depending on the type of warranty service specified below for the machine. Lenovo will attempt to resolve

your problem over the telephone or electronically. Certain machines contain remote support capabilities for direct problem reporting, remote problem determination, and resolution with Lenovo. You must follow the problem determination and resolution procedures that Lenovo specifies. Scheduling of service will depend upon the time of your call, machine technology and availability of parts. Service levels are response time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations. Additional charges may apply outside Lenovo's normal service area. Contact your local Lenovo representative or your reseller for country- and location-specific information.

The type of service is Customer Replaceable Unit (for example, keyboard, mouse, speaker, memory, or hard disk drive) Service and On-site Service.

### ***Customer Replaceable Unit (CRU) Service***

Lenovo provides a replacement CRU to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from Lenovo at any time on your request. A CRU is designated as being either a Tier 1 (mandatory) or a Tier 2 (optional) CRU. Installation of Tier 1 CRUs, as specified in this announcement, is your responsibility. If Lenovo installs a Tier 1 CRU at your request, you will be charged for the installation. You may install a Tier 2 CRU yourself or request Lenovo to install it, at no additional charge, under the type of warranty service designated for your Machine.

Based upon availability, a CRU will be shipped for next business day (NBD) delivery. Lenovo specifies in the materials shipped with a replacement CRU whether a defective CRU must be returned to Lenovo. When return is required, return instructions and a container are shipped with the replacement CRU, and you may be charged for the replacement CRU if Lenovo does not receive the defective CRU within 15 days of your receipt of the replacement.

The following parts or features have been designated as Tier 1 CRUs:

- L2U/L4U library without drives
- Drive sled with drive (SCSI, Fibre, SAS)
- Library Controller Card
- Blank Out Cover for Optional Power Supply
- Blank Out Cover for the Drive Bay
- Adhesive attached feet for desk top application
- 250 watt power supply
- Right Side magazine
- Left Side 2U magazine
- Left Side Upper 4U magazine
- Left Side Lower 4U magazine

### ***On-site Service***

At Lenovo's discretion you will receive CRU service or Lenovo or your reseller will repair the failing machine at your location and verify its operation. If required, On-site Repair is provided, 9 hours per day, Monday through Friday excluding holidays, NBD response. You must provide a suitable working area to allow disassembly and reassembly of the Lenovo machine. The area must be clean, well lit, and suitable for the purpose. On-site Service is not available in all countries, and some countries have kilometer or mileage limitations from an Lenovo service center. In those locations where On-site Service is not available, the normal in-country service delivery is used.

Call Lenovo to assist with problem isolation for hardware to determine if warranty service is required. Telephone support may be subject to additional charges, even during the limited warranty period.

Calls must be received by 5:00 p.m. local time in order to qualify for NBD service.

## **International Warranty Service**

International Warranty Service (IWS) is available in selected countries or regions.

The warranty service type and service level provided in the servicing country may be different from that provided in the country in which the machine was purchased.

Under IWS, warranty service will be provided with the prevailing warranty service type and service level available for the IWS-eligible machine type in the servicing country, and the warranty period observed will be that of the country in which the machine was purchased.

To determine the eligibility of your machine and to view a list of countries where service is available, visit

<http://www-947.ibm.com/support/entry/portal/docdisplay?Indocid=GCOR-3FBJK2>

## **Licensing**

Programs included with this product are licensed under the terms and conditions of the License Agreements that are shipped with the system.

## **Maintenance services**

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### **Lenovo Services**

Lenovo Services provide hardware warranty service upgrades, maintenance, and selected support services in one agreement.

## **Non-Lenovo parts support**

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### **Warranty service**

Lenovo is now shipping machines with selected non-Lenovo parts that contain a Lenovo field replaceable unit (FRU) part number label. These parts are to be serviced during the Lenovo machine warranty period. Lenovo is covering the service on these selected non-Lenovo parts as an accommodation to its customers, and normal warranty service procedures for the Lenovo machine apply.

### **Warranty service upgrades and maintenance services**

Under certain conditions, Lenovo repairs selected non-Lenovo parts at no additional charge for machines that are covered under warranty service upgrades or maintenance services.

Lenovo Service provides hardware problem determination on non-Lenovo parts (for example, adapter cards, PCMCIA cards, disk drives, or memory) installed within Lenovo machines covered under warranty service upgrades or maintenance services and provides the labor to replace the failing parts at no additional charge.

If Lenovo has a Technical Service Agreement with the manufacturer of the failing part, or if the failing part is an accommodations part (a part with an Lenovo FRU label), Lenovo may also source and replace the failing part at no additional charge. For all other non-Lenovo parts, customers are responsible for sourcing the parts. Installation labor is provided at no additional charge, if the machine is covered under a warranty service upgrade or a maintenance service.

## **Warranty service upgrades**

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### **Lenovo hourly service rate classification**

One

## General terms and conditions

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### **Field-installable features**

Yes

### **Model conversions**

No

### **Machine installation**

Customer setup. Customers are responsible for installation according to the instructions Lenovo provides with the machine.

### **Graduated program license charges apply**

No

### **Licensed machine code**

IBM Machine Code is licensed for use by a customer on the IBM machine for which it was provided by IBM under the terms and conditions of the IBM License Agreement for Machine Code, to enable the machine to function in accordance with its specifications, and only for the capacity authorized by IBM and acquired by the customer. You can obtain the agreement by contacting your IBM representative or visiting

[http://www-304.ibm.com/servers/support/machine\\_warranties/machine\\_code.html](http://www-304.ibm.com/servers/support/machine_warranties/machine_code.html)

IBM may release changes to the Machine Code. IBM plans to make the Machine Code changes available for download from the IBM System x technical support Web site

<http://www-304.ibm.com/systems/support/>

If the machine does not function as warranted and your problem can be resolved through your application of downloadable Machine Code, you are responsible for downloading and installing these designated Machine Code changes as IBM specifies. If you would prefer, you may request IBM to install downloadable Machine Code changes; however, you may be charged for that service.

### **Machine Code License Acceptance Requirement**

Acceptance-By-Use Machine: Yes, acceptance of the Machine Code license terms is conveyed through the user's initial use of the Machine.

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## Prices

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For additional information and current prices, contact your local Lenovo representative.

Single Entity Offerings (SEO)

Description	Part number
IBM TS3100 Tape Library Model L2U	61732UL
IBM TS3200 Tape Library Model L4U	61734UL

The following are newly announced features on the specified models of the IBM TS3100 Tape Library and IBM TS3200 Tape Library 6173 machine type:

Description	Model	Feature number	Initial/ MES/ Both/ Support	RP	
				CSU	MES
IBM TS3100 Tape Library Model	L2U				
	L2U			Yes	
IBM TS3200 Tape Library Model	L4U				
	L4U			Yes	
2 m SAS/Mini-SAS 1x Cable (host SFF-8470 to target SFF-8088)	L2U	5402	Both		
	L4U		Both		
25 m LC-LC Fibre Cable	L2U	6025	Both		
	L4U		Both		
6173 Path Failover	L2U	AS0R	Both		
	L4U		Both		
Additional Power Supply for TS3200	L4U	AS0W	Both		
SAS/Mini-SAS 4x Interposer	L2U	AS0X	Both		
	L4U		Both		
Mini-SAS/Mini-SAS 4x Interposer	L2U	AS0Y	Both		
	L4U		Both		
2 m Mini-SAS/Mini-SAS 1x Cable (host SFF-8088 to target SFF-8088)	L2U	AS0Z	Both		
	L4U		Both		
4.5 Meter VHDCI/HD68 SCSI Cable	L2U	AS14	Both		
	L4U		Both		
10 Meter VHDCI/HD68 SCSI Cable	L2U	AS15	Both		
	L4U		Both		
6173 Transparent LTO Encryption	L2U	AS18	Both		
	L4U		Both		
13 Meter LC/LC Fibre Channel Cable	L2U	AS1A	Both		
	L4U		Both		
6173 Rack Mount Kit	L2U	AS1B	Both		
	L4U		Both		
Ultrium Cleaning Cartridge L1	UCC				
	L2U	AS1E	Both		
	L4U		Both		
6173 Right Side Tape Magazine	L2U	AS1F	Both		
	L4U		Both		
6173 Left Upper 4U Tape Magazine	L4U	AS1G	Both		
6173 Left Lower 4U Tape Magazine	L4U	AS1H	Both		
6173 Left side 2U Tape Magazine	L2U	AS1J	Both		
6173 LTO Ultrium 4 LVD SCSI Drive sled	L2U	AS1L	Both		
	L4U		Both		
6173 LTO Ultrium 4 Fibre Channel Drive sled	L2U	AS1M	Both		
	L4U		Both		
6173 LTO Ultrium 4 SAS Drive sled	L2U	AS1N	Both		
	L4U		Both		
6173 LTO Ultrium 4 Half High Fibre Channel Drive sled	L2U	AS1P	Both		
	L4U		Both		

6173 LTO Ultrium 4 Half High SAS DriveV2 Sled	L2U	AS1Q	Both
	L4U		Both
6173 LTO Ultrium 5 Fibre Channel Drive	L2U	AS1S	Both
	L4U		Both
6173 LTO Ultrium 5 SAS Drive Sled	L2U	AS1T	Both
	L4U		Both
6173 LTO Ultrium 5 Half High SAS Drive Sled	L2U	AS1U	Both
	L4U		Both
6173 LTO Ultrium 5 Half High Fibre Drive Sled	L2U	AS1W	Both
	L4U		Both
6173 LTO Ultrium 6 Fibre Channel Drive	L2U	AS1Y	Both
	L4U		Both
6173 LTO Ultrium 6 Half High SAS Drive Sled	L2U	AS1Z	Both
	L4U		Both
6173 LTO Ultrium 6 Half High Fibre Drive Sled	L2U	AS21	Both
	L4U		Both
Ultrium 4 Data Cartridges 5-Pack	L2U	AS22	Both
	L4U		Both
Ultrium 5 Data Cartridges 5-Pack	L2U	AS23	Both
	L4U		Both
Ultrium 6 Data Cartridges 5-Pack	L2U	AS24	Both
	L4U		Both
2.8m, 10A/120V, C13 to NEMA 5-15P (US) Line Cord	L2U	AS29	Both
	L4U		Both
2.8m, 10A/230V, C13 to CEE7-VII (Europe) Line Cord	L2U	AS2A	Both
	L4U		Both
2.8m, 10A/230V, C13 to DK2-5a (Denmark) Line Cord	L2U	AS2B	Both
	L4U		Both
2.8m, 10A/230V, C13 to BS 1363/A (UK) Line Cord	L2U	AS2C	Both
	L4U		Both
2.8m, 10A/230V, C13 to SI 32 (Israel) Line Cord	L2U	AS2D	Both
	L4U		Both
2.8m, 10A/230V, C13 to SEV 1011-S24507 (Sws) Line Cord	L2U	AS2E	Both
	L4U		Both
2.8m, 10A/230V, C13 to SABS 164 (South Africa) Line Cord	L2U	AS2F	Both
	L4U		Both
2.8m, 10A/230V, C13 to CEI 23-16 (Italy) Line Cord	L2U	AS2G	Both
	L4U		Both
2.8m, 10A/230V, C13 to AS/NZS 3112 (Aus/NZ) Line Cord	L2U	AS2H	Both
	L4U		Both
2.8m, 10A/208V, C13 to NEMA 6-15P (US) Line Cord	L2U	AS2J	Both
	L4U		Both
2.8m, 10A/220V, C13 to IRAM 2073 (Argentina) Line Cord	L2U	AS2K	Both
	L4U		Both
2.8m, 10A/220V, C13 to CNS 10917-3 (Taiwan) Line Cord	L2U	AS2L	Both
	L4U		Both

2.8m, 10A/220V, C13 to GB 2099.1 (China) Line Cord	L2U	AS2M	Both
	L4U		Both
2.8m, 10A/110V, C13 to CNS 10917-3 (Taiwan) Line Cord	L2U	AS2N	Both
	L4U		Both
2.8m, 12A/100V, C13 to JIS C-8303 (Japan) Line Cord	L2U	AS2P	Both
	L4U		Both
2.8m, 12A/220V, C13 to KSC 8305 (S. Korea) Line Cord	L2U	AS2Q	Both
	L4U		Both
2.8m, 10A/240V, C13 to IS 6538 (India) Line Cord	L2U	AS2R	Both
	L4U		Both
2.8m, 10A/220V, C13 to NBR 6147 (Brazil) Line Cord	L2U	AS2T	Both
	L4U		Both
2.8m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	L2U	AS2U	Both
	L4U		Both
EMEA Long Leadtime Configurations	L2U	1763	Initial
	L4U		Initial
Hungary CHW plant 9SH	L2U	1764	Initial
	L4U		Initial
Guad CHW plant 9KQ	L2U	1765	Initial
	L4U		Initial
ISTC CHW 9K2	L2U	1766	Initial
	L4U		Initial
RTP CHW 9NR	L2U	1767	Initial
	L4U		Initial
Offload Manufacturing to ISTC	L2U	1770	Initial
	L4U		Initial
Capacity Scheduling Service	L2U	1772	Initial
	L4U		Initial
Custom SLA Scheduling Service	L2U	1796	Initial
	L4U		Initial
Consolidate Shipment	L2U	8031	Initial
	L4U		Initial
TAA Compliant Order	L2U	8067	Initial
	L4U		Initial
Custom Unit Carton Label	L2U	2220	Initial
	L4U		Initial
Request for a new Vendor Logo Hardware	L2U	2247	Initial
	L4U		Initial
Request for a Classic RPQ	L2U	2248	Initial
	L4U		Initial
IBM TS3100 Tape Library Model	L2U	AS5W	Initial
	L4U		
IBM TS3200 Tape Library Model	L2U	AS5X	Initial
	L4U		

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