

*An IBM Magstar solution that provides tape automation for multiple computing environments*



# Magstar 3494 Tape Library

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## Highlights

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*The IBM Magstar™ 3494 Tape Library provides a cost-effective, highly reliable, and space-efficient tape automation solution for a variety of user environments.*

- *It is a high-performance automated library for IBM Magstar 3590 and 3490E tape drives.*
- *A high-availability model that operates in "hot standby" mode provides a second library manager and accessor for redundancy. Activating the optional second accessor can increase performance.*
- *It provides multiple host connectivity options, maximizing your investment across the enterprise.*
- *It enables exceptional expandability from one to 16 frame units; from one to 62 Magstar 3590 (with ESCON®) or 32 3490E tape transports; and from 160 to 6,240 cartridges (up to 187 TB with compaction).<sup>1</sup>*
- *A single accessor can mount/demount up to 305 cartridges per hour.<sup>2</sup>*
- *The high-capacity input/output facility options enable easy removal of large quantities of cartridges.*
- *The IBM Virtual Tape Server, integrated with the Magstar 3494, can utilize the capacity of the Magstar 3590 high-performance tape cartridges, reducing the costs of tape storage.*
- *SNMP alerts are supported for management of the 3494 from any one of up to five network management workstations.*

## Superior automation solution

The Magstar 3494 is a modular system that contains a cartridge accessor, a library manager, and storage cells for tape cartridges. The 3494 supports both Magstar 3590 and 3490E Model F1A tape drives within the same library but in separate frames.

The Magstar 3494 consists of five basic building blocks that provide a wide range of configuration flexibility. Organizations can start small and grow in an affordable and incremental manner, beginning with one control unit to which you can add drive units, storage units, an IBM Virtual Tape Server unit, and a high-availability model to a maximum configuration of 16 frames and two service bays.

The Magstar 3494 High Availability Model (HA1) eliminates the accessor and library manager as single points of failure. The HA1 has a second accessor, second library manager, and all related hardware. Optionally, the second accessor can be fully active, enabling both accessors to simultaneously perform cartridge management. If one of the accessors fails, the other accessor will provide full support to all drives and cartridge slots in the entire 3494 library. The HA1 is designed for users who require the highest levels of availability and reliability from their tape automation subsystem. Valid configurations for the HA1 are 3, 4, 6, 8, 10, 12, and 16 frames plus two service bays. The HA1 is available with or without the IBM Virtual Tape Server model.



*A Magstar 3494 tape library 16-frame high-availability configuration with two service bay frames.*

## Wide platform connectivity

The Magstar 3494 attaches to multiple systems including AS/400®, RS/6000™, RS/6000 Scalable POWERparallel™ (SP), ES/9000™, ES/3090™, S/390® enterprise servers, and selected systems from Convex, CRAY Research, Inc., Sun Microsystems, and Hewlett-Packard.

## Exceptional performance

The average mount-access time in a one-frame unit is only seven seconds. A Magstar 3494 with a single gripper can perform up to 265 cartridge exchanges per hour and up to 305 exchanges per hour with the optional dual gripper feature.<sup>2</sup> The exchange capability of the accessor can decrease as the number of frame units increases because of increased accessor travel.



*The Magstar 3494's cartridge accessor with the dual gripper feature provides increased performance and availability.*

The time to inventory tape cartridges in a full library frame (control unit, drive unit, or storage unit) is approximately four minutes<sup>3</sup>.

### **Tape drive performance**

Magstar 3590 has a maximum sustained data transfer rate of 9 MB/sec in uncompact mode. The maximum instantaneous data rate is 20 MB/sec on a SCSI interface and 17 MB/sec on an ESCON channel.

One or two IBM 3490E Model F1A tape drives can be configured in a single frame. Each tape drive has a maximum data transfer rate of 3 MB/sec in uncompact mode.

### **High-capacity cartridges**

Magstar 3590's metal particle tape has a capacity of 10 GB of uncompact data and up to 30 GB with compaction. The Enhanced Capacity Cartridge System Tape used with the IBM 3490E tape drives can provide a capacity of 800 MB for uncompact data and up to 2.4 GB with compacted data.

### **Easy manual operations**

A choice of two optional convenience I/O stations provides the capability to add or remove from 10 to 30 cartridges at a time without stopping the operation of the cartridge accessor. The operator can also add cartridges by opening the door of the Lxx unit and inserting cartridges in any

available slot, or remove multiple cartridges from a user-defined high-capacity output facility of up to 160 cartridges.

An additional high-capacity I/O facility can be defined for installations that need to move high volumes of cartridges in and out of the library.

### **SNMP monitoring support**

The 3494 (beginning with Library Manager code 518) supports SNMP alert messaging, enabling you to monitor 3494 operations from one or more SNMP monitor stations. This initial support provides more than 80 operator-class alert messages covering:

- 3494 device operations
- Data cartridge alerts
- Service requests
- VTS alerts

### **Cost effectiveness**

The Magstar 3494 Tape Library provides a cost-effective solution for all tape processing operations. Cost savings result from high performance and reduced requirements in regard to tape drives and cartridges, floor space, power, and personnel. In addition, the same tape library can be shared across multiple platforms such as ES/9000, AS/400, open systems, and others.

The Magstar 3494 has a small footprint, starting at two and one-half feet wide by five feet deep. This size allows it to fit in most rooms, makes it ideal for vaults, and enables significant savings in floor space.

### **Magstar 3494 library components**

#### **Control unit**

The control unit (Lxx unit) is the heart of the Magstar 3494. It contains the library manager, console, cartridge accessor, optional convenience I/O stations, an optional tape drive, barcode reader, optional ESCON controller, and up to 240 cartridge storage cells. Possible tape drive configurations for the Lxx units include:

Model L10—up to two 3490E tape drives.

Model L12—up to two Magstar 3590 tape drives.

Model L14—up to two Magstar 3590 tape drives and an ESCON controller (3590-A50).

#### **Drive unit**

The Magstar 3494 drive units provide the capability for adding tape drives and up to 400 cartridge storage cells:

Model D10—up to two 3490E Model F1A tape drives.

Model D12—up to six SCSI-attached Magstar 3590 tape drives.

Model D14—up to four Magstar 3590 tape drives and an ESCON controller (3590-A50).

#### **Storage unit**

The Magstar 3494 storage unit provides the capability for adding cartridge storage:

Model S10—up to 400 cartridge cells.

### **IBM Virtual Tape Server**

The enhanced IBM Virtual Tape Server has been designed to dramatically reduce hardware storage requirements and improve overall tape library processing performance.

The 3494 Model B18 Control Unit is based on IBM's Seascapes architecture, which consists of a series of building blocks, such as RS/6000 processor technology, fault-tolerant serial disks, and ADSTAR™ Distributed Storage Management (ADSM) software.

The Virtual Tape Server requires a 3494 D12 drive unit that contains from three to six dedicated Magstar 3590 tape drives.

The 3494 B18 is a free-standing frame that can be placed up to 14 meters away from the library. The 3494 D12 drive unit can be in any position in the library and can coexist with Virtual Tape Server or non-Virtual Tape Server frames using either 3490E or Magstar 3590 tape technology.

The enhanced Virtual Tape Server attaches to MVS® systems by using from two standard ESCON channels to up to four high-performance ESCON channels.

## Library manager

The Magstar 3494 library manager controls the following functions:

- Accessing of cartridges
- Placement of cartridges in slots
- Movement of cartridges
- Automatic drive cleaning
- Performance optimization
- Tape handling priorities
- Error recovery
- Error logging

Each High-Availability model (HA1) has two library managers.

## Cartridge accessor

The cartridge accessor is designed for high reliability and performance:

- The accessor's barcode reader enables rapid inventory management by optically scanning the barcodes on the cartridges.
- A standard accessor has a single gripper. The optional dual gripper can improve performance by as much as 40 percent. The second gripper reduces cartridge capacity by 10 percent.
- The HA1 model has two accessors. With an optional feature, both accessors can be active simultaneously. This is designed to further increase library performance.

## Attachment requirements

Host operating systems send data to Magstar 3590 tape drives through SCSI or ESCON attachment and to 3490E tape drives through ESCON, parallel, or SCSI attachment. Host system software communicates library commands to the Magstar 3494 Library Manager, such as volume/drive mount commands. This communication is done via LAN or RS-232 attachment or through the ESCON or parallel channel controller.

## ES/9000

The Magstar 3494 supports all models of ES/9000 9221, 9121, and 9021 systems and all ESA-capable S/370® and S/390 systems.

Programming support is provided for MVS/ESA™ (using either DFSMS/MVS® or Basic Tape Library Support), TPF, VSE/ESA™, and VM/ESA® operating environments. VM/ESA provides mount and demount tape support for guest operating systems such as VSE/ESA and MVS/ESA.

DFSMS/MVS, System Managed Tape, and the Magstar 3494 together provide full media independence in the library.

## AS/400

AS/400 support for the 3494 is provided through OS/400® and Backup Recovery and Media Services/400 (BRM Services/400).

## RS/6000

Support is provided for AIX/6000® operating environments through a programming interface for applications and user commands.

## Convex, CRAY, Silicon Graphics, HP, and Sun Microsystems

Convex supports the Magstar 3494 with the Magstar 3590 only and provides all the necessary device drivers for the connection.

Magstar 3494 supports the Magstar 3590 and 3490E tape drives in the CRAY environment and requires feature #5212 and an RS/6000 operating as a mount server.

Magstar 3494 supports the Magstar 3590 and 3490E tape drives in the Sun environment and requires features #9204 or 9200 and 9211.

Magstar 3494 supports the Magstar 3590 tape drive in the HP environment and requires features #9200, 9210, and an HP 9000 operating as a mount server.

## Optional software

ADSM supports MVS/ESA, VM/ESA, VSE/ESA, OS/400, AIX/6000, and Sun workstations as server platforms and the Magstar 3494 as a storage management device for backing up and managing customer data. These servers support a wide range of IBM and other platform clients.

## Media

Magstar 3590 and IBM 3490E media can be ordered via Magstar 3494 feature codes from IBM Media or Supplies Distribution or from authorized dealers. To order IBM media and supplies in the United States, call toll-free 1-888-IBM-MEDIA (1-888-426-6334) today.

## Tell me more

For more information, contact your IBM representative or your IBM Business Partner. In the United States or Canada, you can also call IBM Direct: 1-800-IBM-CALL (1-800-426-2255).  
Internet: [www.ibm.com/storage](http://www.ibm.com/storage)

**IBM Magstar 3494 Tape Library connectivity table**

Operating system	Library connection	3490E connection	3490E distance from processor	3590 B1A connection	Max. 3590 B1A distance from processor
AIX/6000	LAN	SCSI-II diff.	19 m (62.3 ft.)	SCSI-II diff.	19 m (62.3 ft.)
	RS-232	SCSI-II diff.	17 m (55.7 ft.)	SCSI-II diff.	17 m (55.7 ft.)
	Parallel ESCON	Parallel ESCON	61 m (200.0 ft.) 23 km (13 mi.)		
OS/400	RS-232	SCSI-II diff.	25 m (82 ft.)	SCSI-II diff.	25 m (82 ft.)
	LAN	SCSI-II diff.	25 m (82 ft.)	SCSI-II diff.	25 m (82 ft.)
	RS-232 LAN	Parallel Parallel	122 m (400 ft.) 122 m (400 ft.)		
VSE/ESA	LAN	Parallel	122 m (400 ft.)		
	LAN	ESCON	LAN distance	ESCON (A50/B18)	43 km (A50/B18)
MVS/ESA VM/ESA, TPF	ESCON	ESCON	23 km (13 mi.)	ESCON (A50/B18)	43 km (A50/B18)
MVS/ESA VM/ESA, TPF	Parallel	Parallel	122 m (400 ft.)		
Convex OS	LAN			SCSI-II diff.	25 m (82 ft.)
CRAY UNICOS	RS-232	SCSI-II diff.	17 m (55.7 ft.)	SCSI-II diff.	25 m (82 ft.)
	LAN	SCSI-II diff.	17 m (55.7 ft.)	SCSI-II diff.	25 m (82 ft.)
Solaris	LAN	SCSI-II diff.	17 m (55.7 ft.)	SCSI-II diff.	25 m (82 ft.)
	RS-232				
HP	LAN			SCSI-II diff.	25 m (82 ft.)

<b>IBM Magstar 3494 Tape Library at a glance</b>										
<b>Specifications</b>		<b>Control units</b>			<b>Drive units</b>			<b>Storage units</b>	<b>VTS units</b>	<b>HA1</b>
Model number		L10	L12	L14	D10	D12	D14	S10	B18	
Unit quantity (minimum <sup>4</sup> )		1	1	1						1
Unit quantity (maximum <sup>4</sup> )		1	1	1	15	15	15	15	2	1 (std 2 bays)
Library manager		1	1	1						1
Cartridge accessor		1	1	1						1
Cartridge grippers		1/2	1/2	1/2						1/2
Convenience I/O stations (10 or 30 cartridges)		0/1	0/1	0/1						
Power KVA (excluding drives)		0.3	0.3	0.3	0.1	0.1	0.1		1.8	
Voltage (single phase)		200/240	200/240	200/240	200/240	200/240	200/240		200/240	
BTU/hr (excluding drives)		1000	1000	1000	340	340	340		6550	
<b>Cartridge storage cells, single gripper, I/O station</b>										
no tape drive units		NA	240 <sup>5</sup>	240 <sup>5</sup>	400	400	400	400	400	
one tape drive unit		240 <sup>5</sup>	240 <sup>5</sup>	240 <sup>5</sup>	300	335	345			
two tape drive units		240 <sup>5</sup>	240 <sup>5</sup>	240 <sup>5</sup>	300	335	345			
three to four tape drive units						290	305			
five to six tape drive units						250				
Maximum capacity (TB) <sup>7</sup>		0.57	7.2	7.2	.96	12.0	12.0	12.0	12.0	
<b>Cartridge storage cells, dual gripper, I/O station</b>										
no tape drive units		216 <sup>6</sup>	216 <sup>6</sup>	216 <sup>6</sup>	360	360	360	360	360	
one tape drive unit		216 <sup>6</sup>	216 <sup>6</sup>	216 <sup>6</sup>	270	305	305			
two tape drive units			216 <sup>6</sup>	216 <sup>6</sup>	270	305	305			
three to four tape drive units						260	275			
five to six tape drive units						230				
Maximum capacity (TB) <sup>7</sup>		0.5	6.5	6.5	0.8	10.8	10.8	10.8	10.8	
<b>Tape drive models</b>										
3490 Model F1A <sup>8,9</sup>		0/2			0/2					
3590 Model B1A <sup>10</sup>			0/2	0/2		0/6	0/4			
3590 Model A50				0/1			0/1			
<b>Physical characteristics<sup>11</sup></b>										
Width centimeters (inches)	75.0 (29.5)	75.0 (29.5)	75.0 (29.5)	75.0 (29.5)	75.0 (29.5)	75.0 (29.5)	75.0 (29.5)	75.0 (29.5)	75.0 (29.5)	75.0
Depth centimeters (inches)	152.5 (60.0)	152.5 (60.0)	152.5 (60.0)	152.5 (60.0)	152.5 (60.0)	152.5 (60.0)	152.5 (60.0)	75.0 (29.5)	75.0 (29.5)	152.5
Height centimeters (inches)	180.0 (70.9)	180.0 (70.9)	180.0 (70.9)	180.0 (70.9)	180.0 (70.9)	180.0 (70.9)	180.0 (70.9)	180.0 (70.9)	180.0 (70.9)	180.0
Weight kilograms (pounds)	444 (999)	444 (999)	444 (999)	444 (999)	320 (704)	320 (704)	320 (704)	281.0 (625)	281.0 (625)	

## Footnotes

- These Magstar 3494 capacities assume a 10-cartridge I/O station and a single gripper.
- These numbers reflect accessor capability and are limited in practice by the number of drives, application drive residency, and other factors.
- Performance values are based upon laboratory analysis and might be different from those realized by a user. These values do not constitute a guarantee of performance. Inventory time is based upon several measurement samples.
- Valid configurations include any combination of units meeting these minimum and maximum restrictions.
- With a 10-cartridge I/O station, capacity is 210; with a 30-cartridge I/O station, capacity is 160.
- With a 10-cartridge I/O station, capacity is 190; with a 30-cartridge I/O station, capacity is 140.
- Assumes 3:1 compaction.
- In a SCSI environment, each F1A counts as one tape control unit. ESCON-attached drives require 1.5 control unit attachment.
- When the 3490 F1A is attached to an ESCON channel, the 3490 ESCON feature requires an additional 3494 control unit port.
- Each 3590 B1A contains one transport. If mounted in an L12 or a D12, each 3590 B1A counts as one tape control unit.
- Depth excludes operator and service clearance. Weight excludes tape drives and cartridges.
- These results were produced from models but are consistent with expectations.

## 3494 performance—exchanges per hour

No. units/No. drives	With single gripper	With dual gripper <sup>12</sup>
1/2	265	305
2/4	235	290
3/4	215	280
4/4	200	260
8/16	160 <sup>12</sup>	225
16/16	125 <sup>12</sup>	185



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