



IBM TS3500 Tape Library supports Linear Tape-Open Ultrium 7

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At a glance

IBM[®] TS1070 Model F7A is an IBM Linear Tape-Open[™] (LTO[™]) Ultrium[™] 7 Tape Drive that combine IBM tape reliability and performance at open systems prices. New Ultrium 7 Tape Drives deliver the following improvements:

- Increased maximum data transfer rates deliver up to 300MB/sec native as compared to LTO Ultrium 6 at 160 MB/sec native
- Support for LTO Generation 7 media specification tape cartridge compressed capacity of up to 15 TB with 2.5 to 1 compression
- 8 Gbps Fibre Channel dual-ported interface attachment
- Support for media partitioning and self-describing tape with IBM Spectrum Archive[™] Enterprise Edition software
- Encryption capabilities
- Support for new and field merge TS1070 (3588-F7A) drives into 3584 models L53 and D53
- LTO Ultrium 7 cartridge capacity of up to 120 PB per library (up to 300 PB with 2.5:1 compression), up to 4.5 EB per complex when compressed

TS1070 Model F7A can be installed in new or previously installed TS3500 Tape Library Models L53 and D53.

Order now

For ordering, contact your IBM representative or an IBM Business Partner. For more information, contact the Americas Call Centers at: 800-IBM-CALL (426-2255).

Reference: YE001

Overview

IBM TS1070 Model F7A is designed to be installed in an IBM TS3500 Tape Library to deliver high capacity and performance for the midrange open systems environment. This model incorporates the new LTO Ultrium 7 Tape Drive with enhanced maximum tape drive throughput over the IBM LTO generation 6 Tape Drive (Ultrium 6). It has a native data transfer of up to 300 MB/sec. The TS1070 Tape Drive supports the LTO Generation 7 media specification of more than double the compressed capacity with up to 15 TB with 2.5 to 1 compression (up to 6 TB native capacity) as compared to previous LTO 6 compressed capacity of up to 6.25 TB with 2.5:1 compression (up to

2.5 TB native capacity) per tape cartridge. IBM Ultrium 7 Tape Drives can read and write LTO Ultrium 6, and read LTO Ultrium 5 Data Cartridges. The TS1070 has an 8 Gbps Fibre Channel dual-ported interface for connection to a wide spectrum of open system servers.

The IBM TS1070 LTO Ultrium 7 Tape Drive supports data encryption with Ultrium 7, Ultrium 6, and Ultrium 5 media.

IBM Ultrium 7 enhancements to help improve performance and reliability include:

- Native data transfer rate of up to 300 MB/sec
- LTO Generation 7 media specification tape cartridge compressed capacity of up to 15 TB (up to 6 TB native)
- 8 Gbps Fibre Channel dual-ported drive attachment
- A 1 GB internal buffer
- Support for media partitioning and self-describing tape with IBM Spectrum Archive Enterprise Edition
- LTO Ultrium 7 encryption support
- Support for new and field merge TS1070 (3588-F7A) drives into 3584 models L53 and D53
- LTO Ultrium 7 cartridge capacity of up to 120 PB per library (up to 300 PB with 2.5:1 compression), up to 4.5 EB per complex when compressed

TS1070 Model F7A can be installed in new or installed TS3500 Tape Library Models L53 and D53.

Key prerequisites

Appropriate levels of host and drive software are required to attach the TS1070 Model F7A to a wide range of environments, including select IBM Power Systems™, IBM System p, IBM System z^(R) (zLinux), other servers running Linux™ and Microsoft™ Windows™ operating system environments that support Fibre Channel interfaces.

Refer to the [Technical information](#) section for details.

Planned availability date

October 23, 2015

Description

IBM TS1070 Model F7A is IBM LTO Ultrium 7 Tape Drive designed for the heavy demands of backup and archive tape storage. TS1070 Model F7A is designed to mount in a TS3500 tape library and has an 8 Gbps Fibre Channel dual-ported interface for attachment to a wide range of environments, including select IBM Power Systems, IBM System p, IBM z Systems™ (zLinux), and other servers running Linux and Microsoft Windows operating system environments.

These TS1070 models incorporate seventh-generation IBM LTO Ultrium technology. They offer the following significant improvements over prior generations:

- **Increased performance:** Maximum tape drive throughput native data rate performance of up to 300 MB/sec. Data tracks are written 32 at a time. IBM LTO 7 Tape Drives can read and write LTO Ultrium 6 Data Cartridges at Ultrium 6 capacities and rates, and read LTO Ultrium 5 Data Cartridges at Ultrium 5 capacities and rates.

Note: Although the Ultrium 7 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 2.5 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:** LTO Generation 7 media specification tape cartridge physical capacity is up to 15 TB compressed physical capacity, more than double that of Ultrium 4, 5 and 6 Data Cartridges. This is achieved by increasing the linear density, track density, and the media length. IBM Ultrium 7 tape is an advanced Barium Ferrite tape developed to help provide durability and increased capacity.
- **Encryption:** The IBM TS1070 LTO Ultrium 7 Tape Drive supports data encryption on the base drive with Ultrium 7 or Ultrium 6 media. System managed and library managed encryption and associated IBM Security Key Lifecycle Manager access are all available as a chargeable licensed key (feature 1604, Transparent LTO Encryption) under the TS4500 tape library L-frames. IBM Security Key Lifecycle Manager V1.0 is required with this feature.
- **Attachment options:** TS1070 Tape Drives come with 8 Gbps Fibre Channel dual-ported attachment models for connection to a wide spectrum of open system servers. They are supported on a wide range of environments including select IBM Power Systems, IBM System p, IBM z Systems (zLinux), and other servers running Linux and Microsoft Windows operating system environments.
- **WORM media support:** LTO Generation 7 media specification provides up to 6 TB native capacity, up to 15 TB in compressed mode, and up to 300 Mbps native data rate. IBM 3589 Ultrium 7 WORM Tape Cartridges are designed for archiving and data retention applications, as well as those applications requiring an audit trail. These cartridges work with the IBM LTO Ultrium 7 Tape Drive to help prevent the alteration or deletion of user data. IBM LTO 7 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 that comes 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 delivers up to 15 TB WORM compressed capacity in a single cartridge
- **Internal data buffer:** There is a 1.0 GB internal data buffer in the Ultrium 7 Tape Drive.
- **Digital speed matching:** The Ultrium 7 Tape Drive is designed to perform dynamic speed matching (at one of twelve speeds: 300, 287, 268, 250, 231, 213, 194, 175, 157, 138, 120, 101 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 repositions and improve throughput performance. Speed matching on Ultrium 7 ranges from 100 to 300 MB/sec versus 40 to 160 MB/sec on Ultrium 6.
- **Giant Magneto Resistive (GMR) head design:** Use of flat lap head technology in GMR heads from enterprise tape drives for Ultrium 7 help minimize contact, edge damage, debris accumulation, and wear on the tape as it moves over the read/write heads.
- **Dual-stage 32-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 7 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.
- **IBM Linear Tape File System™ (LTFS) partitioning support:** The principal function of media partitioning is to enable faster data access by splitting the

cartridge into two media partitions. LTFS media partitioning is supported in the TS1070 Tape Drive, and IBM Spectrum Archive Enterprise Edition will be supported in the TS4500 tape library. WORM media can also be partitioned.

IBM LTFS software leverages LTO7 tape partitioning. It is designed to enable a self-describing tape file format and to deliver an easy tape storage and distribution solution without the use of additional database applications. Customers of IBM LTFS software are those who require a standard tape cartridge format at a low cost and will use standalone IBM LTO7 tape drives. IBM LTFS is the perfect solution for those in the media and entertainment industry, and other fields that need massive data storage on tape for long retention periods, such as banking, scientific research, and government sectors. For further information and list of supported operating systems, refer to the LTFS website

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

IBM maintains the latest levels of 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^(R)*
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 the following website

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

The following IBM LTO Ultrium feature enhancements are included in the IBM LTO Ultrium 7 Tape Drive:

- **Positive pin retention and independent tape loader and threader motors:** 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 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 3,584 data tracks in Ultrium 7 versus 2,176 data tracks in Ultrium 6. 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 7, 6, 5, and 4 tape drives. This method uses the surface of the tape, rather than the edges, to control tape motion, helping to 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.
- **Optimized robust drive components for automation environments:** Using some of the most robust components available, such as steel ball bearings in the

loader, robust leader block design, and a single circuit card, helps 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 feature optimizes 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 7 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 7 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 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 7 LTO-CM is 16320 bytes. Communication between the drive and the LTO-CM is via a low-level RF field transmitted by the drive to the cartridge.
- **Statistical Analysis and Reporting System (SARS):** The Ultrium 7 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 to deliver a more reliable drive. The seventh-generation drive electronics are designed to provide error correction of soft errors in the memory arrays in data and control paths.

With support for LTO Ultrium-format tape data cartridges, TS1070 Model F7A with the TS3500 tape library can be a cost-effective solution for backup, save-and-restore, and archiving functions.

Ultrium 7 Data Cartridges

The physical compressed capacity of the LTO 7 Data Cartridges have more than doubled the capacity of the IBM Ultrium 6 Data Cartridge with a capacity of up to 15 TB with 2.5 to 1 compression. IBM LTO Ultrium 7 Tape Drives can read and write Ultrium 6, and read Ultrium 5 data cartridges. IBM LTO 7 cartridges can be resident in the same TS3500 and TS4500 tape libraries with the Ultrium 6 and 5 data cartridges. IBM LTO 7 data cartridges can be ordered using IBM machine type 3589, IBM LTO Ultrium Tape Cartridges.

These cartridges have been designed to provide several enhancements over previous tape technologies and 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.

TS3500 features and functions

TS1070 Ultrium 7 tape drive is supported in TS3500 Tape Library Models L53 and D53. Appropriate levels of host and drive software are required to attach the TS1070 to a wide range of environments, including select IBM Power Systems, IBM System

p, IBM z Systems (zLinux), and other servers running Linux and Microsoft Windows operating system environments that support Fibre Channel interfaces.

Encryption

LTO 5 and later LTO tape drives are encryption capable, which means they can convert data into a cipher that ensures 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 feature number 1604 (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, a key manager that works in conjunction with the keystore of your choice to perform all necessary key management tasks is offered. There is no recovery for lost encryption keys. Refer to the *IBM Encryption Key Manager* and *IBM Security Key Lifecycle Manager* (formerly Tivoli[®] Key Lifecycle Manager) publications.

Product positioning

As you compare competitive tape solutions, consider:

- Capacity and performance requirements
- Data integrity and encryption, reliability, and availability
- Data partitioning, formatting, and management such as LTFS
- Storage usage and application requirements
- Affordability
- Loyalty to legacy or existing tape formats

TS1070 and its software applications are designed to address these requirements and deliver a functionally rich tape storage solution incorporating LTO Ultrium 7 Tape Drive technology.

TS1070 is an excellent choice if you use tape drives that require larger capacity or higher performance tape backup. The TS1070 Tape Drive can be the answer to growing storage requirements and shrinking backup and archive windows.

The TS3500 Tape Library and IBM software applications excel in addressing these requirements and deliver a functionally rich tape storage solution incorporating LTO Ultrium and 3592 tape technology. You also gain flexibility of automated tape library management and unattended save, restore, and archive operations.

Depending on capacity requirements, a wide spectrum of tape libraries are available from the IBM Ultrium Tape family of products based on your storage usage and requirements. Lower capacity tape automation products to choose from include the IBM TS3310, TS3200, or TS3100 Tape Libraries.

For high duty-cycle and start/stop intensive tape applications with mission-critical data protection and high-capacity requirements, consider the IBM TS1140 or TS1150 or 3592 Tape Drive with the IBM TS3500 and TS4500 tape library.

Reference information

For more information, refer to the following announcements:

- IBM TS1140 Tape Drive Model EH7, Hardware Announcement [114-078](#), dated May 19, 2014
- IBM TS4500 Tape Library, Hardware Announcement [114-072](#), dated May 19, 2014
- IBM TS1060 Tape Drive Model F6A, Hardware Announcement [112-162](#), dated October 03, 2012
- IBM TS1140 Tape Drive Model E07, Hardware Announcement [111-087](#), dated May 09, 2011
- IBM TS1050 Tape Drive Model F5A, Hardware Announcement [110-075](#), dated April 12, 2010
- IBM TS3500 Tape Library, Hardware Announcement [106-320](#), dated May 09, 2006
- IBM TS1150 Tape Drive models EH8 and E08, Hardware Announcement [114-165](#), dated October 06, 2014

For 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), visit

<http://www.ibm.com/ibm/environment/products/rohs.shtml>

Product number

Description	Machine type	Model	Feature number
TS1070 Ultrium 7 Tape Drive	3588	F7A	
3588 F7A/F7C Drive Plant Install	3588	F7A	9607
3588 F7A/F7C Drive Field Install	3588	F7A	9608
TAA Compliance	3588	F7A	0983*
LTO5 and LTO6 tape drive support	3584	D52, L52	1405
LTO5 and LTO6 tape drive support	3584	D53, L53	1405
LTO6 and LTO7 tape drive support	3584	D52, L52	1407
LTO6 and LTO7 tape drive support	3584	D53, L53	1407
3588 F7A/F7C Plant Install	3584	D53, L53	9607
3588 F7A Field Install	3584	D52, L52	9608
3588 F7A Field Install	3584	D53, L53	9608

* This feature was previously announced on other model

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^(R) ID and password are required (use IBM ID).

[BP Attachment for Announcement Letter 115-133](#)

Education support

Call IBM IT Education Services at 800-IBM-TEACH (426-8322) for catalogs, schedules, and enrollments.

Publications

Information on TS1070 Model F7A Tape Drive is contained in the following TS3500 Tape Library publications. Additional copies are available. To order, contact your IBM representative.

Title	Order number
<i>IBM Tape Device Driver Installation and User's Guide (English)</i>	GC27-2130
IBM TS1050 (Model 3588 F5A), TS1060 (Model 3588 F6A), and TS1070 (Model 3588 F7A) Installation instructions for 3588 drive model conversion F5A to F5C, F6A to F6C, or F7A to F7C	12X4574

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 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 the following website

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

IBM Knowledge Center provides you with a single information center 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. IBM Knowledge Center is located at

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

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.

The IBM Publications Center Portal is located at

<http://www.ibm.com/shop/publications/order>

Services

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 visit

<http://www.ibm.com/services/>

For details on available IBM Business Continuity and Recovery Services, contact your IBM representative or visit

<http://www.ibm.com/services/continuity>

For details on education offerings related to specific products, visit

http://www.ibm.com/services/learning/ites.wss/zz/en?pageType=tp_search_new

Technical information

Specified operating environment

Physical specifications

Height and length of LTO 7 tape drives:

- Width: 156 mm (6.1 in)
- Depth: 366 mm (14.4 in)
- Height: 84.76 mm (3.3 in)
- Weight: 3.29 kg (7.25 lb)

Operating environment

Equipment environment specifications for IBM TS1070 tape drives:

- Temperature: 10°C to 40°C (50°F to 104°F)
- Relative humidity: 20 - 80% noncondensing
- Electrical power: 5.0 amps peak at 5 V dc, 2.0 amps peak at 12 V dc, 34 watts max continuous
- Noise level: 5.8 Bels operating

Equipment environment specifications for IBM TS3500 and TS4500 tape libraries:

- Temperature: 15°C to 32°C (60°F to 90°F)
- Relative humidity: 20 - 80% noncondensing
- Electrical power: 5.1 amps at 200-240 V ac, 1.1 kVA (max per frame)

The TS3500 and TS4500 tape libraries are classified as a Category 1 product as defined in C- S 1-1710-006. The maximum noise level (operating/idle) in bels (at recommended ambient temperature) is:

- Operating sound power level: 7.5 bels

Hardware requirements

TS1070 Model F7A is designed for installation in TS3500 Tape Library Model L53 or D53. Up to twelve TS1070 models can be installed in one of these frames (for a total of up to 192 Ultrium Tape Drives in a 16-frame library). The TS1070 can be installed and intermixed within the same frame with other Ultrium 1, 2, 3, 4, 5, 6, or 7 Tape Drives.

TS1070 Model F7A has an 8 Gbps Fibre Channel interface that may attach in either fabric or arbitrated loop topology.

An LTO Fibre Drive Mounting Kit feature (#1514) is required on a TS3500 Tape Library frame to install a TS1070. The TS1070 must be ordered separately and is designed for customer setup in the TS3500 Tape Library. When ordered with a new TS3500 coming from the plant, one of the following feature numbers should be specified:

- Feature number 9607 (3588 F67/F7C Plant Install) should be specified on the TS1070, and the TS3500 Tape Library frame into which it will be installed, if it is going to be shipped with the TS3500 Tape Library frame
- Feature number 9608 (3588 F7A/F7C Field Install) should be specified on the TS1070 if it is going to be shipped for installation into an already installed TS3500 Tape Library frame

TS1070 Tape Drive Model F7A is designed for customer setup. However, if the customer desires assistance with the installation, feature number 1678, 3588 Drive Field Install Assist, can be ordered on the TS3500 frame (one feature for each drive that is needed).

Customer-owned TS1070, TS1060, TS1050, or TS1040 Tape Drives, or 3588 tape drives removed from a TS3500 library frame, can be installed in another TS3500 frame. An LTO Fibre Drive Mounting Kit feature (#1514) is required for installing a TS1070 or 3588 Tape Drive in a drive slot in a TS3500 Tape Library Model L53 or D53 frame.

Labeled or bulk quantities of LTO Ultrium cartridges can be ordered using machine type 3589 or purchased through distributors. Refer to the **Supplies** section for additional information.

A TS1070 Model F7A in the TS3500 Tape Library can be attached to a wide range of environments, including select IBM Power Systems, IBM System p, IBM z Systems (zLinux), and other servers running Linux and Microsoft Windows operating system environments that support Fibre Channel interfaces.

A current list of supported open system configurations for Model F7A is available from the following website

<http://www-03.ibm.com/systems/support/storage/config/ssic>

Select the **model**, then **Interoperability Matrix**, and view the *Supported Servers and Operating Systems* for the product.

Cables

Cables are required to attach tape drives in the TS3500 tape library to each server connection, up to the number of tape drive attachments installed. A Fibre Channel cable should be specified on the TS3500 frame.

Fibre Channel cables

A Fibre Channel cable is required to attach a TS1070 in the TS3500 Tape Library through the standard Fibre Channel patch panel in the TS3500 Tape Library Model L23 or L53 to host Fibre Channel adapters, the IBM 2109 SAN Fibre Switch, or other Fibre Channel components. The cable can be customer supplied or ordered with the TS3500 Tape Library in the lengths shown. The attaching Fibre Channel cable must be a 50.0/125 micrometer, short wavelength, fiber-optic cable for distances up to 500 meters. These tape drives come with LC Duplex connectors. One 2.0 meter LC-LC Fibre Channel drive-to-patch panel cable is included with each Fibre Mounting Kit (#1504). If additional cables are required, for example, to attach the second interface on a 3588 Model F7A Tape Drive, they can be ordered with feature number 1461 - Additional LC/LC Patch Panel Cable.

Features available for Fibre Channel cables, and their respective lengths, are available on the TS3500 frame, with the following feature numbers:

- Feature number AGK1 - 10 m OM3 fiber Cable (LC)
- Feature number AGK2 - 25 m OM3 fiber Cable (LC)
- Feature number AGK3 - 80 m OM3 fiber Cable (LC)

An interposer is available to connect a tape drive or server LC Duplex adapter to a SC Duplex cable by ordering the Interposer SC-LC Fibre feature (#5096). Refer to the Special Features section of the TS3500 or 3584 Tape Library Sales Manual for detailed descriptions of these features.

HBA support

For a current list of HBAs that support the TS1070 or TS3500, visit

<http://www-03.ibm.com/systems/support/storage/config/ssic/index.jsp>

Software requirements

LTO Ultrium or Enterprise Tape Drives in the TS3500 and TS4500 tape libraries

For the latest supported hardware interoperability configurations, refer to the Storage Interoperation Center website

<http://www.ibm.com/systems/support/storage/config/ssic>

The installation of a TS3500, TS4500, or 3584 Tape Library may require code updates for supported open systems device drivers or storage management software. According to the SAPR Guide, the account team or Business Partner should ensure that the customer checks the support levels required for their particular software environment prior to the installation of the TS1070. A Solutions Assurance call is required at a minimum for the installation of the first TS1070 in an account.

IBM Spectrum Protect™ and other industry-leading compatible software offerings provide storage and tape management software for the TS4500 (machine type 3584). Supporting software and applications must be obtained separately from IBM, IBM Business Partners, or ISVs. A list of compatible software is available from your IBM representative or at

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

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>

For a list of compatible software, operating systems, and servers for LTO tape drives, visit

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

Under **IBM TS3500 Tape Library** or **IBM TS4500 Tape Library**, select **Product details**. Under **Learn more**, select **Interoperability matrix** or select **ISV matrix for LTO**.

For a list of compatible software, operating systems, and servers for 3592 tape drives, visit

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

Under the appropriate tape drive, select **Product details**. Under **Learn more**, select **Interoperability matrix** or **ISV matrix**.

For complete IBM storage interoperability information, including operating systems, servers, switches, and adapters supported by the TS3500 and TS4500 tape library

in a storage-area network (SAN) configuration, visit the IBM Storage Interoperation Center (SSIC) at

<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>

Compatibility

Only LTO 5 and later LTO tape drives are supported with the TS3500 tape library.

TS1070 Tape Drives can read and write LTO Ultrium 7 or 6 data cartridges, and can read LTO Ultrium 5 data cartridges. The LTO Generation 7 media specification up to 15 TB compressed data cartridges can only be used on the new IBM LTO Ultrium 7 Tape Drives.

The TS1070 Model F7A Tape Drive and LTO Ultrium 7 cartridges can be resident in the same TS3500 Tape Library with IBM LTO Ultrium 6 Tape Drives and cartridges, IBM LTO Ultrium 5 Tape Drives and cartridges, IBM LTO Ultrium 4 Tape Drives and cartridges, or with TS1130, TS1140 or 3592 Tape Drives and cartridges.

Limitations

- Although the compression technology can increase the amount of data stored on the media, the actual degree of compression achieved is highly sensitive to the characteristics of the data being compressed.
- Fibre Channel cable lengths are limited to 500 meters (1,650 ft).
- Although multiple systems may be attached to a tape drive, the systems cannot use the drive simultaneously.

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

Planning information

Customer responsibilities

Physical planning is a customer responsibility. Detailed planning information is in the *IBM TS3500 Tape Library Introduction and Planning Guide*(GA32-0559). Current levels of the open systems device drivers should be obtained to ensure the TS1070 Model F7A is supported.

Customers are responsible for obtaining the appropriate adapters, cables, and interposers (if required) for system attachment. Customers are also responsible for ordering media.

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 the TS1070 Model F7A in the TS3500 Tape Library to each server connection (up to the number of tape drive attachments installed). Refer to **Cables** in the [Hardware requirements](#) section for a list of cables for the TS1070 Model F7A Tape Drive.

Installability

Installation time for each field-installed TS1070 tape drive in the TS3500 tape library is approximately 0.5 to 0.7 hours.

Direct customer support

Eligible customers can obtain installation and usage assistance through ASK Support using the search word 3584, 3588, TS3500, or TS1070.

Packaging

Product	Shipment group	Number of boxes
3588 Model F7A	3588 Tape Drive Model F7A	1

Security, auditability, and control

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

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, visit

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

Terms and conditions

Volume orders

Contact your IBM representative.

IBM Global Financing

Yes

Products - terms and conditions

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 a 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.

Warranty service

If required, IBM provides repair or exchange service depending on the types of warranty service specified for the machine. IBM will attempt to resolve your problem over the telephone, or electronically via an IBM website. Certain machines contain remote support capabilities for direct problem reporting, remote problem determination, and resolution with IBM. You must follow the problem determination and resolution procedures that IBM specifies. Following problem determination, if IBM determines on-site service is required, scheduling of service will depend upon the time of your call, machine technology and redundancy, 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 IBM's normal service area. Contact your local IBM representative or your reseller for country-specific and location-specific information.

On-site Service

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

Service level is 24 hours per day, 7 days a week, 4 hour average, same day response.

Warranty service

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

Warranty service upgrades

During the warranty period, warranty service upgrades provide an enhanced level of On-site Service for an additional charge. Service levels are response-time objectives and are not guaranteed. See the Warranty services section for additional details.

IBM will attempt to resolve your problem over the telephone or electronically by access to an IBM website. Certain machines contain remote support capabilities for direct problem reporting, remote problem determination, and resolution with IBM. You must follow the problem determination and resolution procedures that IBM specifies. Following problem determination, if IBM determines on-site service is required, scheduling of service will depend upon the time of your call, machine technology and redundancy, and availability of parts.

Maintenance service options

On-site Service

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose. The following on-site response-time objectives are available as warranty service upgrades for your machine. Available offering is 24 hours per day, 7 days a week, 2 hour average response.

Maintenance services

If required, IBM provides repair or exchange service depending on the types of maintenance service specified for the machine. IBM will attempt to resolve your problem over the telephone or electronically, via an IBM website. Certain machines contain remote support capabilities for direct problem reporting, remote problem determination, and resolution with IBM. You must follow the problem determination and resolution procedures that IBM specifies. Following problem determination, if IBM determines on-site service is required, scheduling of service will depend upon the time of your call, machine technology and redundancy, and availability of parts. Service levels are response-time objectives and are not guaranteed. The specified level of maintenance service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country-specific and location-specific information. The following service selections are available as maintenance options for your machine type.

On-site Service

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

Service levels are:

- 9 hours per day, Monday through Friday, excluding holidays, next business day response
- 9 hours per day, Monday through Friday, excluding holidays, 4 hour average response
- 24 hours per day, 7 days a week, 4 hour average response
- 24 hours per day, 7 days a week, 2 hour average response

Machine Exchange Service

IBM will initiate shipment of a replacement machine to your location. You are responsible for its installation and verification of operation. You must pack the failed machine into the shipping container that contained the replacement machine and return the failed machine to IBM. Transportation charges, both ways, are paid by IBM. You may be charged for the replacement machine if IBM does not receive the failed machine within 15 days of your receipt of the replacement.

Non-IBM parts service

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

This service includes hardware problem determination (PD) on the non-IBM parts (for example, adapter cards, PCMCIA cards, disk drives, memory) installed within IBM machines and provides the labor to replace the failing parts at no additional charge.

If IBM 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 IBM FRU label), IBM may also source and replace the failing part at no additional charge. For all other non-IBM 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.

Usage plan machine

No

IBM hourly service rate classification

Two

When a type of service involves the exchange of a machine part, the replacement may not be new, but will be in good working order.

General terms and conditions

Field-installable features

Yes

Model conversions

No

Machine installation

Installation is performed by IBM. IBM will install the machine in accordance with the IBM installation procedures for the machine. In the United States, contact IBM at 1-800-IBM-SERV (426-7378). In other countries, contact the local IBM office.

Graduated program license charges apply

No

Licensed Internal Code and Licensed Machine Code

This product does not contain Licensed Internal Code or Licensed Machine Code.

Educational allowance

A reduced charge is available to qualified education customers. The educational allowance may not be added to any other discount or allowance.

The educational allowance is 15% for the products in this announcement.

Prices

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

Description	Machine type	Model	Feature number
TS1070 Ultrium 7 Tape Drive	3588	F7A	
3588 F7A/F7C Drive Plant Install	3588	F7A	9607
3588 F7A/F7C Drive Field Install	3588	F7A	9608
TAA Compliance	3588	F7A	0983*
LTO5 and LTO6 tape drive support	3584	D52, L52	1405
LTO5 and LTO6 tape drive support	3584	D53, L53	1405
LTO6 and LTO7 tape drive support	3584	D52, L52	1407
LTO6 and LTO7 tape drive support	3584	D53, L53	1407

Description	Machine type	Model	Feature number
3588 F7A/F7C Plant Install	3584	D53, L53	9607
3588 F7A Field Install	3584	D52, L52	9608
3588 F7A Field Install	3584	D53, L53	9608

Feature number	Model	Field install only	Plant install only	MES removal	MES removal charge
9607	F7A	N	Y	Y	N
9608	F7A	N	Y	Y	N
0983*	F7A	N	Y	N	N
1405	D52, L52	Y	Y	N	N
1405	D53, L53	Y	Y	N	N
1407	D52, L52	Y	Y	N	N
1407	D53, L53	Y	Y	N	N
9607	D53, L53	N	Y	Y	N
9608	D52, L52	Y	Y	Y	N
9608	D53, L53	Y	Y	Y	N

* This feature was previously announced on other model

Pricing terms

Prices in the following PDF prices link are suggested list prices on day of announcement for the U.S. only. They are provided for your information only. Dealer prices may vary, and prices may also vary by country. IBM list price does not include tax or shipping and is subject to change without notice.

[ENUS-115-133-LIST_PRICES_2015_10_06.PDF](#)

Alternative service

Machine type-model	IOR IBM Same day On-site Repair (IOR, 24 x 7)
3588-F7A	

ServiceElect (ESA) charges

For ServiceElect (ESA) maintenance service charges, contact IBM Global Services at 888-IBM-4343 (426-4343).

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