



IBM System Storage TS2230 Tape Drive Express Model H3V offers high capacity and performance in midrange systems environments

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At a glance

IBM® System Storage® TS2230 Tape Drive Express® Model H3V combines IBM tape reliability and performance at open systems prices. Features of the new TS2230 Model H3V include:

- Maximum data transfer rate of up to 80 MB/sec native
- Ultrium 3 data and WORM (write once, read many) cartridge capacity for up to 400 GB native physical capacity per cartridge (800 GB with 2:1 compression)
- 6 Gbps Serial Attached SCSI (SAS) attachment
- A 256 MB internal buffer
- 4 KB cartridge memory with Ultrium 3 media
- Half-high drive form factor
- 19-inch rack mount shelf option can accommodate two TS2230 Tape Drives side by side in the rack
- Dual SAS ports per drive to improve availability and attachability
- An Ethernet port to improve serviceability
- Integrated electronics using IBM-engineered copper technology

Overview

The new **IBM System Storage TS2230 Tape Drive Express Model H3V** (SEO 3580S3V), an external stand-alone or rack mountable unit, is designed to offer high capacity and performance for the midrange systems environment. TS2230 incorporates the Linear Tape-Open (LTO) **IBM System Storage Ultrium 3 Half-High SAS Tape Drive** Version 2 with a maximum throughput performance of up to 80 MB/sec native data transfer rate.

With the use of the **IBM LTO Ultrium 3 400 GB Data Cartridge**, the Ultrium 3 Tape Drive provides tape cartridge capacity for entry level customers at a low cost. IBM Ultrium 3 Tape Drives can read and write LTO Ultrium 2 data cartridges, and read LTO Ultrium 1 data cartridges.

The TS2230 Model H3V Tape Drive is the entry model of a family of half- high LTO external stand-alone tape drives. LTO Ultrium 3 media written on the TS2230 tape drive is read and write compatible with the TS2240 Model H4V Tape Drive, and read compatible with the TS2250 H5S Tape Drive.

TS2230 Model H3V Tape Drive uses a 6 Gbps dual port SAS (Serial Attached SCSI) interface for connection to a wide spectrum of system servers, including selected IBM, HP-UX, Sun Solaris, UNIX®, Linux®, and Windows® servers.

TS2230 provides an excellent migration path from digital linear tape (DLT or SDLT), 1/4 in (QIC), 4 mm (DAT), or 8 mm tape drives.

The TS2230 storage enclosure design allows two TS2230 Model H3V Tape Drives to be mounted side by side in a 19-inch IBM server Rack Mount Shelf Kit requiring just 2U of rack space.

Key prerequisites

Appropriate levels of host software are required to attach the IBM System Storage TS2230 Tape Drive to selected IBM, HP-UX, Sun Solaris, UNIX, Linux, and Windows servers.

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

Planned availability date

December 3, 2010

Description

IBM System Storage TS2230 Tape Drive Express Model H3V, an external stand-alone or rack-mountable unit, contains an LTO Ultrium 3 tape drive designed for the heavy demands of backup tape storage. TS2230 is supported for SAS attachment to selected IBM, HP-UX, Sun Solaris, UNIX, Linux, and Windows servers.

TS2230 Tape Drive Express Model H3V incorporates IBM LTO Ultrium technology and offers the following features:

- **Performance:** Maximum Ultrium 3 tape drive throughput native data rate performance is up to 80 MB/sec. IBM Ultrium 3 Tape Drives can read and write LTO Ultrium 3 and Ultrium 2 Data Cartridges, and can read LTO Ultrium 1 Data Cartridges.
Note: Although the Ultrium 3 Tape Drive provides the capability for excellent tape performance, other components of the system may limit the actual performance achieved. Also, although the compression technology used in the tape drive can typically double the amount of data that can be stored on the media, the actual degree of compression achieved is highly sensitive to the characteristics of the data being compressed.
- **Tape cartridge capacity:** The tape cartridge physical capacity is up to 400 GB native (800 GB with 2:1 compression) with the use of the IBM LTO Ultrium 3 400 GB Data Cartridge. The tape itself is an advanced metal particle tape developed to provide durability and capacity.
- **Compatible with Ultrium 2 and Ultrium 1 cartridges:** The Ultrium 3 Tape Drive can read and write Ultrium 2 cartridges, and read Ultrium 1 cartridges.
- **Media compatibility:** Media written on the TS2230 external stand-alone tape drive is read and write compatible with the TS2240 tape drive, and read compatible with the TS2250 tape drive.
- **Attachment options:** TS2230 Tape Drive Model H3V comes with a 6 Gbps SAS interface for connection to a wide spectrum of open system servers. TS2230 is supported on selected IBM, HP-UX, Sun Solaris, UNIX, Linux, and Windows servers.
- **Digital speed matching:** The Ultrium 3 Tape Drive performs dynamic speed matching at one of fourteen speeds to reduce the number of backhitch repositions and improve throughput performance by more closely matching the

speed of the data to or from the host. Ultrium 3 speed matching ranges from 30 to 80 MB/sec.

- **WORM media support:** IBM 3589 Ultrium 3 400 GB WORM Tape Cartridges are designed for applications such as archiving and data retention, as well as those applications requiring an audit trail. These cartridges work with the IBM LTO Ultrium 3 Tape Drive to help prevent the alteration or deletion of user data.
- **Large internal data buffer:** There is a 256 MB internal data buffer in the Ultrium 3 Half-high Tape Drive.

Enhanced features in the IBM LTO Ultrium 3 Tape Drive include:

- **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 provide a more reliable drive.
- **Dual-stage 16-channel head actuator:** The actuator is designed to provide precision head alignment to help support higher track density and improved data integrity.
- **Independent tape loader, threader motors, and positive pin retention:** These are designed to help improve the reliability of loading and unloading a cartridge, and to retain the pin even if tension is dropped. An independent loader motor, coupled with the positive pin retention, is designed to cause the tape to thread with a higher level of reliability.
- **Servo and track layout technology:** 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:** IBM's patented Surface Control Guiding Mechanism is designed to guide the tape along the tape path in the Ultrium 3 Tape Drive. This method uses the surface of the tape to control tape motion, rather than the edges. 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:** To help enhance reliability and prolong the life of the drives, some of the most robust components available are used, such as an all metal clutch, steel ball bearings in loader, robust leader block design, and a single circuit card.
- **Power management:** The Ultrium 3 Tape Drive power management function is designed to control the drive electronics to be either completely turned off or placed in a low-power mode when the circuit functions are not needed for drive operation. LTO drive technology focuses on power savings designed to bring the wattage used by the drive down to a target of 5 watts at time of availability. This savings is realized in an unloaded state with no commands being issued to the drive over Ethernet or host interface.
- **Adaptive read equalization:** This equalization is designed to automatically compensate for dynamic changes in readback signal response.
- **Dynamic amplitude asymmetry compensation:** This dynamically optimizes readback signals for linear readback response from magneto resistive (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 has two advantages. First, it helps improve performance if a subsequent append overwrites somewhere after the first filemark, and second, write of multiple filemarks typically indicates a point where an append operation might occur after the first of these filemarks. This change helps prevent having to rewrite data sets containing customer data and the first filemark, if such an append occurs.
- **LTO Data Compression (LTO-DC):** The Ultrium 3 uses LTO-DC, which is an implementation of a Lempel-Ziv class 1 (LZ-1) data compression algorithm. LTO-DC is an extension of Adaptive Lossless Data Compression (ALDC) and an improvement over previous IBM lossless compression algorithms. IBM's patented Scheme-Swapping compression is designed to look ahead at incoming data, and

determine the most efficient storage method (either ALDC or pass-thru mode) to help provide optimal data compression and increase data throughput.

- **LTO Cartridge Memory (LTO-CM):** Contained within the LTO Ultrium data cartridge is the LTO-CM, which is a passive, contactless silicon storage device that is physically a part of the cartridge. The LTO-CM is designed to hold information about that specific cartridge, the media in the cartridge, and the data on the media. The storage capacity of the LTO-CM is 4 KB. Communication between the drive and the LTO-CM is via a low-level radio frequency (RF) field transmitted by the drive to the cartridge.
- **Statistical Analysis and Reporting System (SARS):** The Ultrium 3 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 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.

Ultrium 3 400 GB Data Cartridge

IBM LTO Ultrium 3 Tape Drives can read and write Ultrium 2 data cartridges, and read Ultrium 1 data cartridges. LTO Ultrium 400 GB data cartridges can be ordered using machine type 3589, LTO Ultrium tape cartridges, or feature number 8305 at the time of purchase.

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 tape itself is an advanced metal particle tape developed for durability and capacity.

With support for IBM LTO Ultrium-format tape data cartridges, the TS2230 Tape Drive provides an excellent migration path from digital linear tape (DLT or SDLT), 1/4 in (QIC), 4 mm (DAT), or 8 mm Tape Drives. It can be a cost-effective solution for backup, save-and-restore, and archiving functions as the entry point for the family of IBM Ultrium tape products.

Product positioning

As competitive tape solutions are compared, consider:

- Capacity and performance requirements
- Data integrity, reliability, and availability
- Storage usage and application requirements
- Affordability
- Loyalty to legacy or existing tape formats
- Space limitations in the work environment

TS2230 Tape Drive Express Model H3V is an excellent choice if tape drives that require larger-capacity or higher-performance tape backup are used. TS2230, an entry offering to the family of IBM Ultrium Tape products, is the answer to growing storage requirements and shrinking backup windows.

TS2230 external stand-alone Tape Drive can read and write Ultrium 3 and Ultrium 2 media and can read Ultrium 1 media. LTO Ultrium 3 media written on the TS2230 tape drive is read and write compatible with the TS2240 Model H4V Tape Drive, and read compatible with the TS2250 H5S Tape Drive.

TS2230 Tape Drive is an excellent tape storage solution if digital linear tape drives are used or there is a requirement for high-performance tape backup. In addition to reading and writing on IBM LTO Ultrium 2 or 3 format tape cartridges, the TS2230

Tape Drive provides an excellent functional alternative to DLT/SDLT, 1/4 in, 4 mm, 8 mm, or IBM Magstar® MP 3570 Tape Drives.

For capacity requirements greater than 400 GB (native) and for incorporating LTO Ultrium technology, the IBM TS2240 and IBM TS2250, the IBM System Storage TS2900 Tape Autoloader, the IBM System Storage TS3100 or TS3200 Tape Library, or the IBM System Storage TS3310 and TS3500 Tape Libraries should be considered.

For mission-critical data protection needs, optimized for enterprise multi-mode and host attachment, or high-cycle and start/stop intensive tape applications, consider the IBM System Storage TS1120 or TS1130 Tape Drive with the IBM System Storage TS3500 Tape Library.

Product number

Description	Machine		Part number
	type	Model	
TS2230 Tape Drive Express Model H3V with HHLT03 SAS Tape Drive V2, with enclosure and power supply	3580	S3V	3580S3V
Options for Model S3V			
2.0M SAS/Mini-SAS 1x Cable			95P4711
2.0M Mini-SAS/Mini-SAS 1x Cable			95P4713
Rack Mount Kit w/PDU Line Cord			96P1565
Ultrium Cleaning Cartridge			23R7008
Ultrium 3 Data Cartridge (5-pack)			95P2020
Power cord options			
2.8M Power Cord 125V US/CAN			23R7141
2.8M Power Cord 250V US/CAN			23R7145
2.8M Power Cord 250V France/Germany			23R7146
2.8M Power Cord 250V Denmark			23R7147
2.8M Power Cord 250V UK			23R7148
2.8M Power Cord 250V Israel			23R7149
2.8M Power Cord 250V Switzerland			23R7150
2.8M Power Cord 250V S. Africa			23R7151
2.8M Power Cord 250V Italy			23R7152
2.8M Power Cord 250V Australia			23R7153
2.8M Power Cord 250V Uruguay/Argentina			23R7154
2.8M Power Cord 250V China (PRC)			23R7155
2.8M Power Cord 125V Taiwan			23R7158
2.8M Power Cord 250V Taiwan			23R6981
2.8M Power Cord 125V Japan			23R6982
2.8M Power Cord 250V Japan			23R6983
2.8M Power Cord 250V Korea			23R6984
2.8M Power Cord 250V India			23R6985
2.8M Power Cord 250V Brazil			23R6987
Rack Device to PDU Line Cord			23R7000
Storage Bid Machine Select			23R7263

Note: The power cord options are used in the country listed and other countries. Refer to the *IBM System Storage TS2230 Tape Drive Model H3V Setup, Operator, and Service Guide* (GC27-3903) for specific country availability or contact your IBM representative.

Publications

The following publication is shipped with the product. Additional copies are available immediately.

Title	Order number
IBM System Storage TS2230 Tape Drive Model H3V Setup, Operator, and Service Guide	GC27-3903
CD containing TS2230 Tape Drive Model H3V Setup, Operator, and Service Guide in all available translations	

The following publications are available. immediately. To order, contact your IBM representative.

Title	Order number
IBM System Storage TS2230 Tape Drive Model H3V Setup, Operator, and Service Guide	GC27-3903
IBM System Storage TS2230 Tape Drive Model H3V Quick Reference (English)	GC27-2276
IBM Tape Device Driver Installation and User's Guide (English)	
IBM Tape Device Driver Programming Reference (English)	

These publications are also available at

<http://www-05.ibm.com/e-business/linkweb/publications/servlet/pbi.wss>

Click on country, then enter publication number.

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 a few pull down menus to navigate to the correct download as follows:

- In the first pull down menu labeled "Product Group", select "Storage Systems".
- In the next pull down menu that appears which is labeled "Product Family", select "Tape Systems".
- With the next pull down menu, "Product Type", select "Tape Device Drivers and Software".
- This will in turn bring up the "Product" menu, which provides selections for "Platform drivers, Tools, or Software".
- Under "Platform drivers", in order to download your driver, select the correct operating system.
- Two more pull down menus will appear with information. Click "Continue".
- The next screen can be used to narrow the search, however just click "Continue" to view what is available.

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

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

The IBM Systems Information 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. The IBM Systems Information Center is at

<http://publib14.boulder.ibm.com/infocenter/systems>

IBM Publications Center Portal

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

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, as well as payment options via credit card. A large number of publications are available online in various file formats, which can currently be downloaded free of charge.

The following translated publications will be included on CD-ROMs, with the product. They will also be available from the following website

<http://www-05.ibm.com/e-business/linkweb/publications/servlet/pbi.wss>

Click on country, then enter publication number.

Title	Order number	Part number
IBM System Storage TS2230 Tape Drive Model H3V Setup, Operator, and Service Guide	GC27-3903	English
	GC19-3502	Czech
	GC12-4483	German
	GA88-4249	Japanese
	GC11-7899	Spanish
	SC14-7076	Turkish
IBM System Storage TS2230 Tape Drive Model H3V Quick Reference	GC27-2276	English

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/index.html>

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

Specified operating environment

Physical specifications

- Width: 213 mm (8.4 in.)
- Depth: 332 mm (13.1 in.)
- Height: 58 mm (2.3 in.)
- Weight: 4.3 kg (9.40 lbs.)

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

Operating environment

- Temperature: 10 to 38° C (50 to 100° F)
- Relative humidity: 20 to 80 %
- Wet bulb (caloric value): 26° C (78.8° F)
- Electrical power: 0.21 kVA 1.0 amps at 100 V ac, 0.5 amps at 240 V ac

Hardware requirements

TS2230 Tape Drive comes with raven black covers. TS2230 Model H3V uses a SAS interface and can be attached to selected IBM, HP-UX, Sun Solaris, UNIX, Linux, and Windows servers that support those interface specifications. A current list of supported open system configurations is available from the following website

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

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

Cables: For the TS2230 Model H3V, a SAS cable is required to attach a TS2230 Tape Drive to host a SAS adapter.

- SAS/Mini-SAS cables provide attachment from HBA with SFF-8470 to the drive with SFF-8088
- Mini-SAS/Mini-SAS cables provide attachment from HBA SFF-8088 to the drive with SFF-8088.

At least one SAS cable should be specified on the initial plant order.

The following cable options are available for SAS attachment:

- Feature number 5402 - 2.0M SAS/Mini-SAS Cable (from HBA with SFF-8470 to drive with SFF-8088)
- Feature number 5502 - 2.0M Mini-SAS/Mini-SAS Cable (from HBA with SFF-8088 to drive with SFF-8088)

Refer to the **Special Features** section of the TS2230 (3580) Tape Drive Sales Manual for detailed descriptions of these features.

Support for the following host bus adapters (HBAs)

For a current list of HBAs that support the TS2230, visit

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

Software requirements

For a current list of host software versions and release levels that support the TS2230, refer to the following website

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

Tivoli® Storage Manager, BRMS, and other compatible software offerings provide storage and tape management software for the 3580 or TS2230 family of products. Supporting software and applications must be obtained separately from IBM, IBM Business Partners, or independent software vendors (ISVs). A list of compatible software is available from your IBM representative or at

<http://www-1.ibm.com/storage/tape/lto>

Select the model, then "Product Details," then "LTO Compatibility," and view "Independent Software Vendor (ISV) matrix for LTO" for the product.

IBM continues to work together with the ISVs to support the IBM LTO Ultrium Tape Drives or TS2230 family of products. Individual application vendors should be contacted for specific information and availability dates.

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 a few pull down menus to navigate to the correct download as follows:

- In the first pull down menu labeled "Product Group", select "Storage Systems".
- In the next pull down menu that appears which is labeled "Product Family", select "Tape Systems".
- With the next pull down menu, "Product Type", select "Tape Device Drivers and Software".
- This will in turn bring up the "Product" menu, which provides selections for "Platform drivers, Tools, or Software".
- Under "Platform drivers", in order to download your driver, select the correct operating system.
- Two more pull down menus will appear with information. Click "Continue".
- The next screen can be used to narrow the search, however just click "Continue" to view what is available.

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

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

Compatibility

The IBM LTO Ultrium 3 Tape Drive can read and write IBM LTO Ultrium 2 and 3 data cartridges, and read IBM LTO Ultrium 1 data cartridges. Ultrium 3 media written on the TS2230 External Stand-alone Tape Drive is read and write compatible with the LTO Ultrium 4 tape drive, and read compatible with LTO Ultrium 5 Tape Drives.

Limitations

SAS cable lengths are limited to 5.5 m (18 ft).

Installing more than one TS2230 tape drive on a SAS bus may impact tape drive or system performance. Intermixing of other SAS devices on the same bus as the TS2230 may also impact performance of those devices.

Although multiple systems may be attached to a tape drive, the systems cannot use the drive simultaneously.

While 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.

Planning information

Customer responsibilities

Physical planning is a customer responsibility. Detailed planning information is in the *IBM System Storage TS2230 Tape Drive Model H3V Setup, Operator, and Service Guide* (GC27-3903). TS2230 Tape Drive is designated as a customer setup unit. It is the customers' responsibility to install the unit. Customers are responsible for obtaining the appropriate SAS 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. Customers can download the latest level of firmware from the LTO website

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

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 Web site 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

For the TS2230 Model H3V, a SAS cable is required to attach a TS2230 Tape Drive to a host SAS adapter. SAS/Mini-SAS cables provide attachment from HBA with SFF-8470 to the drive with SFF-8088. Mini-SAS/Mini-SAS cables provide attachment from HBA SFF-8088 to the drive with SFF-8088. At least one SAS cable should be specified on the initial plant order.

The following cable options are available for SAS attachment:

- Feature number 5402 - 2.0M SAS/Mini-SAS Cable (from HBA with SFF-8470 to drive with SFF-8088)
- Feature number 5502 - 2.0M Mini-SAS/Mini-SAS Cable (from HBA with SFF-8088 to drive with SFF-8088)

Refer to the **Specify or Special Features** section of the 3580 Sales Manual for a detailed description of the cables available.

Installability

Installation time for the TS2230 Tape Drive is approximately 0.5 to 0.7 hours.

Packaging

Product	Shipment group	Number of boxes
3580	TS2230 with Tape Drive (3580 Model H3V) Power cord option One cleaning cartridge Documentation CD that includes: <ul style="list-style-type: none">- IBM System Storage TS2230 Model H3V Tape Drive Setup, Operator, and Service Guide- IBM System Storage TS2230	1

- Statement of Limited Warranty
 - IBM Translated Safety Notices
- Documentation kit that includes:
- License Agreement
 - IBM System Storage TS2230
Statement of Limited Warranty
 - IBM System Storage TS2230
Model H3V Quick Reference
 - CD pointer document
 - Device Driver pointer document
 - Compliance document

Supplies

For users

The IBM LTO Ultrium 3 400 GB Data Cartridges (feature 8305 or machine type 3589) and the IBM LTO Cleaning Cartridge (feature 8002) for use in the TS2230 Model H3V Tape Drive can be purchased through dealers around the world using the feature numbers with the initial order. IBM-branded media, including 400 GB LTO Ultrium 3 tape cartridges, and media supplies are available directly through AAS or at 1-888-IBM-MEDIA (426-6334) in the U.S. and Canada. Refer to the 3589 Sales Manual for further information.

For remarketers

Remarketers can purchase IBM-branded media and media supplies.

For additional information, go to the following website

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

For users and remarketers

IBM-branded media and media supplies can be ordered directly through AAS using machine type 3589.

IBM-branded media and media supplies can be also purchased through Priority Fulfillment Services and its distribution channel in North America, Latin America, and Asia Pacific.

Security, auditability, and control

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

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

Global Technology Services

Contact your IBM representative for the list of selected services available in your country, either as standard or customized offerings, for the efficient installation, implementation, and/or integration of this product.

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.

Customer Replaceable Unit (CRU) Service

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

Warranty period

- The TS2230 Model H3V has a three year warranty. IBM Ultrium 3 400 GB media is warranted separately

Optional IBM features initially installed in an IBM machine carry the same warranty period as the machine. If installed after the initial machine installation, they carry the balance of the machine warranty or the optional feature warranty, whichever is greater.

Warranty service

If required, IBM provides repair or exchange service, depending on the type of warranty service specified below for the machine. IBM will attempt to resolve your problem over the telephone or electronically by access to an IBM Web site. You must follow the problem determination and resolution procedures that IBM 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 IBM's normal service area. Contact your local IBM representative or your reseller for country- and location-specific information.

Customer Replaceable Unit (CRU) Service

IBM provides a replacement CRU (for example, keyboard, mouse, speaker, memory, or hard disk drive) to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM at any time on your request. Installation of Tier 1 CRUs, as specified in this announcement, is your responsibility. If IBM installs a Tier 1 CRU, at your request, you will be charged for the installation.

Based upon availability, a CRU will be shipped for next business day (NBD) delivery. IBM specifies in the materials shipped with a replacement CRU whether a defective CRU must be returned to IBM. 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 IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

The following parts have been designated as Tier 1 CRUs:

- The complete IBM TS2230 Tape Drive with enclosure
- External 2.0 m SAS Cables

International Warranty Service

International Warranty Service (IWS) is not available.

Licensing

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

CRU and Machine Exchange Service

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

Warranty period

- The TS2230 Model H3V has a three year warranty. IBM Ultrium 3 400 GB media is warranted separately

Optional IBM features initially installed in an IBM machine carry the same warranty period as the machine. If installed after the initial machine installation, they carry the balance of the machine warranty or the optional feature warranty, whichever is greater.

Warranty service

If required, IBM provides exchange service for the machine. IBM will attempt to resolve your problem over the telephone or electronically by access to an IBM Web site. You must follow the problem determination and resolution procedures that IBM 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 IBM's normal service area. Contact your local IBM representative or your reseller for country- and location-specific information.

CRU and Machine Exchange service

At IBM's discretion you will receive specified CRU service, or 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.

Service level is:

- 9 hours per day, Monday through Friday, excluding holidays, next business day response.

International Warranty Service

International Warranty Service (IWS) is not available.

Licensing

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

Warranty service upgrades

IBM hourly service rate classification

Two

Field-installable features

No

Model conversions

No

Machine installation

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

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 at

http://www.ibm.com/servers/eserver/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 Storage technical support Web site

http://www-304.ibm.com/jct01004c/systems/support/machine_warranties/index.html

You may also obtain updated code by contacting your IBM representative.

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.

Pricing

For all local charges, contact your IBM representative.

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