

Practical usage models for the HP StorageWorks DAT 72x6 Tape Autoloader in small and medium business environments



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Executive summary

HP listens to customers. In a recent study of the small and medium business segments, HP discovered that the current top priorities for those customers are:

- Improving backup and recovery (69%)
- Improving disaster recovery capabilities (61%)
- Improving data security (51%)

The new HP StorageWorks DAT 72x6 Tape Autoloader:

- Improves backup and recovery reliability by automating the whole backup process.
- Supports HP One Button Disaster Recovery (OBDR) to enable simple robust disaster recovery functionality (see Appendix 3).
- Comes complete with in-the-box backup and disaster recovery software supported on a wide range of platforms.
- Can be used in a wide range of versatile configurations:
 - Workgroup server backup with low administration
 - Departmental server with weekly archive, monthly rotation
 - Small network with multiple servers (LAN-based backup)
 - Remote site, long archive backups

With the DAT 72x6 Tape Autoloader, the top two priorities for the small and medium business segment just got solved—in a very cost-effective manner.

Figure 1.



Target audience

This white paper targets end users in small and medium business who want to deploy a flexible, robust, and reliable automated backup solution within a budget. This white paper explains the different usage models where the DAT 72x6 Tape Autoloader can most effectively be used.

Why DAT?

In the small and medium business segment where entry-level tape drive technology is used, 4-mm DAT technology reigns supreme, which is why more than 48% of all tape drives shipped in the world are DAT tape drives¹. Within the DAT category of tape drives, HP has the number one market share.

The DAT 72x6 Tape Autoloader provides a proven, reliable, backwards compatible, low-cost technology that gives customers assurance that their information is safe.

Why automated backup?

- Improved reliability—No human intervention
- Better return on IT investment—Automation devices can be shared across many systems
- Improved performance—Multiple tape drives in tape libraries can back up data faster than backing up to a single drive
- Easier manageability—All the media is managed in a single location by a single application

Why DAT autoloaders?

- DDS/DAT is the highest volume tape drive technology in the market.
- DAT has the highest installed base of tape drives compared to its nearest rival—by a factor of 5.
- Users see it as an excellent, proven solution that meets their needs.
- Excellent backwards compatibility with previous DAT formats and a newly enhanced future roadmap mean DAT rates extremely high in terms of investment protection.
- The autoloader combines a proven history from a successful tape technology with a proven robotics design to offer reliable, stress-free, low cost of ownership, automated backup.

Why HP DAT autoloaders?

HP is number one in the DAT autoloaders market share.

HP DAT autoloader robotics have been refined for maximum reliability over many years of development, they offer an mean time between failures (MTBF) of 100,000 hours at 30% duty cycle, a mean swap before failures (MSBF) of 50,000 swaps, and a cartridge swap life of greater than 160,000.

HP DAT autoloaders come with in-the-box Yosemite TapeWare software supported on Microsoft® Windows®, Novell NetWare, and Linux.

Only HP DAT autoloaders support OBDR—the easiest to use disaster recovery process in the business.

HP autoloader robotics have been refined for maximum reliability over the past eight years. During which time, more than 350,000 HP autoloader units have been shipped.

¹ Source: Gartner 2003.

DAT 72x6 Tape Autoloader overview

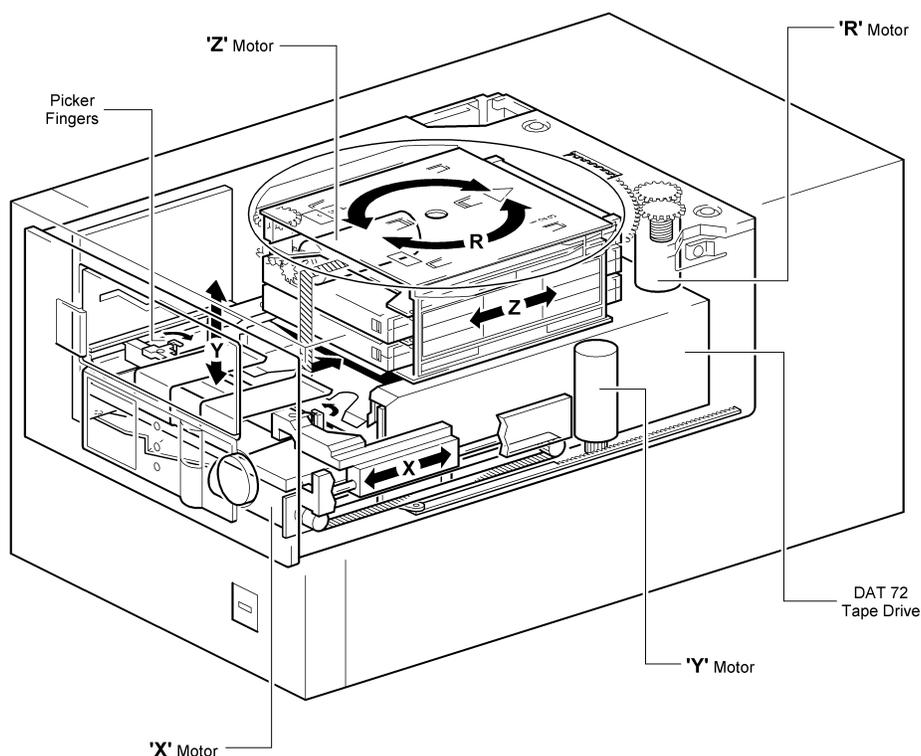
The DAT 72x6 Tape Autoloader, like the HP StorageWorks DAT 40x6 Tape Autoloader before it and the HP StorageWorks DAT 24x6 Tape Autoloader before that, comes from a long line of proven, reliable DAT autoloaders from HP spanning eight years.

The DAT 72x6 Tape Autoloader is a six-slot autoloader, which can accommodate 72 GB per single tape (assuming 2:1 data compression). The tapes are held in a receptacle called a magazine.

The DAT 72x6 Tape Autoloader can back up data at a rate of around 21 GB/hour (at 2:1 data compressibility).

The autoloader is available as either an internal 5.25" full height unit, which allows it to be integrated easily inside almost all of today's server enclosures, or as an external stand-alone unit with self-contained power supply.

Figure 2.



The ingenious design illustrated has several degrees of motion:

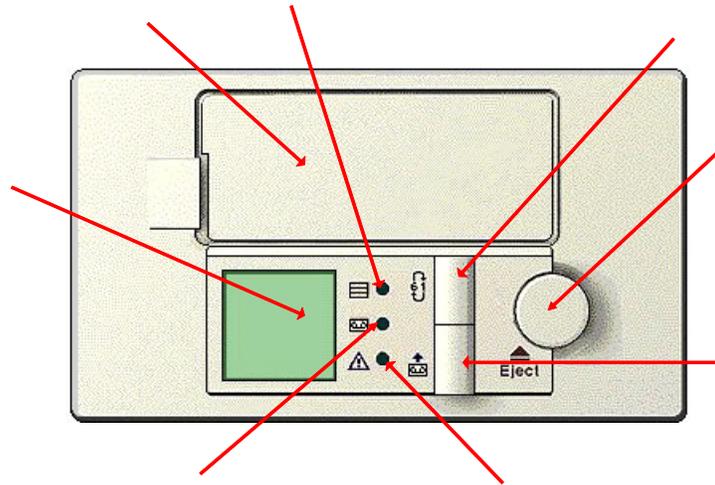
- The X motion inserts and withdraws the media from the DAT drive located at the bottom of the unit. The robotic components performing this function are called the picker fingers.
- The Y motion accesses the three cartridge slots on one side of the magazine.
- The R motion rotates the carousel to access the alternative three slots in the magazine.
- The Z motion allows the whole 6-slot magazine to be ejected from the device.

Highly reliable robotics can achieve a proven 50,000 MSBF.

The autoloader also has an intuitive, easy-to-use front panel with localized LCD display (into English, French, German, Spanish, Portuguese, Japanese, or a numeric code for other languages).

Figure 3.

DAT 72x6 front panel



In addition, the DAT 72x6 Tape Autoloader features the unique OBDR—the simplest, quickest way to recover your server or workstation from a total system failure (see Appendix 3).

All HP StorageWorks DAT autoloaders are supplied with fully functional TapeWare XE software (single server version) for Windows NT®, Novell NetWare, and Linux. The software is fully optimized for HP StorageWorks DAT autoloaders and can implement features such as automatic tape spanning and intelligent tape cleaning (see Appendix 2).

DAT media comes in three formats:

- DDS-3 media (HP Part C5708A) 125-m tape—Compressed capacity 24 GB (at 2:1)
- DDS-4 media (HP Part C5718A) 150-m tape—Compressed capacity 40 GB (at 2:1)
- DAT 72 media (HP Part C8010A) 170-m tape—Compressed capacity 72 GB (at 2:1)

In addition, there is a universal DAT cleaning cartridge (HP Part C5709A) and the empty magazines for the autoloader are HP Part C1571A.

The important thing to realize with DAT is that the tape format is determined by the media itself, so DDS-3 media placed in a DAT 40 or DAT 72 drive will always have data written to it in DDS-3 format. Therefore, you know very easily what the format of the data on your tape is.

Table 1.

Media format	Drive type		
	DAT 24	DAT 40	DAT 72
DDS-3	W/R	W/R	W/R
DDS-4	media ejected	W/R	W/R
DAT 72	media ejected	media ejected	W/R

W = write compatible

R = Read compatible

Similarly, DAT 72 media placed in a DAT 24 or DAT 40 drive will be ejected, since the DAT 24 and DAT 40 tape drives cannot write DAT 72 format on DAT 72 media.

It is fully expected that when the sixth generation DDS format is announced, it will read DAT 72 and DAT 40 media, ensuring maximum investment protection (see Appendix 1).

It is extremely important that HP StorageWorks DAT autoloaders are **not** used as large tape drives since usage as a large tape drive will exceed the recommended duty cycle (30%) of the autoloader, potentially resulting in reduced reliability. It is better to use the autoloader to fully automate the backup process, as illustrated in the following scenarios.

If a larger capacity automated tape drive solution is required, customers should consider the HP StorageWorks Ultrium range of autoloaders and libraries.

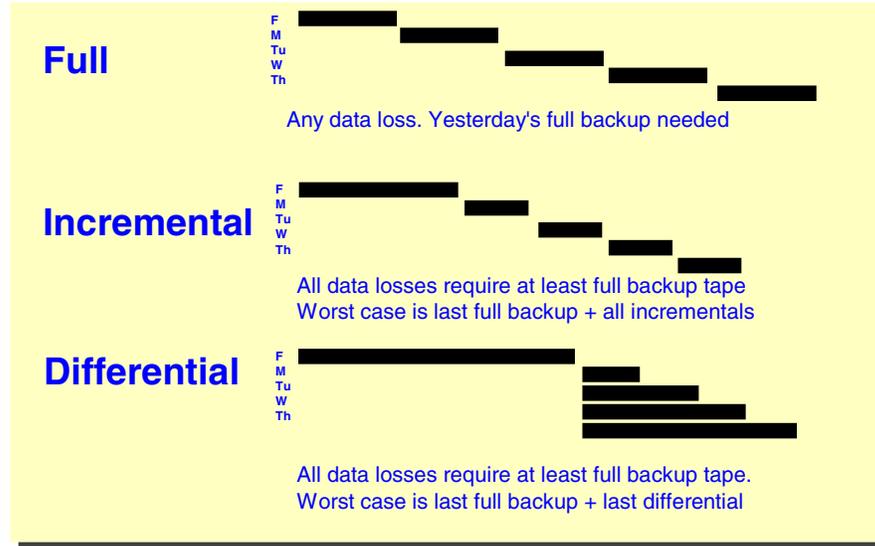
Backup basics

The following diagram shows the three most effective techniques of backing up data to ensure data can be restored to a given point in time—full, incremental, and differential. The following usage scenarios show full and differential backups being used, but full and incremental could equally be used.

Incremental and differential backups are used to minimize the amount of data to be backed up following a full backup, hence reducing the backup window.

Figure 4.

Recovery Strategies



The following scenarios assume disk capacities are in line with SCSI disk capacities—18, 36, and 73 GB—and the tape capacities obtainable depend on the compressibility of the data, which is generally estimated at 2:1. For a more conservative approach, assume your data is 1.5:1 compressible.

All the scenarios utilize the in-the-box software (TapeWare) supplied with the DAT 72x6 Tape Autoloader; however, scenario 3 requires the additional purchase of a TapeWare Master Server upgrade to enable LAN-based backup.

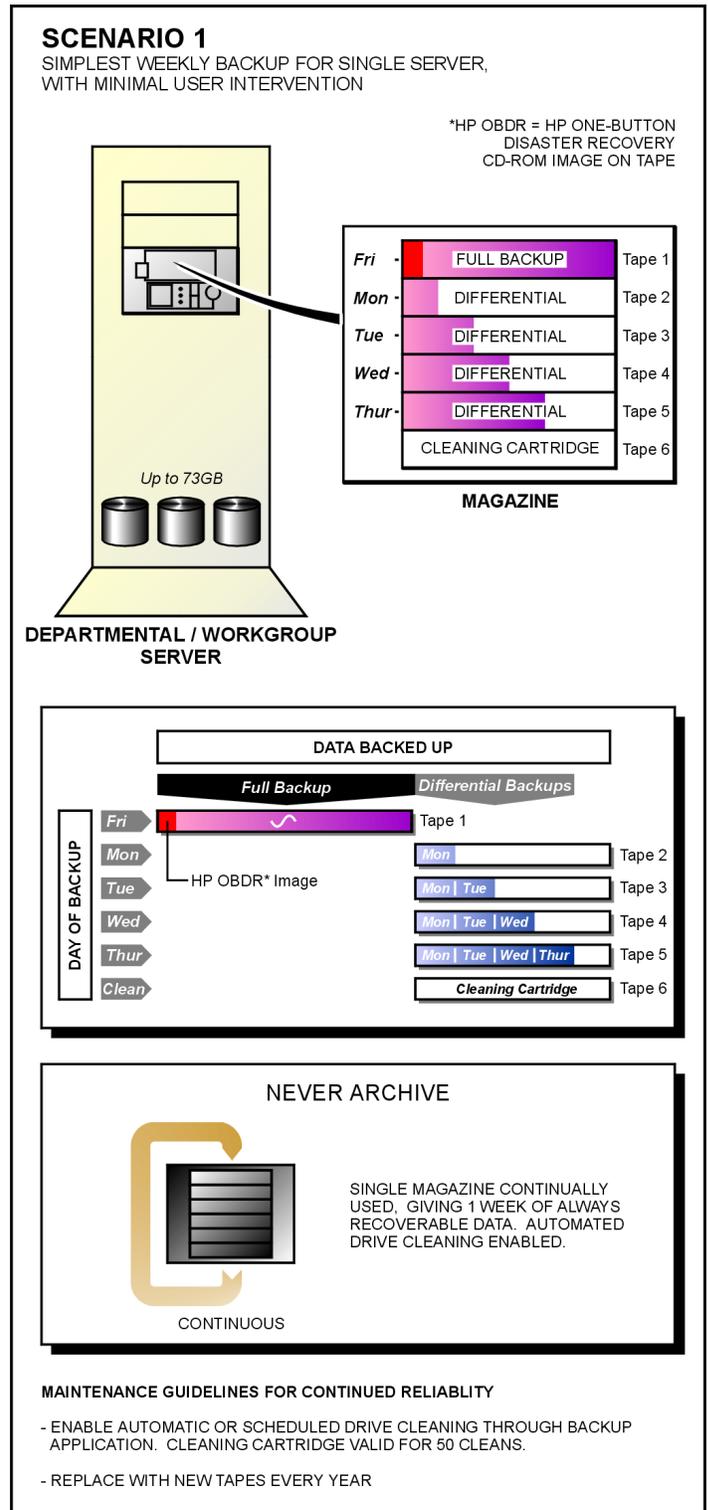
Scenario 1: simple weekly backup for single server with minimal user intervention

This usage model emphasizes:

- Simplicity and ease of use—“set it and forget it”
- Easy to restore files using full backup and last differential
- Increased reliability through reduced human intervention
- Built-in disaster recovery with every full backup using OBDR (see Appendix 2)
- Cost effectiveness because it requires only five pieces of media per year
- Fully automated drive cleaning (A cleaning cartridge permanently occupies slot 6 and TapeWare can detect when cleaning is required and schedule the drive to be cleaned.)

Limitations include:

- The amount of data that can be backed up is limited to a full tape (72 GB at 2:1 data compression).
- Recovery period is limited to one week.
- Data is not located offsite.
- If data is required to be archived, the magazine should be removed and the media labeled and archived safely.



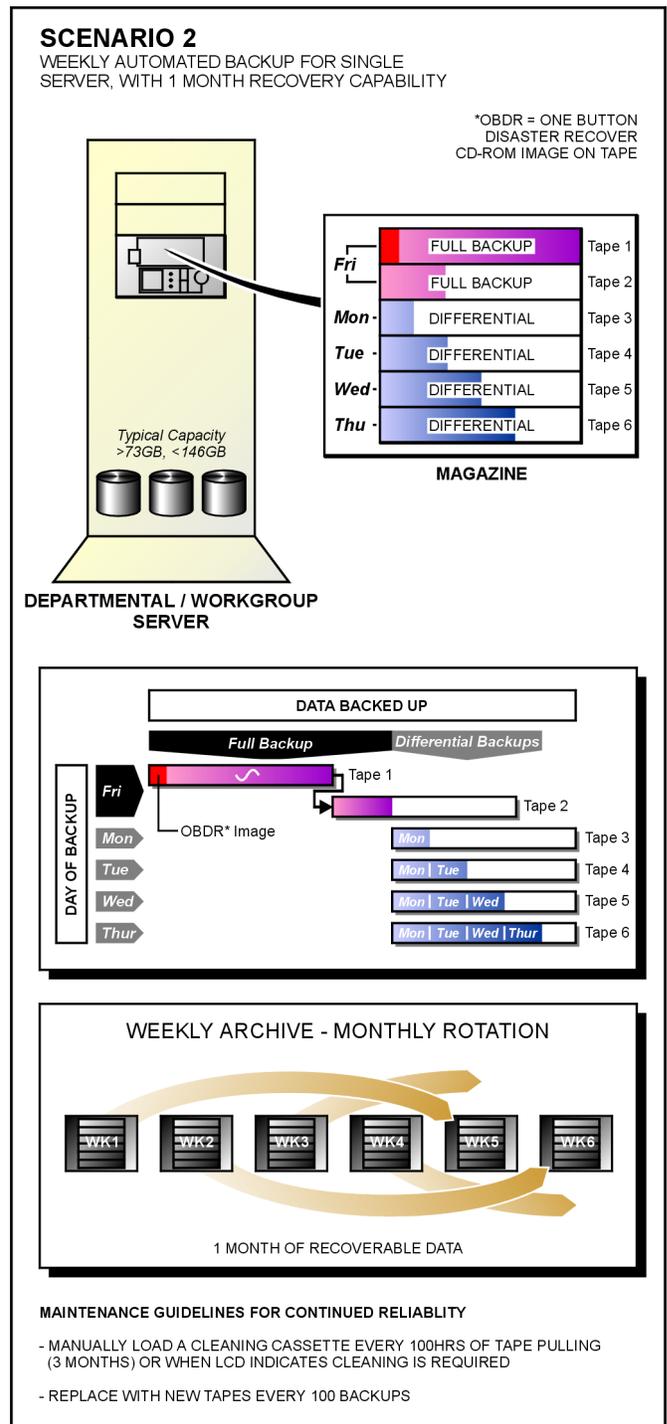
Scenario 2: weekly backup of up to 144 GB with archive capability

This usage model emphasizes:

- High-capacity backup (up to 144 GB at 2:1 data compression).
- Built-in disaster recovery with every full backup using OBDR (see Appendix 2).
- Using only 24 low-cost DDS media (4 X 6 cartridge magazines), this usage model allows for data to be restored to any point in time during the past month.
- Increased reliability through reduced human intervention.

Limitations include:

- The user must actively monitor the device to decide when periodic tape drive cleaning should be performed.
- Data is not located offsite until a week of backups is performed.



Scenario 3: backup of small multiple servers

This usage model emphasizes:

- Cost-effective small and medium business backups for departments that have LAN-based systems. The number of servers supported is dependent on volumes of data to be backed up. Businesses need to buy only one backup device instead of several separate devices connected to individual servers.
- Easier management. It is easier to manage the single device at one location than several devices at multiple locations.
- Built-in disaster recovery with every full backup using OBDR (see Appendix 2).
- Increased reliability through reduced human intervention.
- Using only 24 low-cost DDS media (4 X 6 cartridge magazines), this usage model allows for data to be restored to any point in time during the past month, for any of the servers using the autoloader for backup.

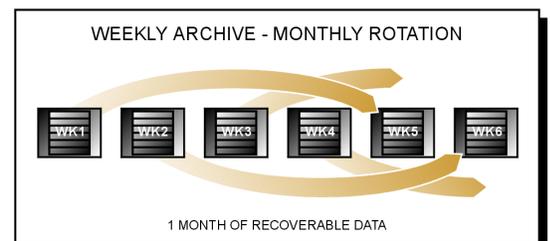
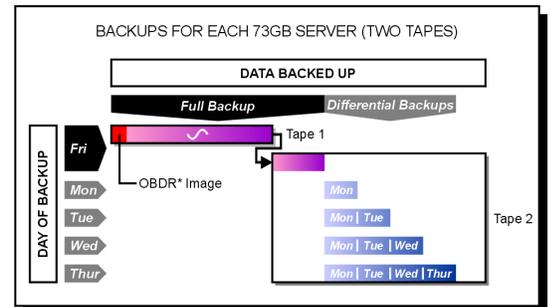
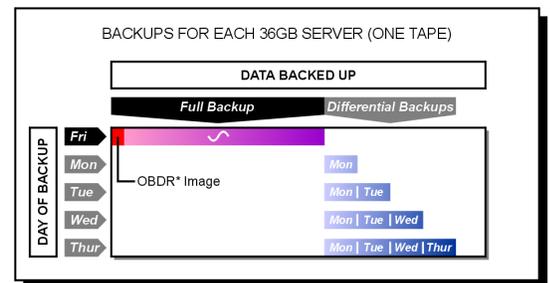
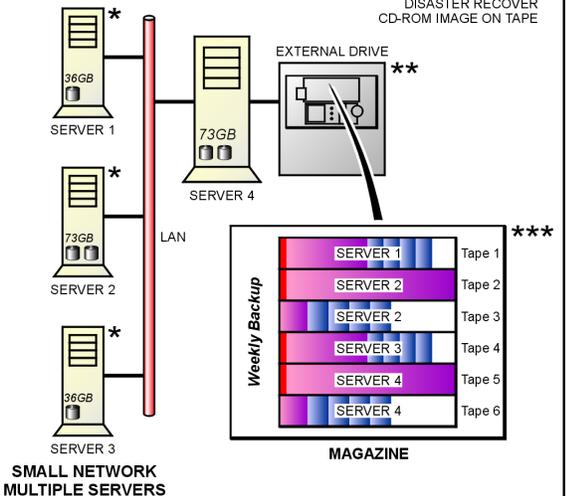
Limitations include:

- Additional TapeWare software module to upgrade TapeWare Master server is required to enable backup to take place over the network.
- The user must actively monitor the device to decide when periodic tape drive cleaning should be performed.
- In the case of a necessary OBDR recovery, the autoloader must have a SCSI connection to the "downed" server and the OBDR recovery tape inserted in slot 1 of the autoloader.
- LAN should be 100/1000 BaseT for best performance.
- Data is not located offsite until a week of backups is performed.

SCENARIO 3

COST EFFECTIVE AND MANEAGABLE BACKUP OF MULTIPLE SMALL SERVERS

*OBDR = ONE BUTTON DISASTER RECOVER CD-ROM IMAGE ON TAPE



MAINTENANCE GUIDELINES FOR CONTINUED RELIABILITY

- MANUALLY LOAD A CLEANING CASSETTE EVERY 100HRS OF TAPE PULLING (3 MONTHS) OR WHEN LCD INDICATES CLEANING IS REQUIRED
- REPLACE WITH NEW TAPES EVERY 100 BACKUPS

NOTES

* TO CREATE DR IMAGE FROM NETWORK CLIENTS REQUIRES PURCHASE OF ADDITIONAL MODULE. SEE www.tapeware.com/tp

** TO PERFORM DR RESTORE ON SERVERS 1,2,3 WILL REQUIRE AUTOLOADER TO BE DIRECTLY ATTACHED TO SERVER

*** DR IMAGE FOR RESTORE ALWAYS HAS TO BE IN SLOT 1

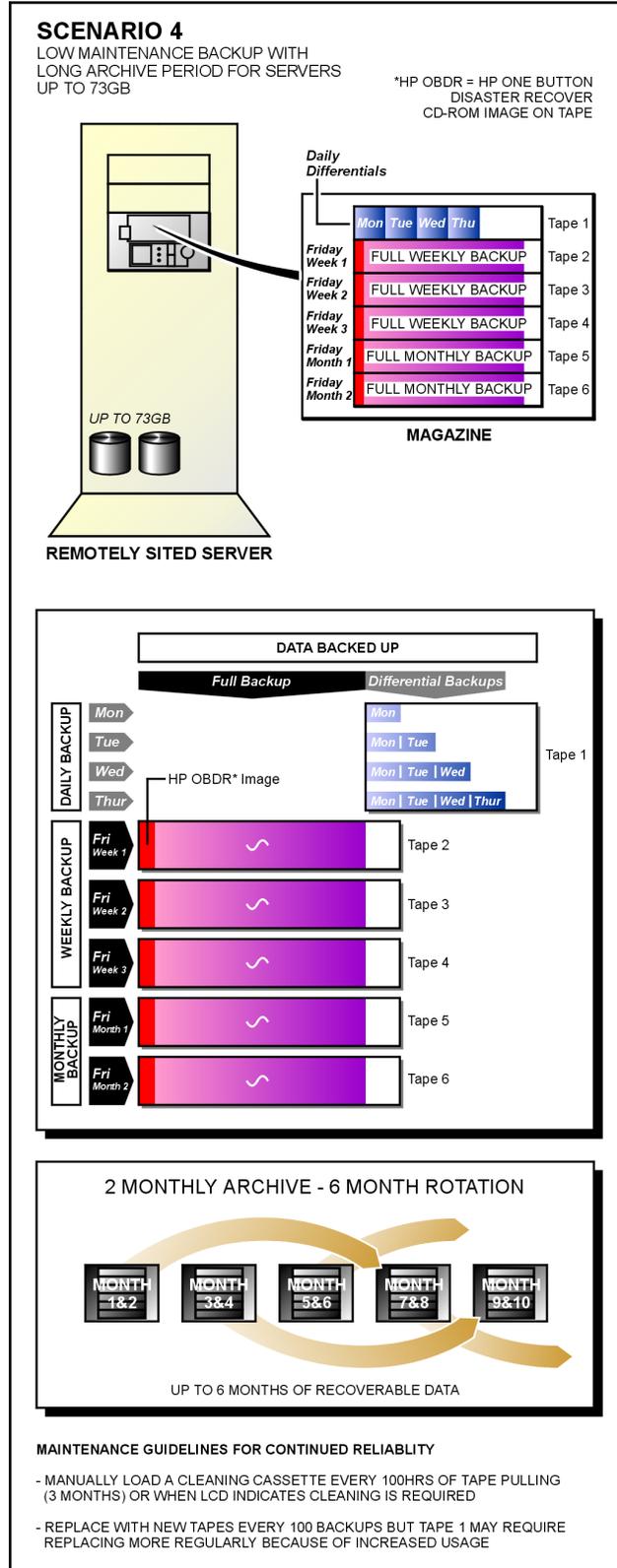
Scenario 4: low maintenance backup with long archive period for remote sites

This usage model emphasizes:

- Optimal use of autoloader capacity for long-term automated backup at remote sites where there is limited IT resources.
- Built-in disaster recovery with every full backup using OBDR, but the DR recovery must be performed by an IT professional.
- Increased reliability through reduced human intervention.
- Two months of backups can take place before a magazine cartridge must be replaced. Up to six months of data is recoverable.
- TapeWare backup software provides full remote management through a remote console or with the TapeWare Web Gateway.

Limitations include:

- The amount of data to be backed up is limited to a full tape (72 GB at 2:1 data compression).
- No offsite storage of data until two months of data has been backed up.
- The user must actively monitor the device to decide when periodic tape drive cleaning should be performed.
- Tape 1 is used the most and will require replacing more frequently than other tapes in the autoloader.



These four usage scenarios clearly illustrate the flexibility of the DAT 72x6 Tape Autoloader.

Connectivity and compatibility

For the latest hardware connectivity and software compatibility for the DAT 72x6 Tape Autoloader, visit <http://www.hp.com/go/connect> since this is continually being enhanced.

For downloads of the latest drivers for the DAT 72x6 Tape Autoloader, visit <http://www.hp.com/go/support> and enter the part number Q1566A (DAT 72x6 internal) or Q1567A (DAT 72x6 external).

For updated information on TapeWare, go to <http://www.yosemitetech.com>.

Total solution in the box—Yosemite TapeWare XE and DAT 72x6 Tape Autoloaders

The overall cost of automation (hardware and software) used to deter some people from reaping the full benefits that automated backup can deliver. Now with the fully featured single server edition of TapeWare XE shipped with the DAT 72x6 Tape Autoloader, taking advantage of tape automation has never been easier or more affordable. In addition, the in-the-box software can be economically upgraded to support enterprise class functionality for a fraction of the cost of other backup software vendors. See Table 2 for upgrade information.

Operating systems supported with the latest release of TapeWare are:

- NetWare 4.2/5.1/6.x
- Windows NT Server
- Windows 2000 Server/Advanced Server
- Windows Small Business Server 2000/2003
- Windows Server 2003 Standard/Enterprise
- Red Hat Linux 7.x/8.x/EL 2.1/EL 3.0
- SuSE Linux 7.x/8.x

The in-box software is designed to back up only the single server onto which it is installed, but can easily be upgraded to support centralized and distributed network backup and recovery of mixed platforms by upgrading to TapeWare Master server edition and adding client and media server licenses. In addition, online backup agents to protect Microsoft SQL, Microsoft Exchange, Oracle, or general open files can also be purchased.

The following features included in TapeWare XE are of particular interest for autoloader usage:

- Automatic tape spanning when the tape is full
- Remote management over the web
- Easy-to-schedule and easy-to-manage rotation schemes
- Extensive error reporting database
- Fully automatic drive cleaning
- OBDR support
- TapeAlert for predictive diagnosis, for example, this reports when media is coming to the end of its useful life

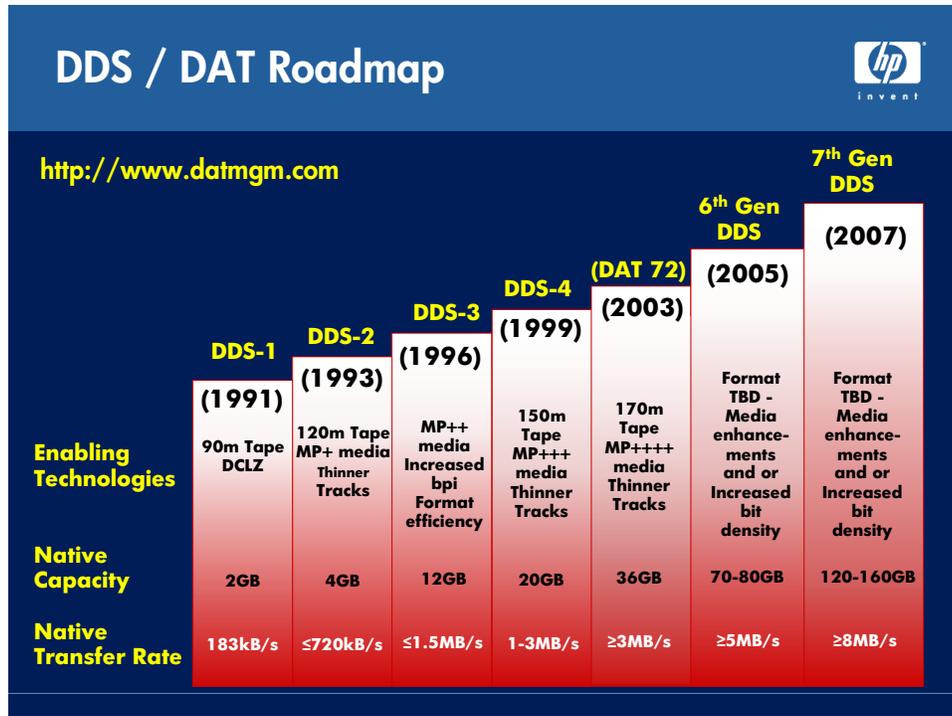
Table 2.

	TapeWare XE HP in-box software	TapeWare Master Server Upgrade	TapeWare Master Starter Pack Upgrade	TapeWare Master Server Enterprise Pack Upgrade	TapeWare Master Server Small Business Server Upgrade
Platforms These are the platforms that can be backed up.	Windows NT,XP, 2000, 2003 NetWare 4.2, 5.1, 6.x Linux (Red Hat, SuSE)	Windows NT,XP, 2000, 2003 NetWare 4.2, 5.1, 6.x Linux (Red Hat, SuSE)	Windows NT,XP, 2000, 2003 NetWare 4.2, 5.1, 6.x Linux (Red Hat, SuSE)	Windows NT,XP, 2000, 2003 NetWare 4.2, 5.1, 6.x Linux (Red Hat, SuSE)	Windows Small Business Server 200 / 2003
Storage Manager Controlling storage management server.	Windows NT,XP, 2000, 2003 NetWare 4.2, 5.1, 6.x Linux (Red Hat, SuSE)	Windows NT,XP, 2000, 2003 NetWare 4.2, 5.1, 6.x Linux (Red Hat, SuSE)	Windows NT,XP, 2000, 2003 NetWare 4.2, 5.1, 6.x Linux (Red Hat, SuSE)	Windows NT,XP, 2000, 2003 NetWare 4.2, 5.1, 6.x Linux (Red Hat, SuSE)	Windows Small Business Server 200 / 2003
Devices Devices can be connected to these platforms.	Windows NT,XP, 2000, 2003 NetWare 4.2, 5.1, 6.x Linux (Red Hat, SuSE)	Windows NT,XP, 2000, 2003 NetWare 4.2, 5.1, 6.x Linux (Red Hat, SuSE)	Windows NT,XP, 2000, 2003 NetWare 4.2, 5.1, 6.x Linux (Red Hat, SuSE)	Windows NT,XP, 2000, 2003 NetWare 4.2, 5.1, 6.x Linux (Red Hat, SuSE)	Windows Small Business Server 200 / 2003
Network Support	Remote Management only	Yes (Optional)	Yes	Yes	Yes (Optional)
Autoloader Support	Single Drive	Single Drive	Single Drive	Single Drive	Single Drive
Number of Servers	1 Only	1 Standard (Expandable)	1 Standard (Expandable)	3 Standard (Expandable)	1 Standard (Expandable)
Number of Workstations	N/A	Optional	Unlimited Workstations	Unlimited Workstations	Optional
HP OBDR Support	Included	Optional	Optional	Optional	Included
Suggested Retail	Included	\$279.00	\$384.00	\$629.00	\$489.00
Standard Components	TapeWare XE Disaster Recovery	TapeWare Master Server	TapeWare Master Server Unlimited Workstations	TapeWare Master Server (2) Client Servers Unlimited Workstations	TapeWare Master Server MS Exchange Agent MS SQL Agent Disaster Recovery
Optional Agents	MS Exchange Agent MS SQL Agent Oracle Agent Library Expansion	Client Servers Media Servers MS Exchange Agent MS SQL Agent Ms Cluster Agent Oracle Agent Library Expansion Unlimited Workstations Disaster Recovery	Client Servers Media Servers MS Exchange Agent MS SQL Agent Ms Cluster Agent Oracle Agent Library Expansion Disaster Recovery	Client Servers Media Servers MS Exchange Agent MS SQL Agent Ms Cluster Agent Oracle Agent Library Expansion Disaster Recovery	Client Servers Media Servers MS Cluster Agent Oracle Agent Library Expansion Unlimited Workstations

For example screenshots of TapeWare functionality, see Appendix 2.

Appendix 1. DAT roadmap

Figure 5.



The HP sixth generation DAT tape drive is already well into development and due for release in 2005. As usual it will align with the key value proposition of DAT technology:

“Proven, reliable, backwards compatible, low cost technology that gives customers assurance that their information is safe.”

Appendix 2. TapeWare in action

Figure 6. Server based—activity wizard

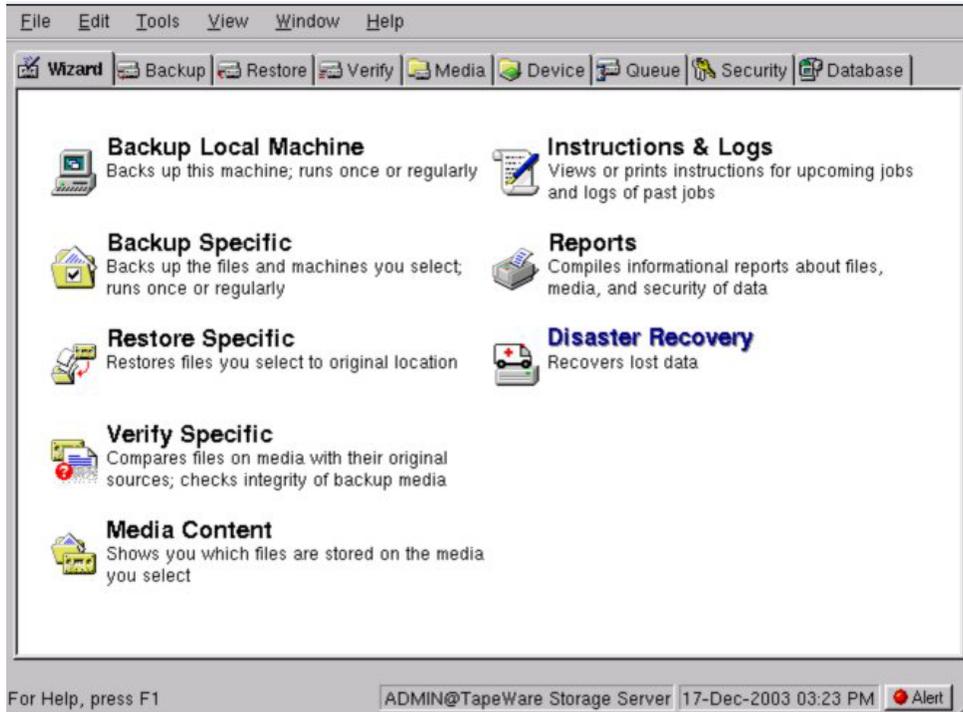


Figure 7. Easy-to-schedule backups

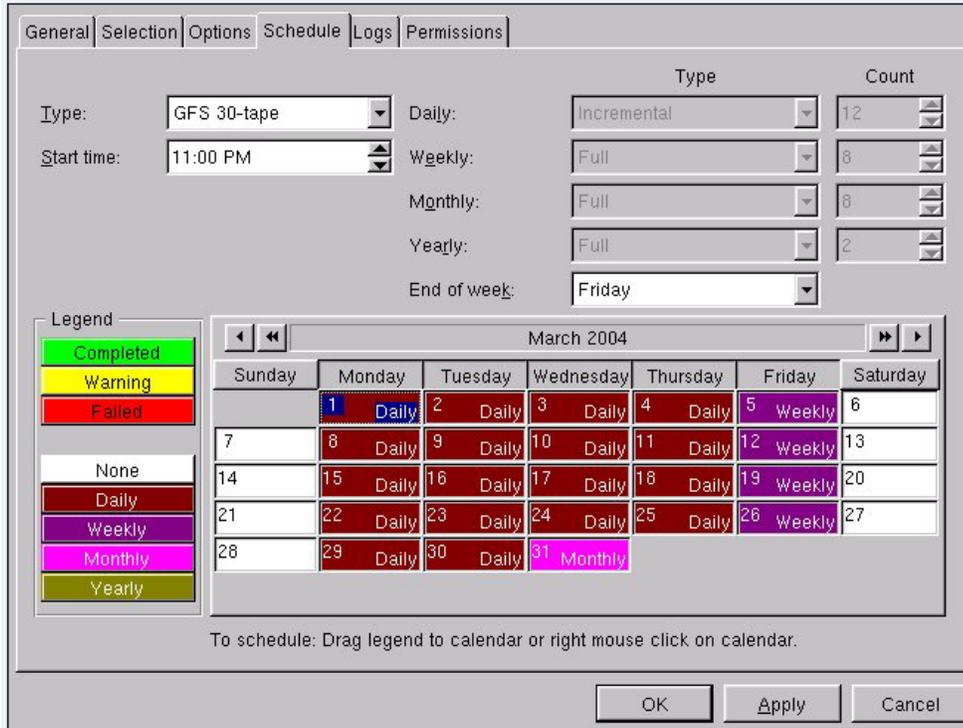


Figure 8. Start of the OBDR process using TapeWare

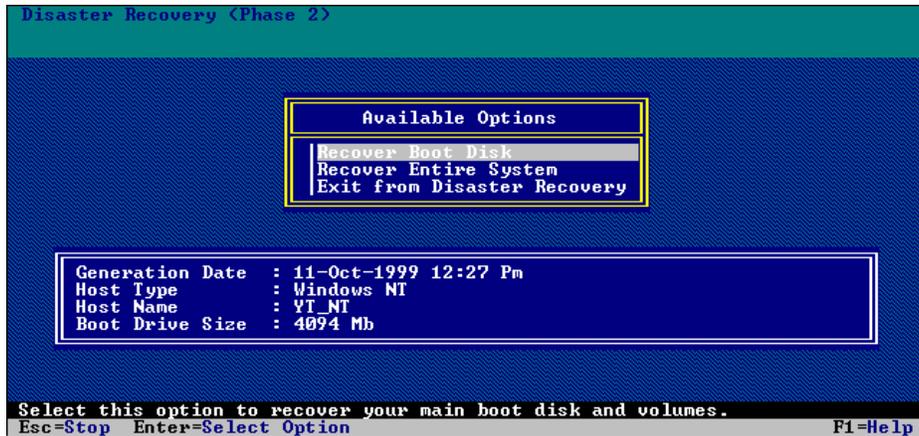


Figure 9. TapeWare remote management GUI (web based)—logon

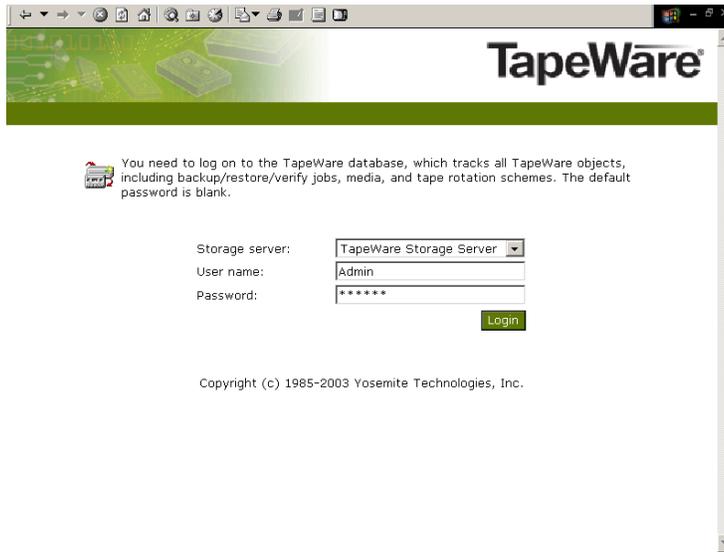
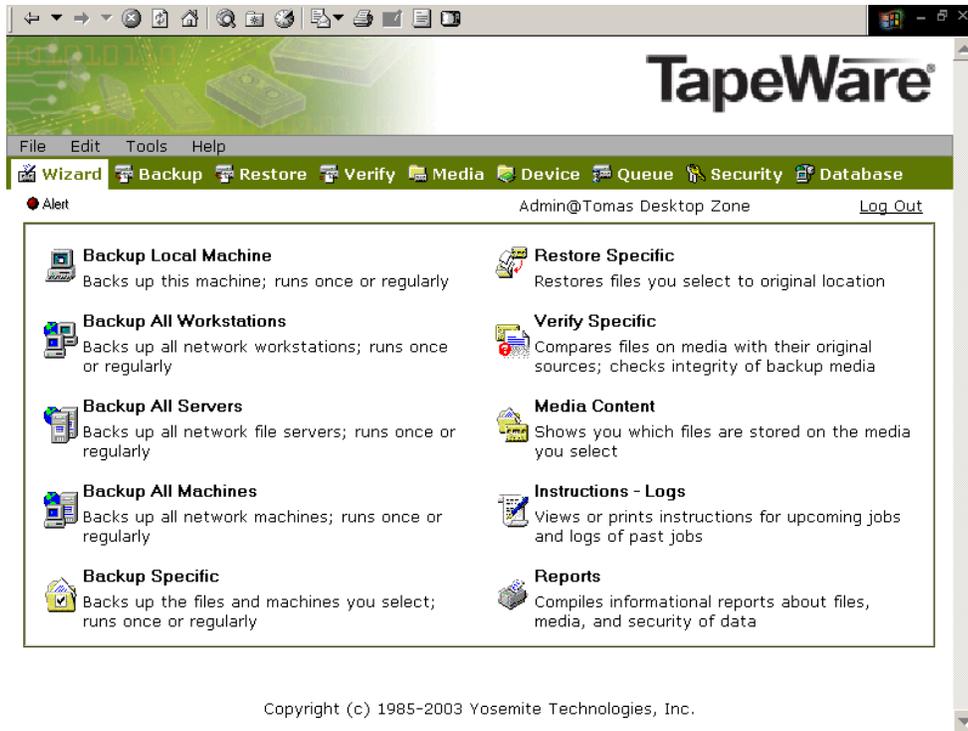


Figure 10. Remote (web) management—activity wizard



Appendix 3. OBDR

OBDR is the simplest, fastest, easiest way to recover your server or workstation from a total system failure.

Consider the alternatives summarized in Figure 11. Before OBDR, the only way you could recover from a total system failure was by using multiple pieces of media, which was very time-consuming and unreliable.

With OBDR, you power up the autoloader with the “eject” button depressed to place the autoloader into OBDR mode, ensuring the OBDR boot tape is in magazine slot 1. In this mode the DAT 72x6 Tape Autoloader emulates a bootable CD-ROM drive and the system can recognize the drive and boot using just the autoloader. OBDR mode is displayed on the front LCD and any tape backup made with OBDR-compatible software can be loaded into the autoloader in slot 1 and booted directly from tape.

At backup time, OBDR-compatible software writes a Disaster Recovery (DR) image onto the backup tape along with the normal tape backup. This DR image contains a basic operating system with tape drivers and other system configuration files, so that when the DR image is running, it is capable of recovering the rest of the backup session on that tape.

OBDR is unique to HP StorageWorks DAT drives and Ultrium drives, together with DAT 40x6 Tape Autoloader and DAT 72x6 Tape Autoloader.

OBDR is fully supported by Yosemite Technologies TapeWare under NetWare, Windows, and Linux environments. Many other independent software vendors such as VERITAS and Computer Associates also support OBDR, and, of course, HP StorageWorks Data Protector supports OBDR.

For more information about OBDR, go to www.hp.com/go/obdr.

Figure 11.

Disaster Recovery Options			
			
Conventional Method	Using Disaster Recovery Floppies	Using Disaster Recovery Floppies	HP One-Button Disaster Recovery
<ul style="list-style-type: none">• Repair hardware• Collect all necessary media together• Reload OS from CD-ROM or floppies• REBOOT• Reload backup software from CD-ROM or floppies• REBOOT• Load recovery tape and restore system• REBOOT	<ul style="list-style-type: none">• Repair hardware• Collect all necessary media together• REBOOT from DR floppies• Load recovery tape and restore system• REBOOT	<ul style="list-style-type: none">• Repair hardware• Collect all necessary media together• REBOOT from CD-R or CD-RW• Load recovery tape and restore system• REBOOT	<ul style="list-style-type: none">• Repair hardware• BOOT in OBDR mode and automatically restore system• REBOOT

For more information

On tape technology: <http://www.hp.com/go/tape>

On hardware connectivity and software compatibility: <http://www.hp.com/go/connect>

On TapeWare backup software: <http://www.yosemitetech.com>

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