



# IBM System Storage TS3500 Tape Library now offers model conversions and enhancements

## Overview

Model conversions are now available for the IBM System Storage™ TS3500 Tape Library (machine type 3584). You can convert the IBM TotalStorage® 3584 Tape Library Models L22, L52, D22, and D52 to the IBM System Storage TS3500 Tape Library Models L23, L53, D23, and D53, respectively. The Models L23, L53, D23, and D53 are designed to provide enhanced power architecture and frame control assembly, and additional new functions and features (refer to Hardware Announcement 106-320, dated May 9, 2006).

Additional ordering enhancements being announced for the TS3500 Tape Library include entry and tiered pricing for Advanced Library Manager System (ALMS). Additional firmware enhancements, requiring the latest version of TS3500 firmware, being announced for the TS3500 Tape Library include:

- TS1120 Model E05 (machine type 3592) Tape Drive encryption support (refer to Hardware Announcement 106-655, dated August 29, 2006)
- Library to drive interface speed improvement
- Web user interface enhancements such as viewing parsed library and drive error logs, resetting library node cards, and viewing license key status for capacity, ALMS, and path failover

These advancements in performance, reliability, and function are intended to help enhance library management, and provide flexibility, growth, and a foundation for automation across an enterprise or business installation, while supporting investment protection.

## Key prerequisites

Appropriate levels of host software are required to attach the TS3500 Tape Library with the IBM System Storage TS1030 or TS1120 Tape Drives to selected IBM System i™, IBM System p™, IBM System x™, or IBM System z products, and supported Hewlett Packard, Sun, UNIX®, Linux™, and Windows™ servers. Refer to the **Technical information** section for details.

## Planned availability dates

- September 8, 2006: Firmware enhancements and capabilities, including encryption support
- October 27, 2006: Model conversions and ALMS features

## At a glance

The TS3500 Tape Library is designed to provide IBM tape and automation capabilities at open systems prices. Enhancements include:

- Model conversion options to Models L23, L53, D23, and D53 that are designed to provide an enhanced power architecture and frame control assembly, and additional functions and features
- TS1120 Model E05 Tape Drive encryption support
- Entry and tiered pricing for Advanced Library Manager System (ALMS)
- Web user interface enhancements such as viewing parsed library and drive error logs, resetting library node cards, and viewing license key status for capacity, ALMS, and path failover

### For ordering, contact:

Your IBM representative, an IBM Business Partner, or the Americas Call Centers at

800-IBM-CALL

Reference: YE001

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## Description

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The TS3500 Tape Library is part of the family of IBM tape library storage solutions designed for the storage requirements for today's midrange to high-end systems. The library subsystem is designed to optimize access to data and reliability. The TS3500 Tape Library includes an enhanced power architecture and frame control assembly. This enhanced frame control assembly has fewer parts than the previous frame control assembly and is designed with hot-swappable redundant parts to help improve reliability. The enhanced frame control assembly comes standard on Models L23 and L53, and can be ordered as an optional feature on Models D23 and D53.

The TS3500 Tape Library supports the IBM System Storage TS1030 LTO Ultrium Tape Drive and IBM System Storage TS1120 Tape Drive. IBM LTO Ultrium tape drives are compact storage devices that are designed to support the highly intensive read and write operations required by today's open-system servers. The IBM LTO Ultrium 3 Tape Drive is the third generation of LTO Ultrium tape drives in the IBM TotalStorage LTO Ultrium family of products. The TS1120 Tape Drives are designed to provide high levels of performance, functionality, and cartridge capacity supporting the 3592 tape format, including data encryption and Write Once Read Many (WORM) media support.

The TS3500 or 3584 Tape Library Models D32, D52, D53, L32, L52, and L53 can be equipped with IBM TS1030 (3588) or LTO Ultrium Tape Drives, and Models D22, D23, L22, and L23 with the TS1120 or 3592 Tape Drives. The TS3500 Tape Library Models D22, D23, D52, D53, L22, L23, L52, and L53 have a smaller footprint than Model D32 or L32, so they take up less floor space. The Ultrium 3 Tape Drives and data cartridges can be resident in the same TS3500 Tape Library frame with Ultrium 1 or 2 Tape Drives and data cartridges, and adjacent frames can have TS1120 or 3592 Tape Drives and data cartridges. The TS3500 Tape Library supports mixed media in the same library by supporting the intermix of Models D22, D23, D32, D52, and D53 within a TS3500 Tape Library. Input/Output (I/O) stations are located on Model L22, L23, L32, L52, or L53 to facilitate tape loading and unloading.

The TS3500 Tape Library is designed to provide an excellent network data backup and archive solution. With the granularity and scalability to support requirements from a few servers to hundreds of clients, from gigabytes to terabytes, this powerful pairing can grow with you, helping to protect your investment.

### Model conversions

You can now convert to the newer TS3500 Tape Library models. The following model conversions are available:

- 3584 Model L22 to Model L23
- 3584 Model L52 to Model L53
- 3584 Model D22 to Model D23
- 3584 Model D52 to Model D53
- 3584 Model L23 to Model L53
- 3584 Model L53 to Model L23
- 3584 Model D23 to Model D53
- 3584 Model D53 to Model D23

### Advanced Library Management System (ALMS)

ALMS is the next generation of IBM Multi-Path Architecture. ALMS provides a license key to enable dynamic management of cartridges, storage slots, tape drives, and logical libraries in a TS3500 Tape Library. Tape drives can be easily assigned to any logical library using a Web user interface. Logical libraries can be added, deleted, or changed non-disruptively. The

assignment of inserted cartridges to a logical library can be set manually, by the software application, or by user-defined policies. Storage capacity can typically be changed without any impact to host applications. According to a customer's tape library capacity needs, ALMS can now be implemented as an "entry", "intermediate", or "full" capacity on demand level in the IBM TS3500 Tape Library.

### Tape drive encryption

The TS1120 Model E05 Tape Drive (machine type 3592 Model E05) now supports data encryption. This encryption capability is now standard on all new TS1120 Model E05 Tape Drives and is available as a chargeable upgrade option for existing installed TS1120 Model E05 Tape Drives. This upgrade requires changes to the drive hardware and microcode. The TS1120 can work with an IBM Encryption Key Manager component for the Java™ Platform (Encryption Key Manager) program that uses standard key repositories to generate and communicate encryption keys for tape drives on supported systems across the enterprise. The TS1120-based encryption and associated Encryption Key Manager are supported in a wide variety of operating systems environments including zOS, iOS, AIX®, HP, Sun, Linux, and Windows. In addition, three different encryption management methods are supported: Application Managed, System Managed, or Library Managed. The TS1120 supports transparent encryption to help minimize application changes in the system and library managed implementations. This encryption capability is supported via the TS1120 Tape Drive Model E05 integrated or attached to the TS3500 Tape Library and in other environments.

### Functional enhancements

Enhancements to the TS3500 Tape Library can help improve user interaction with the library. These functional enhancements include:

- Library to drive interface speed improvement

The communication speed between the TS3500 Tape Library and attached TS1030 and TS1120 Tape Drives has been increased. This is designed to reduce the time for tape drive code updates and the time to gather tape drive logs. This may require the drive firmware to be updated to the latest level to take advantage of the speed increase.

- Web user interface enhancements

Enhancements to the TS3500 Tape Library Web user interface improve system administrator and user interaction with the library. The Web user interface is now designed to support the ability to view parsed library and drive error logs, reset library node cards, and view license key status for library capacity, ALMS, and path failover.

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## Product positioning

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As you compare competitive tape solutions, consider:

- Library scalability
- Capacity, performance, and library management requirements
- Data integrity and security, reliability, and availability
- Storage usage and application requirements
- Affordability

- Loyalty to legacy or existing tape formats, including LTO and 3592 drive technology
- Server attachment and operating system support

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

The TS3500 Tape Library models are a smart choice for tape automation for IBM System i, IBM System p, IBM System z™, or IBM System x, and other popular open systems. The TS3500 Tape Library utilizes IBM Multi-Path Architecture, designed to allow homogeneous or heterogeneous open systems applications to share the library robotics, with ALMS for storage slot pooling and flexible drive assignment. New models of the IBM System Storage TS3500 Tape Library provide enhanced tape drive technology and support while helping to protect the investment in existing 3584 Tape Library installations. Model conversions are now available to convert to these new models. Also, additional enhancements and capabilities for the TS3500 Tape Library include:

- Tape drive encryption support for the TS1120 Model E05 (machine type 3592)
- Entry and intermediate priced offerings of ALMS for smaller library customers
- Library to drive interface speed improvement
- Web user interface enhancements such as the ability to view parsed library and drive error logs, reset library node cards, and view license key status for capacity, ALMS, and path failover

These enhancements improve the value of the TS3500 Tape Library in your environment. Customers will need to download the latest version of library and drive firmware.

The TS3500 Tape Library Base Frame Model L53 offers 64 to 287 slots for LTO Ultrium tape cartridge media and up to 12 IBM LTO Ultrium Fibre Channel Tape Drives. It is designed to provide excellent price/performance in the open systems environments where the tape automation requirements include from 1 to 12 drives or a library native capacity of up to 115 TB.

The TS3500 Tape Library Base Frame Model L23 offers 58 to 260 slots for 3592 tape cartridge media and up to 12 IBM TS1120 Tape Drives, with a library native capacity of up to 130 TB. The TS1120 Tape Drives are designed to provide high capacity, performance, and reliability in open systems environments with tape drive flexibility to accommodate capacity, as well as fast access where these requirements are needed.

Up to 15 TS3500 Tape Library Expansion Frame 3584 Models D22, D23, D32, D52, or D53 can be added to either the Model L22, L23, L32, L52, or L53. The Model D23 provides up to 400 cartridge slots for 3592 media, and can contain up to 12 TS1120 Tape Drives. The Model D53 provides up to 440 slots for LTO media, and can contain up to 12 Ultrium Fibre Channel Tape Drives. This can provide a total TS3500 library capacity of up to 192 IBM LTO Ultrium or TS1120 Tape Drives, with up to 6,887 Ultrium cartridge slots holding up to 2,755 TB of native physical capacity, or with up to 6,260 3592 cartridge slots holding up to 3,130 TB of native physical capacity.

The TS3500, part of a family of IBM System Storage tape products, can be the answer to growing storage requirements and shrinking backup windows.

If you have existing digital linear tape experience or require high-performance automated tape backup, the TS3500 Tape Library constitutes an excellent tape storage solution. In addition to reading and writing on LTO Ultrium-format tape cartridges, the TS3500 tape drives provide an enhanced functional alternative to DLT/SDLT, 1/4-inch, 4mm, 8mm, or IBM Magstar® MP 3570 tape drives.

For capacity requirements less than 28.8 TB (compressed), and depending on your storage usage and requirements, a wide spectrum of tape libraries are available from the family of IBM System Storage Ultrium Tape products. Tape automation products to choose from include the IBM System Storage TS3310 Tape Library (up to 169.6 TB compressed), IBM System Storage TS3200 Tape Library (up to 35.2 TB compressed), and IBM System Storage TS3100 Tape Library (up to 17.6 TB compressed).

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## Reference information

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- The TS1120 Tape Drive Model E05 supports encryption, Hardware Announcement 106-655, dated August 29, 2006
- The TS3500 Tape Library Models L23, D23, L53, and D53, Hardware Announcement 106-320, dated May 9, 2006
- The 3588 Model F3B, Hardware Announcement 106-340, dated May 9, 2006
- The TS1120 Tape Controller Model C06, Hardware Announcement 106-339, dated May 9, 2006
- The IBM System Storage TS1120 Tape Drive Model E05, Hardware Announcement 105-413, dated October 11, 2005
- The 3584 Model HA1, Hardware Announcement 105-061, dated February 15, 2005
- The 3588 Model F3A, Hardware Announcement 105-063, dated February 15, 2005
- The 3584 Models D22, D52, L22, and L52, Hardware Announcement 104-135, dated April 27, 2004
- The IBM TotalStorage Enterprise Tape Drive 3592 Model J1A, Hardware Announcement 103-235, dated September 9, 2003
- The improved functions and expanded attachment to 16 frames in the UltraScalable Tape Library 3584, Hardware Announcement 103-171, dated June 3, 2003
- The Ultrium 2 Tape Drive in the UltraScalable Tape Library 3584, Hardware Announcement 103-004, dated January 28, 2003
- Expanded I/O and remote library access features for the UltraScalable Tape Library 3584, Hardware Announcement 101-165, dated June 12, 2001
- Native Fibre Channel Support for the UltraScalable Tape Library 3584, Hardware Announcement 101-041, dated February 20, 2001
- The UltraScalable Tape Library 3584, Hardware Announcement 100-237, dated August 23, 2000

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

***Business Partner information***

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

BP Attachment for Announcement Letter 106-658

<https://www.ibm.com/partnerworld/mem/sla.jsp?num=106-658>

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# IBM United States Announcement Supplemental Information

August 29, 2006

## Publications

The following publications are shipped with the product. Additional copies are available. To order, contact your IBM representative.

| Title  | Order number |
|--|--------------|
| IBM System Storage(TM) TS3500 Tape Library Introduction and Planning Guide (IBM 3584 Tape Library) | GA32-0559    |
| IBM System Storage TS3500 Tape Library Operator Guide (IBM 3584 Tape Library)                      | GA32-0560    |
| IBM Ultrium Device Driver Installation and User's Guide (English)                                  | GA32-0430    |
| IBM TotalStorage(R) Tape Device Driver Installation and User's Guide (English)                     | GA35-0154    |
| eServer(R) Safety Notices  | G229-9054    |

The publications listed above and the following publications are also available at:

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

- *IBM System Storage TS3500 Tape Library SCSI Reference* (English) (GA32-0561)
- *IBM Ultrium Device Driver Programming Reference* (English) (GC35-0483)

The IBM Publications Center Portal

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

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

For details on education offerings related to specific products, visit

<http://www.ibm.com/services/learning/index.html>

Select your country, and then select the product as the category.

## Technical information

### *Specified operating environment*

**Hardware requirements:** Model conversions are now available to upgrade installed Model L22 or Model L52 frames to Model L23 or Model L53, respectively. Model conversions are also available to convert Model D22 or Model D52 to Model D23 or Model D53. A frame conversion will replace the library and drive power system for that frame.

The following three feature numbers can now be used instead of ALMS feature #1690:

- 1692 (Entry ALMS) provides ALMS capabilities for a TS3500 Tape Library Models L22, L23, L52, or L53 with the basic slot capacity (without feature #1641, #1642, #1643, or #1644)
- 1693 (Intermediate ALMS) provides ALMS capabilities for a TS3500 Tape Library Model L22, L23, L52, or L53 with the Intermediate Capacity on Demand feature #1641 or #1643
- 1694 (Full ALMS) provides ALMS capabilities for a TS3500 Tape Library Models L22, L23, L52, or L53 with the Full Capacity on Demand feature #1642 or #1644

An update of the microcode firmware for the TS3500 is required to obtain support for the other additional enhancements and capabilities announced for the TS3500 Tape Library including:

- TS1120 Model E05 (machine type 3592) tape drive encryption support
- Library to drive interface speed improvement
- Web user interface enhancements such as viewing parsed library and drive error logs, resetting library node cards, and viewing license key status for capacity, ALMS, and path failover

Customers will need to download the latest version of library and drive firmware.

*This announcement is provided for your information only. For additional information, contact your IBM representative, call 800-IBM-4YOU, or visit the IBM home page at: <http://www.ibm.com>.*

The TS3500 Tape Library can be attached to selected IBM System i™, IBM System p™, IBM System z™, or System x™ products, and Hewlett Packard, Sun, UNIX®, Linux™, and Windows™ servers that support Fibre Channel interfaces.

A current list of supported open system configurations for the IBM LTO Ultrium 3 Tape Drive is available from the following Web site

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

Select “LTO Support”, then the “Interoperability Matrix and Software ISVs”, and view the “Supported Servers and Operating Systems” for the product.

For the latest details on specific hardware, software, and Fibre Channel support for the 3592, refer to the following Web site

<http://www.ibm.com/servers/storage/tape/3592>

### Software requirements

#### TS1030 Tape Drive

Support for the TS1030 Tape Drive in the TS3500 Tape Library is provided in the following operating systems at the minimum levels indicated:

- OS/400® V5R2, or later
- i5/OS™ V5R3, or later
- AIX 5L™ V5.1, V5.2, V5.3, or later
- Sun Solaris 8, 9, or 10
- Microsoft™ Windows 2000 (build 2195, or greater)
- Microsoft Windows 2003 (build 3790, or greater)
- HP-UX 11.00, 11i (64 bit), and 11i v2
- Linux distributions: Red Hat Enterprise Linux V4, SUSE Linux Enterprise Server 9 (SLES 9) and Asianux 2.0

For a current list of host software versions and release levels that support the TS1030 in the TS3500, refer to the following Web site

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

The installation of a TS1030 Tape Drive may require code updates for supported open systems device drivers or storage management software. Per the *Solutions Assurance Product Review (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 TS1030 Model F3B. A Solutions Assurance call is required at a minimum for the installation of the first new TS1030 in an account.

An update of the open systems device drivers can be obtained via anonymous FTP from

<http://ftp.software.ibm.com>

Look under the directory storage/devdrv.

Further information can be found in the *IBM Ultrium Device Driver Installation and User's Guide* (GC32-0430), also available at the above FTP site.

Tivoli® Storage Manager and other compatible software offerings provide storage and tape management software for the TS3500. 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.ibm.com/servers/storage/tape/compatibility/pdf/lto\\_isv\\_matrix.pdf](http://www.ibm.com/servers/storage/tape/compatibility/pdf/lto_isv_matrix.pdf)

IBM continues to work together with ISVs to support the TS3500 Tape Library. Individual application vendors should be contacted for specific information and availability dates. Consult with ISV providers for their support of mixed drive types and media types in the same logical library.

#### TS1120 Tape Drive

Support for the TS1120 Tape Drive in the TS3500 Tape Library is provided in OS/400, i5/OS, AIX®, HP-UX, Linux, Solaris, and Microsoft Windows 2000, or 2003 operating system environments. Support for the z/OS®, z/VM®, and z/VSE® operating system environments is available through the TS1120 Tape Controller Model C06, 3592 Model J70 Controller, or 3494 VTS Models B10 or B20.

The installation of a TS1120 Model E05 Tape Drive may require code updates for S/390®, AS/400®, and supported open systems device drivers or storage management software. Per the *Solutions Assurance Product Review (SAPR) Guide*, the account team or Business Partner should confirm that the customer checks the appropriate PSP buckets for System z environments or the equivalent support levels required for their particular software environment prior to the installation of the TS1120 Model E05. At a minimum, a Solutions Assurance call is required for the installation of the first new TS1120 Model E05 in an account.

An update of the open systems device drivers can be obtained via anonymous FTP from:

<http://ftp.software.ibm.com> see=" cap=" txt=.

Look under the directory storage/devdrv.

Further information can be found in the *IBM TotalStorage Tape Device Driver Installation and User's Guide* (GC35-0154), also available at the above FTP site.

For details on supported software versions and release levels for the TS1120 Model E05, as well as hardware support information, refer to the following Web site

<http://www.ibm.com/servers/storage/tape/3592/interop.html>

**Compatibility:** The TS1120 or 3592 Tape Drives cannot read cartridges written by the 3590 or 3490. Cartridges written by the TS1120 or 3592 cannot be read by the 3590 or 3490. Even though the cartridges are similar in size, they contain different media, and thus are not interchangeable.

The IBM LTO Ultrium 3 Tape Drives can read and write IBM LTO Ultrium 2 Data Cartridges. The LTO Ultrium 400 GB Data Cartridges can only be used on LTO Ultrium 3 Tape Drives.

IBM LTO Ultrium 3 Tape Drives and cartridges can be resident in the same TS3500 Tape Library with IBM LTO Ultrium 1 or 2 Tape Drives and cartridges or with TS1120 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.
- LTO Ultrium data cartridges cannot reside in the same library frame with 3592 data cartridges.

**Planning information**

**Customer responsibilities:** Physical planning is a customer responsibility. Detailed planning information is in the *IBM System Storage TS3500 Tape Library Introduction and Planning Guide* (GA32-0559). Current levels of the open systems device drivers should be obtained to ensure the TS1030 Model F3B 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.

To utilize the remote support facility, phone lines need to be installed close to the TS3500 Tape Library.

**Cable orders:** 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). If no host attachment cables are required to be shipped with the 3584 frame from the plant, then the No Host Cables from Plant feature (#9700) should be specified on the frame.

**Direct customer support:** Eligible customers can obtain installation and usage assistance through ASK Support using the search word TS3500, 3584, TS1030, 3588, TS1120, or 3592.

**Supplies**

**For end users:**

IBM LTO data media supplies including labeled, initialized, bulk data media, or cleaning cartridges can be purchased from IBM using machine type 3589. Refer to the 3589 Sales Manual.

The part numbers for additional supplies are:

| IBM part number | Supply item   |
|-----------------|---|
| 24R1922         | IBM TotalStorage LTO Ultrium 400GB Data Cartridge   |
| 35L2087         | IBM TotalStorage LTO Cleaning Cartridge (universal) |

Labeled, initialized, or bulk data media for the TS1120 Model E05 Tape Drive can be ordered directly through AAS using machine type 3599. Refer to the 3599 Sales Manual.

The part numbers for additional supplies are:

| IBM part number | Supply item  |
|-----------------|--|
| 18P7534         | IBM TotalStorage Enterprise Tape Cartridge 3592 (Data)     |
| 18P7535         | IBM TotalStorage Enterprise Tape Cartridge 3592 (Cleaning) |

**Note:** The 3592 data cartridge has servo tracks written on it. These tracks are designed to enable the tape drive to accurately position the read and write head with respect to the media while the tape is in motion. If these servo tracks are damaged or removed (such as by degaussing), the cartridge is no longer useable.

For information about IBM branded media, such as additional IBM LTO Ultrium data or cleaning cartridges, or 3592 data or cleaning cartridges, call 888-IBM-MEDIA (426-6334) in the U.S. or Canada or refer to the following Web site

<http://www.ibm.com/servers/storage/media>

**Security, auditability, and control**

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

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

**Terms and conditions**

**MES discount applicable:** Equal to the volume commitment discount

**Field installable feature:** Yes

**Warranty period:** One year

**Customer setup:** No

**Machine code:** No license terms apply

**Prices**

| Description         | Machine type | Model              | Feature number | Purchase price | MMMC | Field install only | Plant install only |
|---------------------|--------------|--------------------|----------------|----------------|------|--------------------|--------------------|
| TS3500 Tape Library | 3584         | L22, L23, L52, L53 |                |                |      |                    |                    |
| Entry ALMS          |              |                    | 1692           | \$2,000        | NC   | No                 | No                 |
| Intermediate ALMS   |              |                    | 1693           | 4,500          | NC   | No                 | No                 |
| Full ALMS           |              |                    | 1694           | 6,000          | NC   | No                 | No                 |

| Model From | Model To | Model conversion purchase price |
|------------|----------|---------------------------------|
| L22        | L23      | \$15,000                        |
| L52        | L53      | 15,000                          |
| D22        | D23      | 12,500                          |
| D52        | D53      | 12,500                          |
| L23        | L53      | 4,600                           |
| L53        | L23      | 4,600                           |
| D23        | D53      | 4,500                           |
| D53        | D23      | 4,500                           |

| Feature From | Feature To | Feature conversion purchase price |
|--------------|------------|-----------------------------------|
| 1641         | 1643       | \$0                               |
| 1642         | 1644       | 0                                 |
| 1681         | 1682       | 0                                 |

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## Order now

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To identify your local IBM representative or IBM Business Partner, call 800-IBM-4YOU (426-4968).

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Mail: IBM Americas Call Centers  
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**Note:** Shipments will begin after the planned availability date.

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