HP StorageWorks

DAT USB Tape Drives

User Guide

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About this guide

This guide provides information about:

- Installing the HP StorageWorks DAT USB tape drive
- Using the HP StorageWorks DAT USB tape drive
- Troubleshooting the HP StorageWorks DAT USB tape drive

Intended audience

This guide is intended for users who install, operate and maintain the HP StorageWorks DAT tape drive.

Related documentation

In addition to this guide, the following document provides related information:

- 'Start here' poster for an overview of the installation information in this guide (available in English, French, German and Japanese)

You can find these documents from the Manuals page of the HP Business Support Center website:

http://www.hp.com/support/manuals

In the Storage section, click **Tape Storage and Media** and then select your product.

Document conventions and symbols

Table 1 Document conventions

Convention	Element
Blue text: Table 1	Cross-reference links and e-mail addresses
Blue, underlined text: http://www.hp.com	website addresses
Bold text	• Keys that are pressed • Text typed into a GUI element, such as a box • GUI elements that are clicked or selected, such as menu and list items, buttons, tabs, and check boxes
Italic text	Text emphasis
`Monospace` text	• File and directory names • System output • Code • Commands, their arguments, and argument values

Convention	Element
Monospace, italic text	• Code variables • Command variables
Monospace, **bold** text	Emphasized monospace text

⚠ WARNING!

Indicates that failure to follow directions could result in bodily harm or death.

⚠ CAUTION:

Indicates that failure to follow directions could result in damage to equipment or data.

IMPORTANT:

Provides clarifying information or specific instructions.

NOTE:

Provides additional information.

HP technical support

For worldwide technical support information, see the HP support website:

http://www.hp.com/support

Before contacting HP, collect the following information:

- Product model names and numbers
- Technical support registration number (if applicable)
- Product serial numbers
- Error messages
- Operating system type and revision level
- Detailed questions

Registering your tape drive

Once you have installed and tested your HP StorageWorks tape drive, please take a few minutes to register your product on the following website:

http://www.register.hp.com

To ensure your registration is complete, there are a number of questions on the electronic form that are mandatory. Other questions are optional. However, the more you feel able to complete, the better HP can meet your needs.

Subscription service

HP recommends that you register your product at the Subscriber's Choice for Business website:

http://www.hp.com/go/e-updates

After registering, you will receive e-mail notification of product enhancements, new driver versions, firmware updates, and other product resources.

After signing up, you can quickly locate your products by selecting **Business support** and then **Storage** under Product Category.

HP websites

For additional information, see the following HP websites:

- http://www.hp.com
- http://www.hp.com/go/storage
- http://www.hp.com/service_locator
- http://www.hp.com/support/manuals
- http://www.hp.com/support/downloads

Documentation feedback

HP welcomes your feedback.

To make comments and suggestions about product documentation, please send a message to storagedocs.feedback@hp.com. All submissions become the property of HP.

1 Before you start

In this chapter:

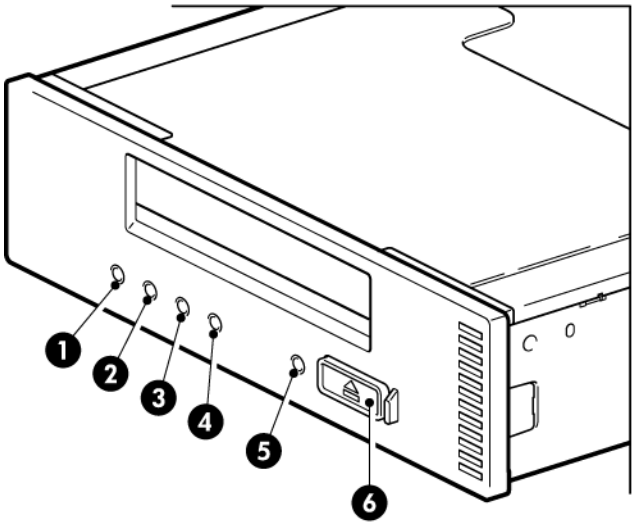
- "HP StorageWorks DAT models" on page 13
- "Which operating systems are supported?" on page 15
- "USB tape drive and cables" on page 15
- "What are the mounting requirements for an internal tape drive?" on page 16
- "Using the HP StorageWorks Tape CD-ROM" on page 17

HP StorageWorks DAT models

This guide describes how to install and operate the following HP StorageWorks DAT USB tape drive models:

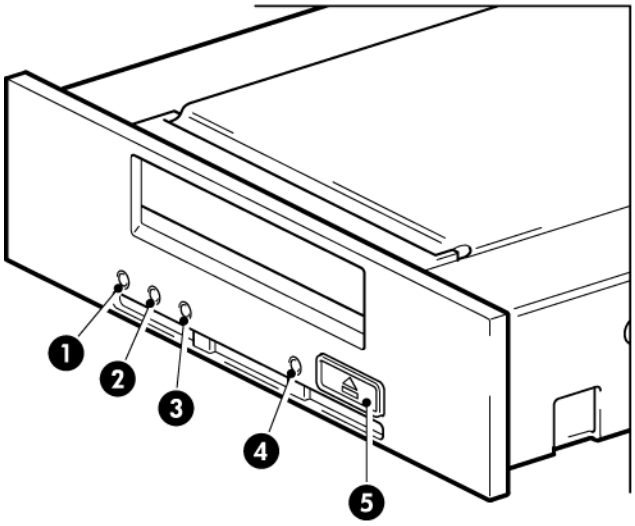
- HP StorageWorks DAT 320
- HP StorageWorks DAT 160
- HP StorageWorks DAT 72
- HP StorageWorks DAT 40

For a detailed product specification, please refer to our World Wide Web site (http://www.hp.com).



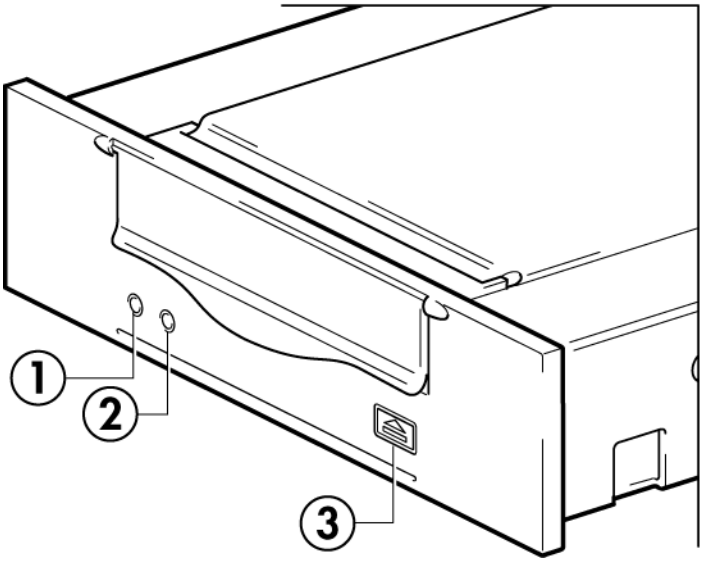
1. Clean LED
2. Tape LED
3. Drive LED
4. Encryption LED
5. Ready LED
6. Eject button

Figure 1 Front view of HP StorageWorks DAT 320 tape drive



1. Clean LED
2. Tape LED
3. Drive LED
4. Ready LED
5. Eject button

Figure 2 Front view of HP StorageWorks DAT 160 tape drive



1. Clean LED
2. Tape LED
3. Eject button

Figure 3 Front view of HP StorageWorks DAT 72 and 40 tape drive

Which operating systems are supported?

HP StorageWorks DAT USB drives can be connected to servers running under Microsoft Windows Server 2008, Server 2003, Vista and XP, and Linux Kernels 2.6.x. Refer to the *HP StorageWorks Tape Software Compatibility* topic on our World Wide Web site, http://www.hp.com/go/connect/ , for the most recent information about the operating system versions that are supported.

USB tape drive and cables

For optimum performance the drive should be connected to a USB 2.0 port and it should be the only device on the USB bus. Although the tape drive will function on USB 1.1, performance will be severely degraded. See also "Verifying USB installation for optimum performance" on page 63. Appropriate USB cables are supplied with your tape drive.

Internal drives

The drive is not powered from the USB bus. It must be connected to the server's power supply.

Three USB cables are provided with the tape drive to support connection to three types of internal USB port:

Figure 4 USB cables

- A USB cable with a 4–pin Intel connector (blue)
- A USB cable with a 4–pin ProLiant connector (red)
- A standard USB cable

NOTE:

If your server does not have an internal USB port, you must purchase and install a separate USB HBA with an internal port before you install the tape drive. See http://www.hp.com/go/connect for recommended products.

External drives

A power cable is provided with your HP StorageWorks DAT tape drive.

The USB 2.0 cable is pre-fitted to the tape drive, you cannot remove it.

Power requirements

Power requirements are:

Table 2 Power requirements

Voltage	Typical Current			Maximum Current		
	DAT 320	DAT 160	DAT 72/40/ 24	DAT 320	DAT 160	DAT 72/40/ 24
5 V	0.70 A	1.54 A	0.7 A	1.4 A	1.61 A	0.8 A
12 V	0.25 A	0.26 A	0.3 A	1.3 A	1.3 A	1.0 A

What are the mounting requirements for an internal tape drive?

Mounting bay

You need one industry-standard, 5¼-inch, half-height bay in which to install the HP StorageWorks DAT tape drive.

Mounting hardware

For many servers, no mounting tray or rails are required. Devices simply slide into the server's chassis and are fixed with screws. Other servers have built-in trays or rails.

Rail kits for a number of industry-standard servers may be available. For more details refer to: http://www.hp.com/go/connect.

Some servers use non-standard mounting rails and do not include spares. If this is the case with your system, you will have to order these accessories from the server manufacturer before you can install the tape drive.

Using the HP StorageWorks Tape CD-ROM

The HP StorageWorks Tape CD-ROM is a central source of information about your tape drive with utilities for getting the best performance from your tape drive.

Use the HP StorageWorks Tape CD-ROM to check installation, as described in this guide, and to verify and troubleshoot performance after installation. It helps you to:

- Install your product, which includes access to drivers, and performance information and tools
- Learn about your product
- Register your product
- Buy media online
- Troubleshoot with HP Library & Tape Tools

2 Drivers and backup software

In this chapter:

- "Install drivers " on page 19
- "Upgrade backup software" on page 20

Install drivers

Installing on Windows

Two drivers are required in order to use HP StorageWorks DAT USB tape drives.

- **HPDAT:** This is the HP Tape driver that works with all HP DAT products. It is regularly updated and is available on the HP StorageWorks CD-ROM or on the HP Support web site. However, certain software applications require you to use their own driver. Always check the software vendor's documentation or web site before installing this driver.
- **USBSTOR:** DAT 320 tape drives only. This Microsoft usbstor driver is loaded automatically by the Operating System. The user does not need to install it.

  HPUSBMSC.SYS: all other DAT models. The HP USB Mass Storage Class Driver is specifically for DAT Tape Drives prior to DAT320 such as DAT72 and DAT160 Drives. It must be installed by the user. The HP USB Mass Storage driver is installed by running the driver installer from the CD supplied with the HP StorageWorks tape drive, as described below, and is also available on the Support website. To check the driver being used on the system, use Device Manager as described in "Ensure that the HPUSBMSC.SYS driver is being used (Windows)" on page 63.

Installation process

The CD-ROM contains a driver install package for the supported Microsoft Windows operating systems, see http://www.hp.com/go/connect. If you prefer to use Windows Device Manager to install the tape drivers manually, you will find them in the **drivers** directory on the CD-ROM.

IMPORTANT:

We strongly recommend that you use the installer package on the HP StorageWorks CD-ROM to install the drivers BEFORE you connect the tape drive.

Updates to the drivers may be provided from time to time on the HP support web site (http://www.hp.com/support). We recommend that these are installed after using the installer on the CD-ROM.

Recommended install process, before connecting the tape drive

1. Insert the HP StorageWorks Tape CD-ROM.
2. Select the **install drivers** link.
3. Run the automated installer and follow the process to load the required drivers onto the system.

4. Once you have installed the tape drive and rebooted, as described in this guide, the tape drive will be detected automatically and the correct driver will be used.

Alternative install process, after connecting the tape drive

If you have not already installed drivers, the Windows Found New Hardware wizard may run when you power on the server and tape drive.

Either:

Follow the on-screen instructions to search for the required drivers on the CD-ROM.

Or:

1. Cancel the wizard and insert the HP StorageWorks Tape CD-ROM.
2. Select the **install drivers** link on the CD-ROM.
3. Run the automated installer and follow the process to load the required drivers onto the system.
4. On completion of the installation the tape drive will be ready to use.

Installing on Linux

The Linux operating system also requires two drivers. These drivers are included with the operating system and should be loaded automatically. See also "Check drivers (Linux)" on page 64.

Upgrade backup software

For optimum performance it is important to use a backup application that is appropriate for your system's configuration. HP, Symantec, EMC and Computer Associates all provide suitable products. Further details about these and other products that may be appropriate can be found on the Software Compatibility page of our connectivity web site, http://www.hp.com/go/connect. It is important to install any recommended upgrades.

NOTE:

Native backup applications, such as Windows Backup,are compatible with DAT tape drives, but are not recommended because they do not support the full features of the tape drive and may cause performance problems. If using this application, the user must always choose 4 mm even when using 8 mm tape with an HP StorageWorks DAT 160 or DAT 320 tape drive.

1. Go to our connectivity web site: http://www.hp.com/go/connect and select **tape backup**.
2. Select **software compatibility**.
3. Select your combination of operating system and tape drive model in the table. A list of supported backup applications is displayed. This will also tell you whether your configuration is compatible with HP One-Button Disaster Recovery, HP OBDR. (All HP StorageWorks DAT tape drives support HP OBDR. However, you can only use this feature if your system configuration and backup application also support it. See "Using HP OBDR" on page 53.)
4. Make sure you have a backup application that supports HP StorageWorks DAT tape drives and download any upgrades or patches, if required.

NOTE:

Certain backup applications require you to use their own Tape driver instead of the HP Tape driver.

Enabling encryption (DAT 320 only)

Your HP StorageWorks DAT 320 tape drive includes hardware capable of performing data encryption while writing and data decryption while reading, both at full speed. This is only possible with DAT 320 GB media. See also "DAT 320 tape drives and encryption" on page 46.

If you wish to make use of the encryption capability, you must enable this feature via the backup software application. Refer to your supplier to find out which applications support this advanced data protection capability.

3 Installing an internal DAT tape drive

In this chapter:

- "Prepare mounting bay" on page 23
- "Attach mounting hardware" on page 24
- "Install drive" on page 25
- "Attach USB cable" on page 25
- "Attach USB and power cable to the tape drive" on page 28
- "Secure the drive" on page 30

Please refer to "Installing an external DAT tape drive" on page 31, if you are installing an external DAT tape drive.

Where the illustrations in this chapter show only the HP StorageWorks DAT 320 tape drive, the process is the same for all models of tape drive.

Prepare mounting bay

You need one industry-standard, 5¼-inch, half-height bay in which to install the HP StorageWorks DAT tape drive. Different models of server require different mounting methods. Refer to your server documentation for detailed information.

⚠ WARNING!

To avoid personal injury or damage to the server or tape drive, ensure that the server is disconnected from the mains power supply while you install the drive.

⚠ CAUTION:

Static electricity can damage electronic components. Always wear an antistatic wriststrap if one is available. If not, after you have disconnected power from the server and removed the cover, touch a bare metal part of the chassis. Similarly, touch a bare metal part of the drive before installing it.

1. Refer to your server documentation for detailed instructions and assemble the necessary tools and materials.
2. Perform a normal system shutdown and turn off the server and any connected peripherals.
3. Remove the cover and access panel from the server, as detailed in your server's documentation.

   As you work inside the server, you may have to disconnect other signal cables or power cables from other devices to maneuver the new drive into place. If you have to do this, make a note of their position and connections so you can put them back correctly later.

4. Remove the filler panel from a spare 5¼-inch bay of your server, as described in your server's documentation. With some servers you may also need to remove the half-height device divider. Keep any screws for use in "Secure the drive" on page 30.
5. You are now ready to install your tape drive.

Attach mounting hardware

If your server requires special rails or other hardware to install the tape drive, mount them on the tape drive now. *If your server does not require special mounting hardware, proceed to "Install drive" on page 25 now.*

Please check your HP ProLiant server documentation to ascertain the correct method of mounting, and to check whether mounting hardware is provided with the server or must be purchased separately. For more details about mounting hardware refer also to: http://www.hp.com/go/connect.

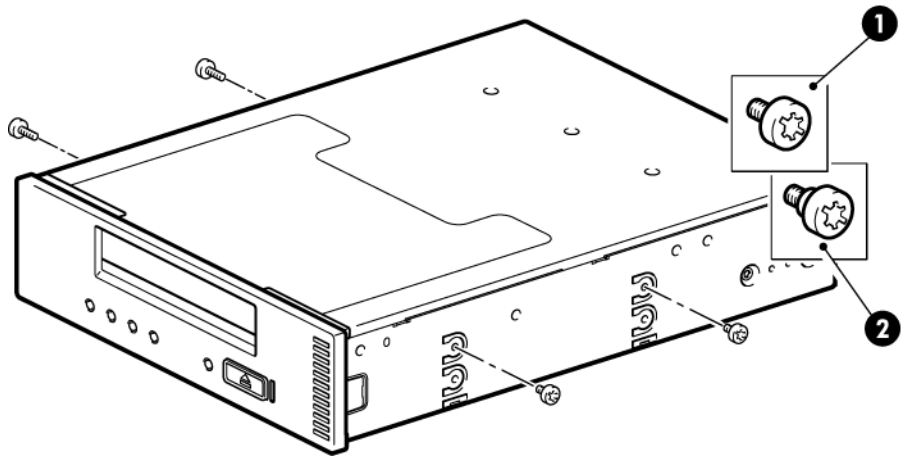
NOTE:

Some servers use non-standard mounting rails and do not include spares. If this is the case with your system, you will have to order these accessories from the server manufacturer before you can install the tape drive.

Different models of server require different mounting methods. Always refer to your server documentation for details. The following diagrams illustrate common mounting methods.

NOTE:

If mounting hardware is supplied with your tape drive, it may not be exactly the same as shown in the illustrations.



1. M3 mounting screws
2. M3 offset mounting screws

Figure 5 Attaching mounting screws

Install drive

CAUTION:

Static electricity can damage electronic components. Always wear an antistatic wriststrap if one is available. If not, after you have disconnected power from the server and removed the cover, touch a bare metal part of the chassis. Similarly, touch a bare metal part of the drive before installing it.

Slide the tape drive into the open bay, aligning the tray or rails with the slots in the bay, as shown in Figure 6 on page 25.

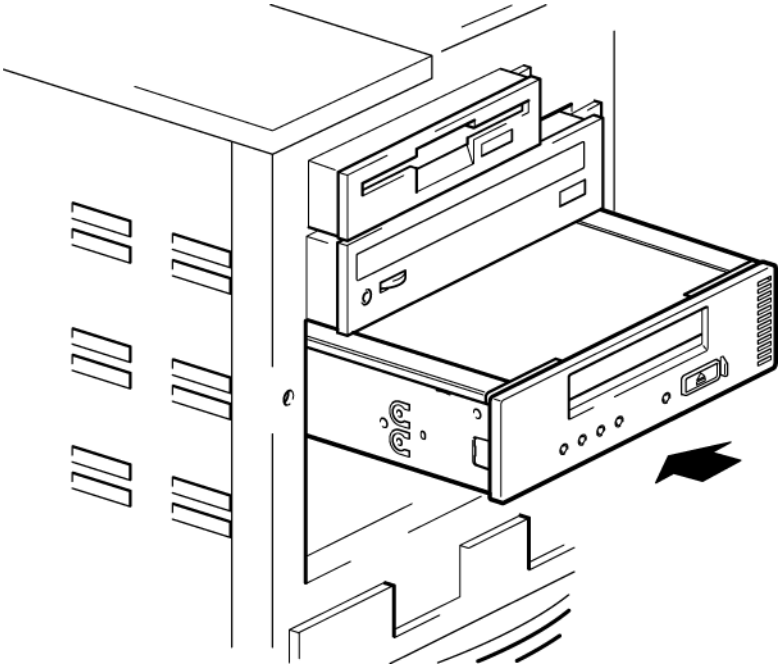


Figure 6 Installing tape drive

If your server does not use mounting hardware, check that the holes in the chassis are aligned with the holes in the side of the tape drive.

Do not secure the drive at this point because you may have to move the drive to get the cables into place.

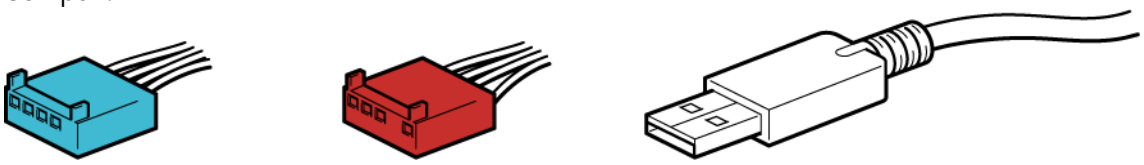
Attach USB cable to the server

Decide which cable to use

NOTE:

It is important to ensure that you connect your drive to a USB 2.0 port. The drive will work on a USB 1.1 port but performance will be severely degraded. See also "Verifying USB installation for optimum performance" on page 63.

Three USB cables are provided with the tape drive to support connection to three types of internal USB port:



- A USB cable with a 4–pin Intel connector (blue)
- A USB cable with a 4–pin ProLiant connector (red)
- A standard USB cable

NOTE:

If your server does not have an internal USB port, you must purchase and install a separate USB HBA with an internal port before you install the tape drive. See http://www.hp.com/go/connect for recommended products.

To check whether your server has an internal USB port:

- Look at the diagram on the inside of the side panel of the server to establish whether the server has an internal USB port and its location. The internal USB port may have a 4-pin or a standard USB connector.
- The 4-pin USB connector on the system board may be orientated vertically or horizontally.

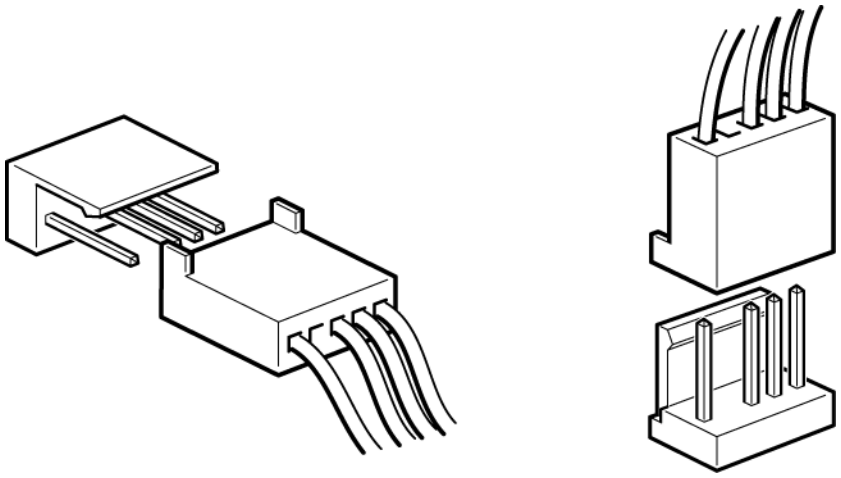


Figure 7 Orientation of internal 4-pin connector (ProLiant header pin layout)

Connect the USB cable to an internal USB port

1. Use the schematic on the inside of the server panel to check whether your server has an internal USB 2.0 port and locate its position.

   If it does not have an internal USB port, you must first install a USB HBA. See http://www.hp.com/go/connect for recommended products.

2. Use the cable supplied with the tape drive to connect to the server.
   - If your server has a standard USB port, use a standard USB cable. You can use the supplied standard USB cable and cable ties to tidy excess cable length.

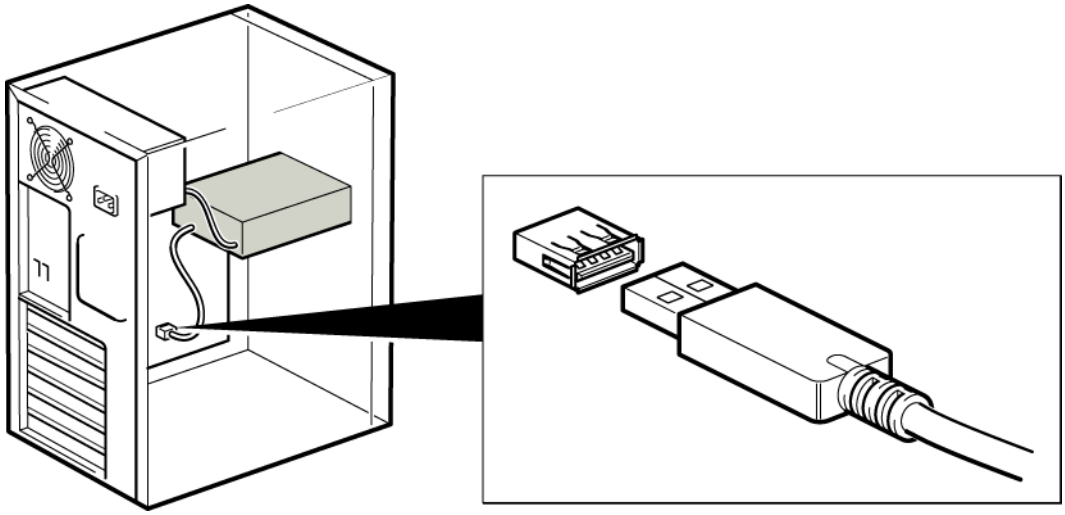


Figure 8 Connecting to a standard USB port

   - If your server has a 4-pin USB port, select the 4-pin cable that is appropriate for the pin layout on the USB port.

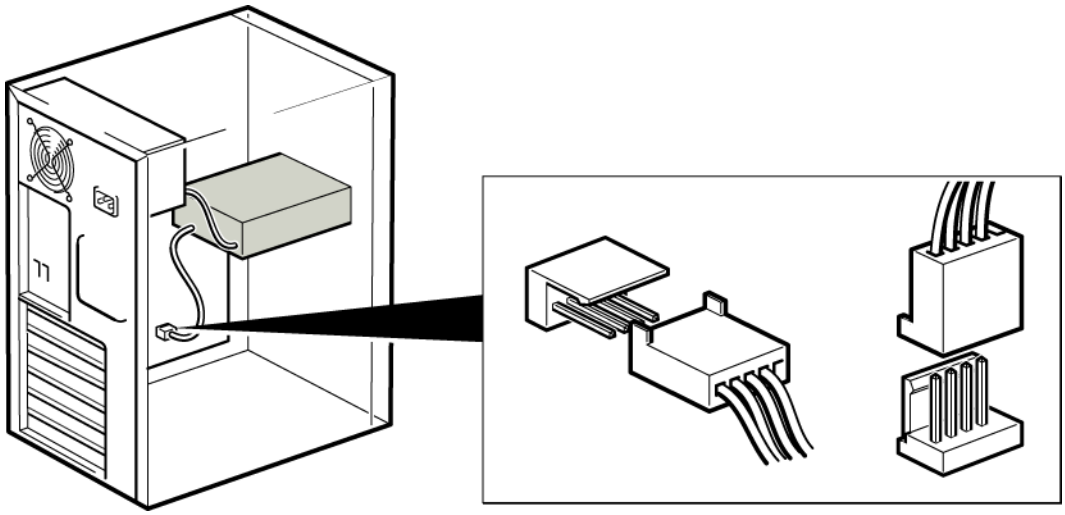


Figure 9 Connecting to a 4-pin USB port with Intel header pin layout (blue)

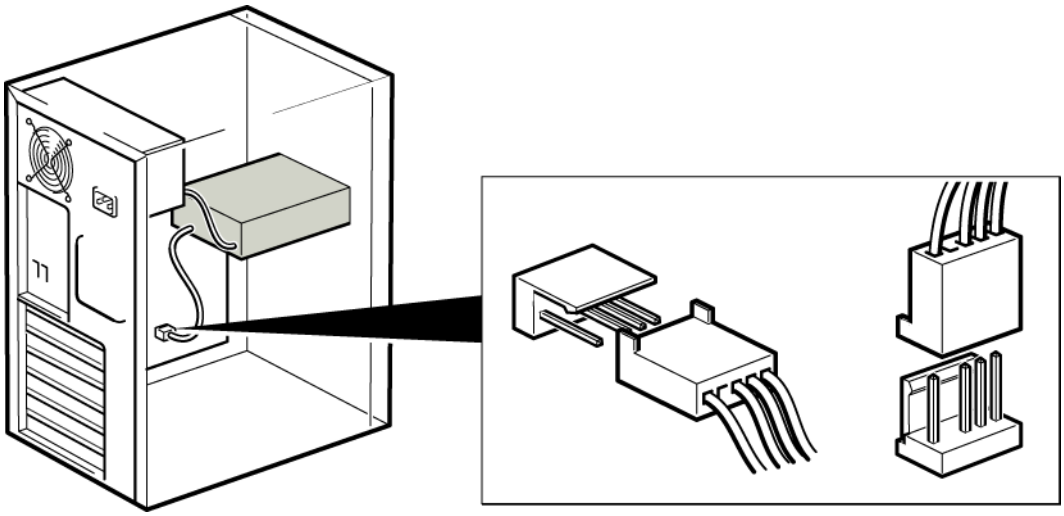


Figure 10 Connecting to a 4-pin USB port with ProLiant header pin layout (red)

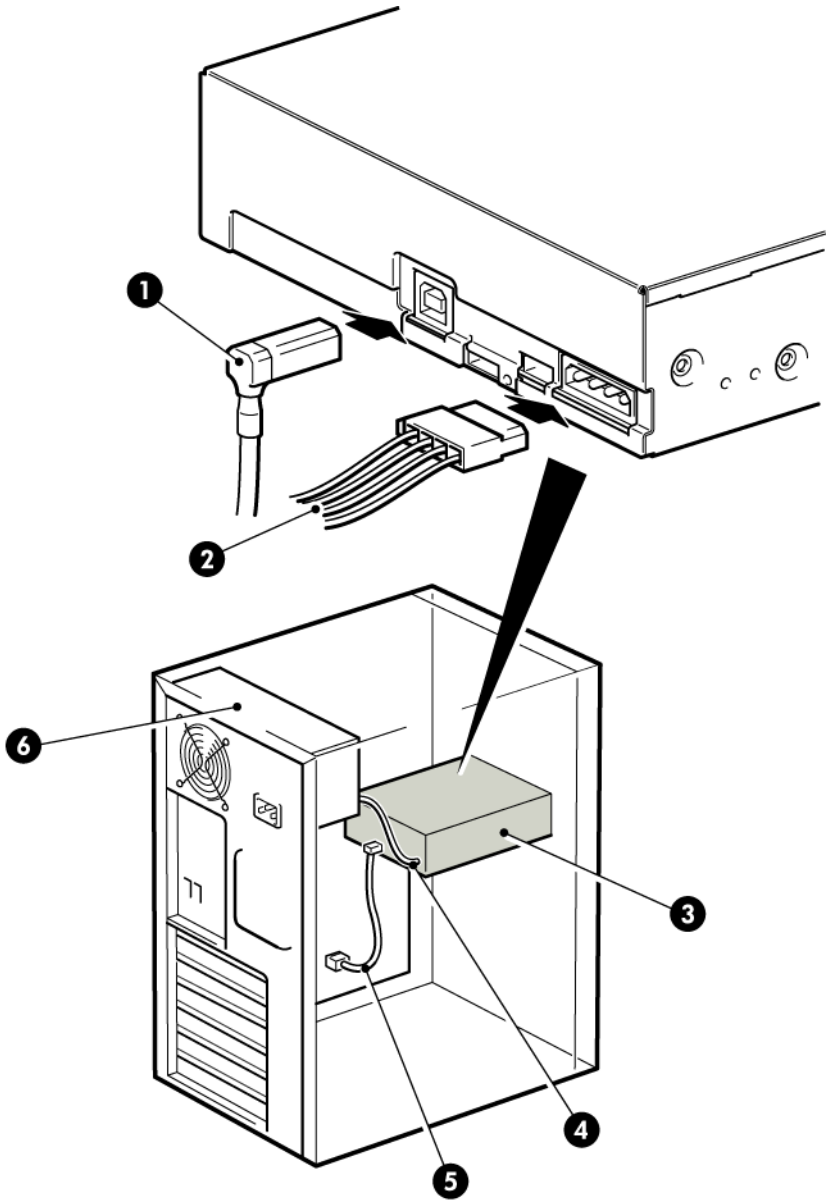
Attach USB and power cable to the tape drive

NOTE:

The drive is not powered from the USB bus. It must be connected to the server's power supply.

1. Connect the Type B connector on the USB cable to the internal tape drive.

2. Attach a spare power cable from the server's internal power supply to the power connector.



1 and 5. USB cable, to server's internal USB port

2 and 4. power cable

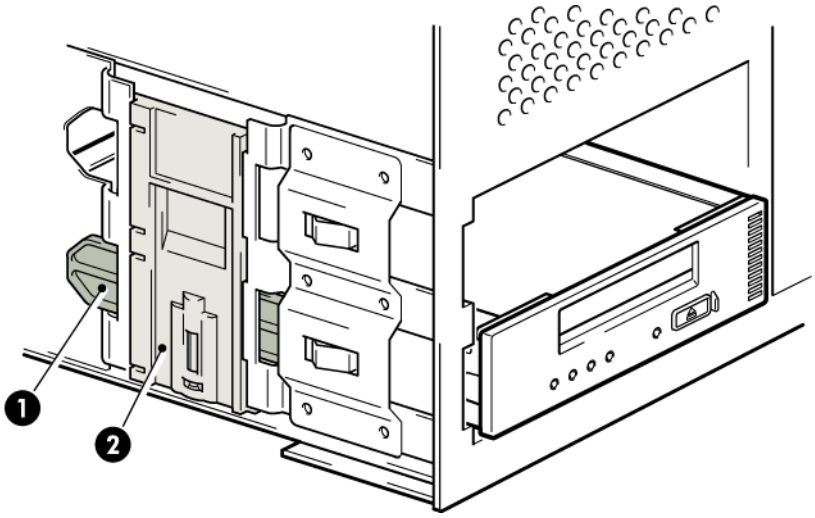
3. tape drive

6. server's power supply

Figure 11 Attaching power cable

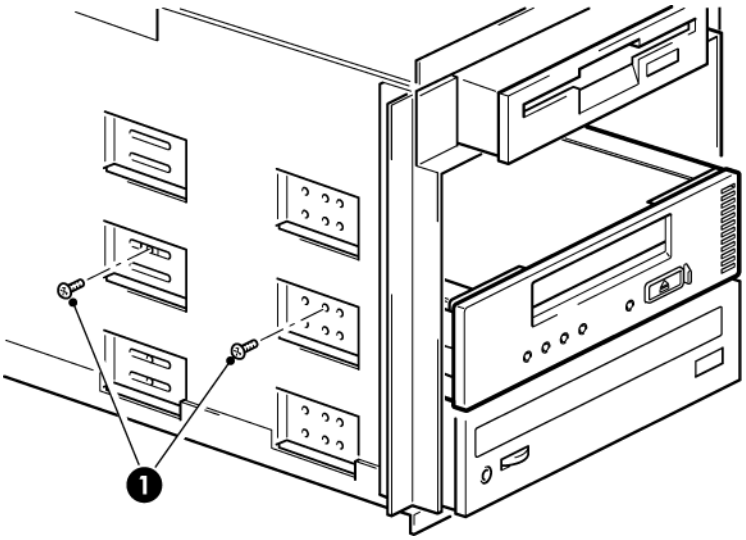
Secure the drive

1. Secure the drive, as described in your server documentation. The following diagrams are examples only.



1. plastic rail
2. server latch, push down to lock the tape drive into position

Figure 12 Securing drive example 1, mounting hardware used



1. M3 screws, supplied with tape drive

Figure 13 Securing drive example 2, no mounting hardware used

2. Ensure blanking plates are in place over empty bays and replace the cover on the server.

4 Installing an external DAT tape drive

In this chapter:

- "Connecting the power and USB cables" on page 31

Please refer to "Installing an internal DAT tape drive" on page 23, if you are installing an internal DAT tape drive.

Connecting the power and USB cables

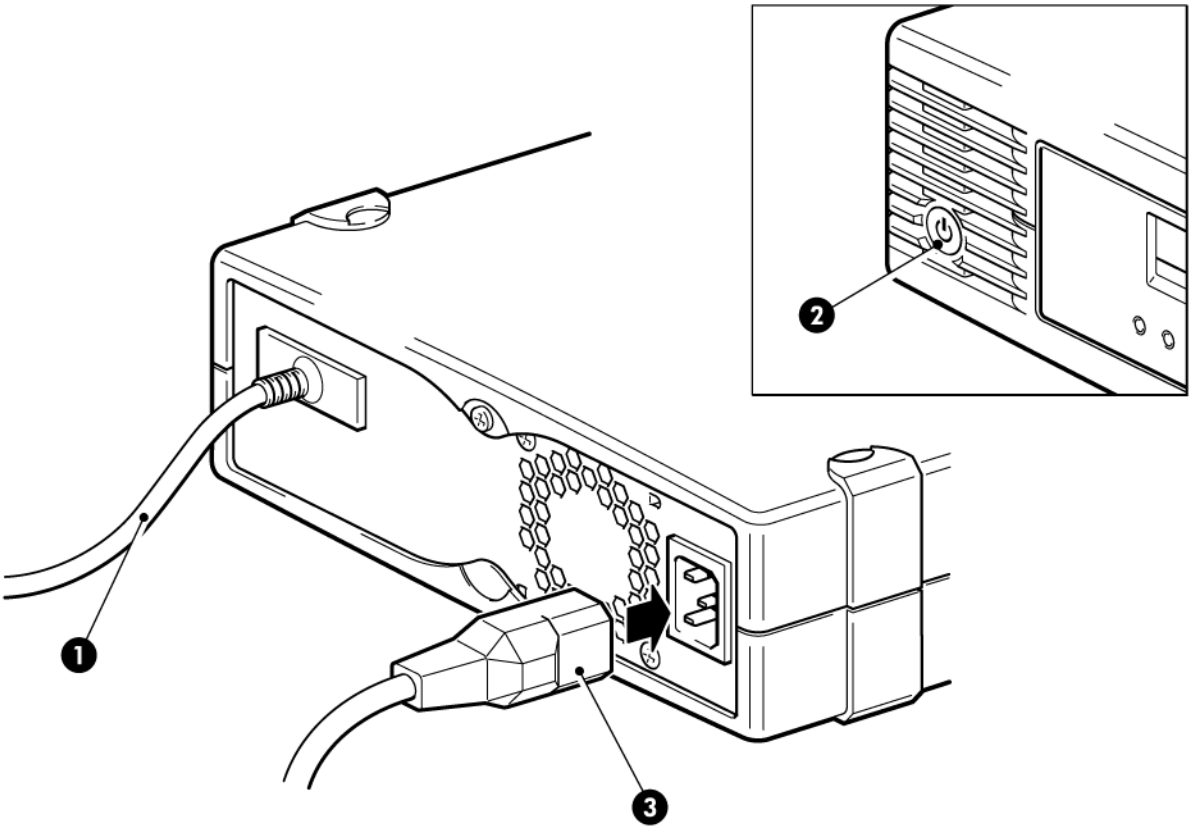
NOTE:

The drive is not powered from the USB bus. It must be connected to the mains power supply.

An external HP StorageWorks DAT drive will operate using any voltage in the range 100–240 volts (0.7 A, 50-60 Hz). No adjustment is needed.

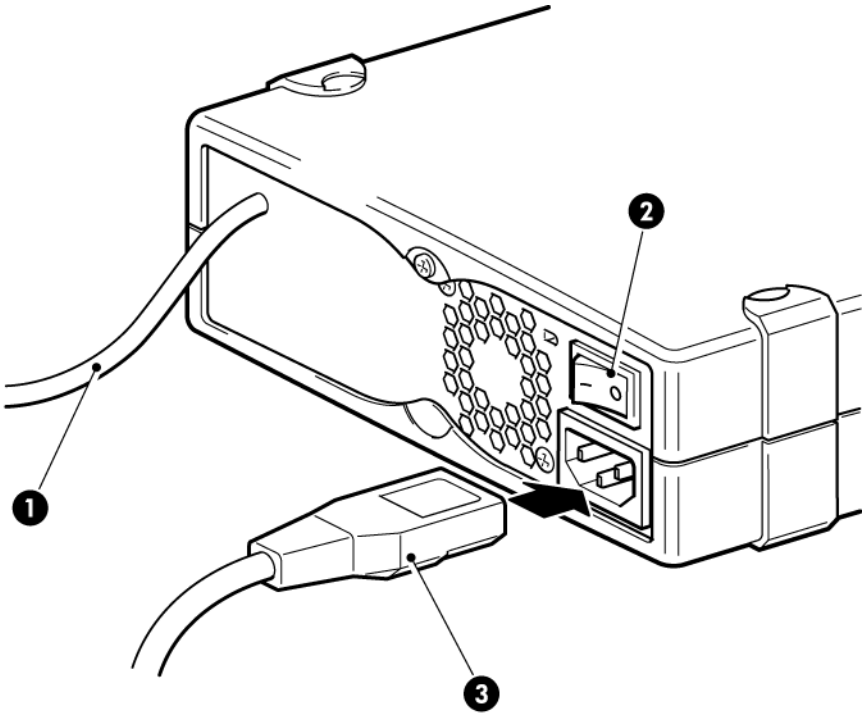
A power cable is provided with your HP StorageWorks DAT tape drive. The USB 2.0 cable is already fitted to the tape drive, you cannot remove it.

1. Plug the power cable securely into the socket on the rear panel of the drive and plug the other end of the power cable into the power outlet.



1. USB cable (pre-fitted)
2. on/off button on front panel
3. power cable

Figure 14 Connecting power and USB cables, DAT 320 tape drives



1. USB cable (pre-fitted)
2. on/off switch, make sure it is in the OFF position (O side down)
3. power cable

Figure 15 Connecting power and USB cables, all other models

2. Plug the USB cable into the USB connector on the server.

NOTE:

It is important to ensure that you connect your drive to a USB 2.0 port. The drive will work on a USB 1.1 port but performance will be severely degraded. See also "Verifying USB installation for optimum performance" on page 63.

5 Verify installation

Once you have installed the drive hardware, check that drivers have been installed correctly and you have the correct version of backup software, and verify that the tape drive is functioning properly before you store your valuable data.

NOTE:

Certain backup applications require you to use their own Tape driver instead of the HP Tape driver.

1. Switch on the drive and the server.
2. The tape drive will run its hardware self-test, which takes about 5 seconds.

   HP StorageWorks DAT 320 and DAT 160 drives: During self-test all the LEDs turn on and turn off again at completion. If self-test passes and there is a cartridge in the drive, the green Ready LED then shows steady green. (If there is no cartridge, the Ready LED is off.) If the test fails, the Drive Error and Tape Error LEDs flash, while the Ready and Clean LEDs are off. This continues until the drive is reset.

   All other drives: If self-test passes, both front panel lights should be off. If a hard error causes the self-test to fail, the clean light changes to steady amber.

   See "Operating your tape drive" on page 37 for more information about front panel lights.

   - **If you installed drivers before connecting the tape drive (Windows only)**

     The tape drive should be detected automatically and the correct drivers used. (See "Install drivers " on page 19.) If the Windows Found New Hardware wizard runs, cancel it and check that both drivers have been installed, as described in "Verifying USB installation for optimum performance" on page 63.

   - **Installing drivers after connecting the tape drive (Windows only)**

     If you have not already installed drivers, the Windows Found New Hardware wizard will run when you power on the server and tape drive. Cancel it and install the drivers as described in "Alternative install process, after connecting the tape drive" on page 20.

   - **Installing drivers (other operating systems)**

     Drivers are included with the operating system and should be loaded automatically. See also "Check drivers (Linux)" on page 64.

3. Verify that the tape drive installation was successful.

   For many operating systems you can run HP Library & Tape Tools from the HP StorageWorks CD-ROM. See also "Diagnostic Tools and Performance" on page 57 for more information about HP Library & Tape Tools, HP's free diagnostics and troubleshooting software.

   If you encounter a problem during this verification procedure, turn to "Troubleshooting" on page 61 for help in diagnosing and fixing the problem.

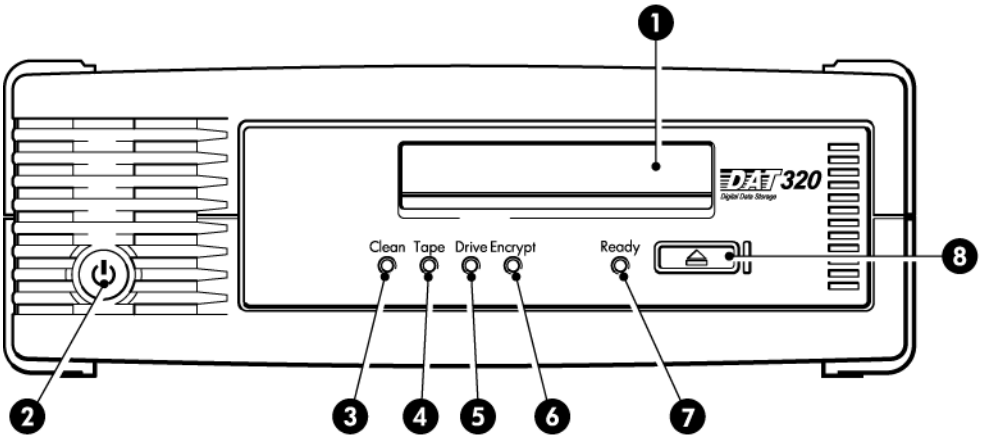
4. You are now ready to carry out a backup and restore test to check that the drive can write data to tape. Use a blank cartridge. Windows Backup or Linux native backup applications can be used to check basic tape drive operation, but they will not support all the advanced features of your tape drive. We recommend that you upgrade your software application before running this test. Check http://www.hp.com/go/connect for software compatibility and install any recommended upgrades.

6 Operating your tape drive

In this chapter:

- "Front panel, DAT 320 tape drives" on page 37
- "Front panel, DAT 160 tape drives" on page 38
- "LED sequences, DAT 320 and DAT 160 tape drives" on page 38
- "Front panel, DAT 72 and DAT 40 tape drives" on page 41
- "LED sequences, DAT 72 and DAT 40 tape drives" on page 41
- "Loading and unloading" on page 42
- "Removing power from the drive" on page 44

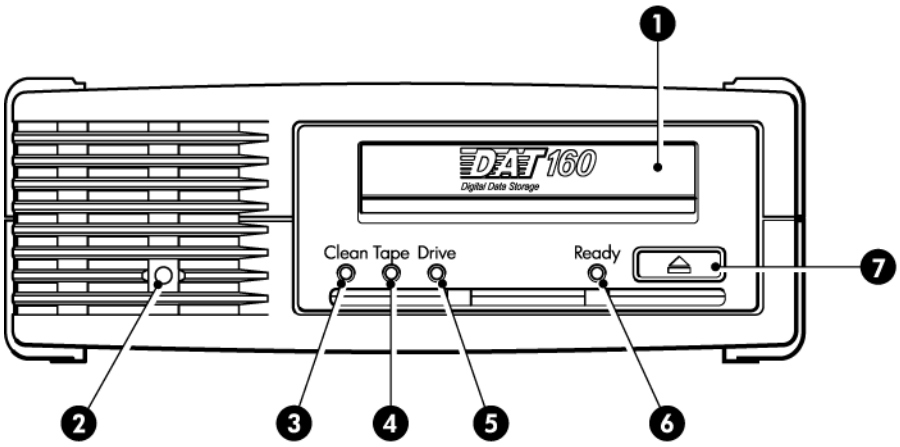
Front panel, DAT 320 tape drives



1. cartridge slot
2. power button and LED (external drives only)
3. clean LED
4. tape LED
5. drive LED
6. encrypt LED
7. ready LED
8. eject button

Figure 16 Front panel, HP StorageWorks DAT 320 external drive

Front panel, DAT 160 tape drives



1. cartridge slot
2. power LED (external drives only)
3. clean LED
4. tape LED
5. drive LED
6. ready LED
7. eject button

Figure 17 Front panel, HP StorageWorks DAT 160 external drive

LED sequences, DAT 320 and DAT 160 tape drives

The LED sequences in the following table relate to the Clean, Tape, Drive and Ready LEDs. The DAT 320 tape drive also has an Encryption LED that describes encryption status. This is described separately in "Encryption LED" on page 40. The meaning of different patterns of LEDs, without encryption enabled, is as follows:

Table 3 LED sequences, DAT 320 and DAT 160 tape drives

LED Sequence	Cause	Action required
All LEDs ON (DAT 320 tape drives only)	The drive is resetting or running self-test.	If LEDs clear in 15 seconds, no action is required. If they stay on, power cycle the drive.
All LEDs OFF with no cartridge in the drive.	This is normal.	No action is required.
All LEDs OFF with cartridge in the drive.	There may be a problem with the cartridge or the tape drive.	1. Eject the cartridge and load a known-good cartridge. If the Ready LED remains off, there may be a problem with the power supply. 2. Check the power cable connection and make sure the drive is switched on. (On an external tape drive the Power LED in the enclosure will be on when power is on.) 3. If the power supply is present and there is still a problem, power cycle or reset the drive. If it still fails, call for service.

LED Sequence	Cause	Action required
Ready is ON.	The drive is ready for operation.	None. This is normal.
Ready FLASHES.	The drive is carrying out a normal activity (read, write).	None. If the drive is upgrading firmware, do not reset or power cycle it.
then *Ready FLASHES- steady ON- FLASHES.*	The drive is in OBDR mode.	See "Running HP OBDR" on page 54 for further details.
Clean FLASHES.	The drive requires cleaning.	Load the DDS cleaning cartridge. See "Cleaning cartridges" on page 49 for supported cartridges and instructions. If the Clean LED is still flashing when you load a new or known good data cartridge after cleaning, call for service.
Ready and Clean FLASH.	Cleaning is in progress.	None. The cleaning cartridge will eject on completion. The cleaning cycle can take up to 5 minutes to complete.
DAT 320 tape drives: Clean and Tape FLASH. The cartridge is ejected automatically and Tape flashes.	The cleaning cartridge has expired (is used up).	Insert a new, good cleaning cartridge.
DAT 160 tape drives: Ready, Clean and Tape FLASH.	The cleaning cartridge has expired (is used up).	Eject the cartridge. Now only the Tape Led flashes. Insert a new, good cleaning cartridge.
Tape FLASHES.	The drive believes the current tape or the tape just ejected is faulty.	Unload the tape cartridge. Make sure that you are using the correct format cartridge. (See "Use the correct media" on page 45.) Reload the cartridge. If the Tape LED still flashes or starts flashing during the next backup, load a new or known good cartridge. If the Tape LED is now off, discard the 'suspect' tape cartridge. If it is still on, call for service.
Drive FLASHES.	The drive mechanism has detected an error.	Load a new cartridge. If the error persists, power cycle or reset the drive. If the Drive LED remains on, call for service.
Drive, Tape and Ready FLASH.	There is a firmware download problem.	Insert a cartridge to clear the LED sequence. If the condition persists, call for service.

Encryption LED, DAT 320 models only

The encryption LED is blue and is off, on or flashing, as described in the following table. The state of the other LEDs depends upon the activity, as described below.

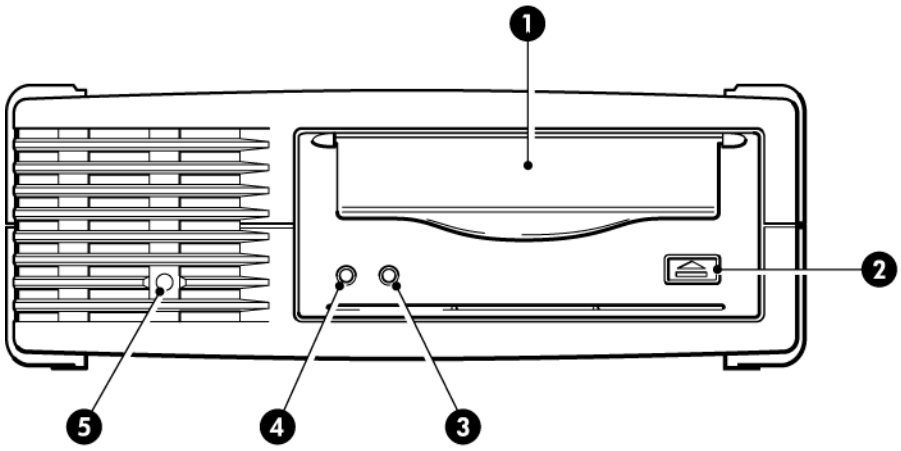
Table 4 Encryption LED, DAT 320 tape drives

Drive LED (Amber)	Encryption LED (Blue)	Ready LED (Green)	State
n/c	Off	n/c	No encryption or decryption activity, encryption parameters are not present. All parameters for all scopes have been cleared.
n/c	Solid blue	n/c	Encryption parameters are loaded; the drive is ready to read/write encrypted data.
n/c	Flashing blue	Flashing green	Reading/writing encrypted data. The Encryption LED flashes with the Ready LED.
n/c	Solid blue	Flashing green	Encryption parameters loaded, but the tape drive is reading/writing unencrypted data from another host. This is the normal Ready LED operation.
Fast flashing	Fast flashing	n/c	There is an encryption related error. The Drive and Encryption LEDS flash simultaneously.
n/c means there is no change from the normal LED specification.			

NOTE:

The Encryption LED only functions if you are using backup software that supports hardware encryption and this feature is enabled in the backup application. See http://www.hp.com/go/connect for backup application compatibility.

Front panel, DAT 72 and DAT 40 tape drives



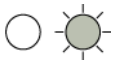
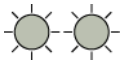
1. cartridge door
2. eject button
3. clean LED
4. tape LED
5. power LED (external drives only)

Figure 18 Front panel, HP StorageWorks DAT 72, 40 and 24 external drive

LED sequences, DAT 72 and DAT 40 tape drives

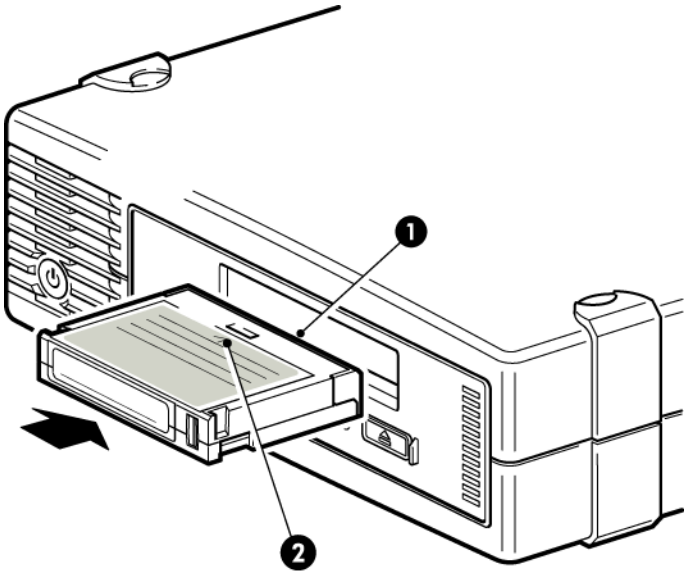
There are two LEDs, labeled Tape and Clean. The meaning of different patterns of LEDs is as follows:

	Tape LED	Clean LED	Meaning
	on	off	The cartridge is loaded and the drive is ready.
	flashing slowly	off	The cartridge is loading or unloading, or self-test is in progress.
	flashing rapidly	off	The cartridge is loaded, activity is occurring.
	off or flashing	on	This is the Error Condition Signal. HP StorageWorks DAT drives perform a comprehensive self-test during power-up. If a hard error causes the self-test to fail, the clean light changes to steady amber. Run HP Library & Tape Tools to help diagnose the problem.

	Tape LED	Clean LED	Meaning
	off or flashing	flashing slowly	This is the Media Caution Signal. 1. Wait for the current operation to finish, then insert a different tape and repeat the operation that was being performed. 2. If the media caution signal does not show this time, it indicates that the original cartridge was nearing the end of its useful life. Copy any data you want to keep from the original tape onto a new tape if possible, then discard the old tape. 3. If the media caution signal appears again with the second tape, the tape heads need cleaning. 4. If the media caution signal appears after using a cleaning cartridge, the cleaning cartridge has probably expired and should be discarded.
	flashing slowly	flashing slowly	When the two LEDs flash alternately, the tape drive is in disaster recovery mode, restoring the operating system (see "Running HP OBDR" on page 54).

Loading and unloading

Inserting cartridges



1. cartridge slot
2. arrow indicates leading direction

Figure 19 Inserting an 8 mm cartridge into an HP StorageWorks DAT 320 external drive

1. Insert a compatible cartridge into the slot on the front panel. As the cartridge is inserted, the drive takes it and performs a load sequence.

NOTE:

The illustration shows an 8 mm cartridge. These cartridges are thicker than earlier-format DDS cartridges and can only be used with HP StorageWorks DAT 320 and DAT 160 tape drives. See "Data cartridges" on page 45 for more information about tape drive and cartridge compatibility.

2. **HP StorageWorks DAT 320 and 160 tape drives:** The Ready light flashes green while the drive performs its load sequence. When the cartridge is loaded, the Ready light shows steady green.

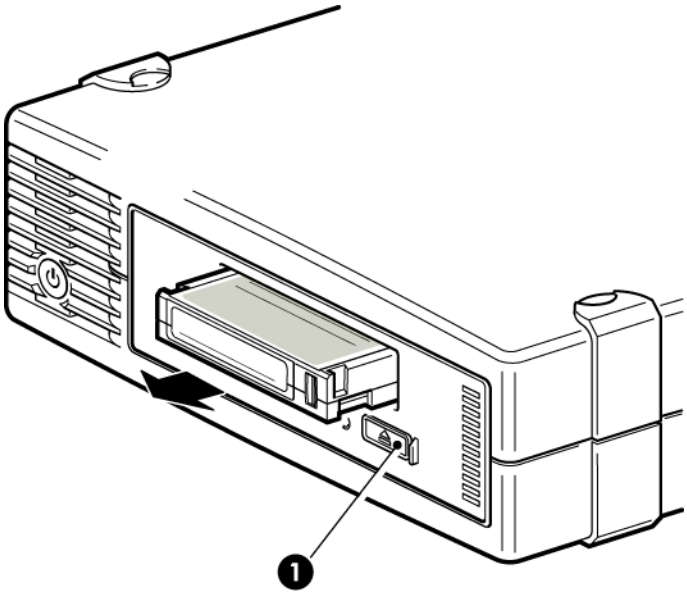
   HP StorageWorks DAT 72 and 40 tape drives: The Tape light flashes green while the drive performs its load sequence. When the cartridge is loaded, the Tape light shows steady green.

Removing cartridges

CAUTION:

Never try to remove a cartridge before it is fully ejected.

1. Press the Eject button on the front panel.



1. eject button

Figure 20 Ejecting a DAT 320 cartridge from an HP StorageWorks DAT 320 external drive

2. The drive completes any task it is currently performing, winds the tape to the beginning, and ejects the cartridge. The sequence will take about 25 seconds for a write-enabled cartridge and 10 seconds for a write-protected cartridge.

Removing power from the drive

To ensure reliable operation, do not remove power from the drive during read, write, fast-search, load and unload activities.

7 Use the correct media

For best performance we recommend HP branded media. Order online at: http://www.hp.com/go/storagemedia.

In this chapter:

- "Data cartridges" on page 45
- "DAT 320 tape drives and encryption" on page 46
- "Write-protecting cartridges" on page 48
- "Cleaning cartridges" on page 49
- "Handling cartridges" on page 50
- "Getting the most out of cartridges and drives" on page 51

Data cartridges

HP StorageWorks DAT 320 and DAT 160 tape drives and cartridges

HP DAT 320 and HP DAT 160 tape cartridges are thicker than earlier formats; they will not fit into earlier tape drive models.

- HP DAT 320 cartridges (Q2032A) provide optimum performance and maximum capacity for HP StorageWorks DAT 320 tape drives; they can only be used with HP StorageWorks DAT 320 tape drives.
- HP DAT 160 (C8011A) cartridges provide optimum performance and maximum capacity for HP StorageWorks DAT 160 tape drives; they can only be used with HP StorageWorks DAT 160 and DAT 320 tape drives.

DAT 160 tape drives are backwards compatible with some earlier formats, DAT 320 tape drives are only backwards compatible with DAT 160 tape drives, see Table 5 on page 46.

Backup application/media compatibility

When selecting the media to use with the backup application:

- You should select 8mm media with DAT 320 tape drives
- You should select 8mm media with DAT 160 tape drives
- You must select 4mm media with DAT 72 and earlier tape drives

IMPORTANT:

Microsoft groups all media types under the single category heading of `4mm DDS`. Therefore, if using Microsoft's Backup Utility for Windows (not recommended) to back up to a DAT 320 or DAT 160 tape drive, select `4mm DDS` for the backup destination in the selection-dropdown menu.

Tape drive/media compatibility

For optimum performance and storage capacity, use tape cartridges that match your drive's format, and normally use only one cartridge per day. Ideally, use:

- HP's DAT 320 cartridges with DAT 320 tape drives
- HP's DAT 160 cartridges with DAT 160 tape drives
- HP's DAT 72 cartridges with DAT 72 tape drives
- HP's DDS-4 cartridges with DAT 40 tape drives

The compatibility between drive models and cartridges is summarized in Table 5 on page 46. Capacities assume a compression ration of 2:1.

NOTE:

Old tape formats are more abrasive than later generations and using older tape formats can reduce the life expectancy of the tape drive.

Table 5 Data cartridge compatibility

	DDS-2	DDS-3	DDS-4	DAT 72	DAT 160	DAT 320
HP StorageWorks DAT 320	not supported	not supported	not supported	not supported	read/write C8011A	**read/write 320 GB* Q2032A**
HP StorageWorks DAT 160	not supported	not supported	read/write C5718A	read/write C8010A	**read/write 160 GB* C8011A**	not supported
HP StorageWorks DAT 72	not supported	read/write	read/write	**read/write 72 GB* C8010A**	not supported	not supported
HP StorageWorks DAT 40	read/write	read/write	**read/write 40 GB* C5718A**	not supported	not supported	not supported
* Capacity assumes 2:1 compression.						

NOTE:

DDS-1 cartridges are not supported on any HP StorageWorks DAT drive.

DAT 320 tape drives and encryption

Your HP StorageWorks DAT 320 tape drive includes hardware capable of performing data encryption at full speed while writing data, and decrypting when reading.

Encryption is the process of changing data into a form that cannot be read until it is deciphered, protecting the data from unauthorized access and use. DAT 320 tape drives use the strongest version of the industry-standard AES encrypting algorithm to protect your data (IEEE P1619.1-2007 compliant GCM-128-AES-256).

To make use of this feature you need:

- A backup application that supports hardware encryption
- DAT 320 GB media; no hardware encryption will be performed when writing earlier generations of tape

When should I use encryption?

Your company policy will determine when you need to use encryption. For example, it may be mandatory for company confidential and financial data, but not for personal data. Company policy will also define how encryption keys should be generated and managed. Backup applications that support encryption will generate a key for you or allow you to enter a key manually.

NOTE:

Encryption with keys that are generated directly from passwords or passphrases may be less secure than encryption using truly random keys. Your application should explain the options and methods that are available. Please refer to your application's user documentation for more information.

How do I enable encryption?

Hardware encryption is turned off by default and is switched on by settings in your backup application, where you also generate and supply the encryption key. Your backup application must support hardware encryption for this feature to work. The software supplied with the tape drive provides this support. See http://www.hp.com/go/connect for an up-to-date list of other suitable backup software.

When will I be asked to enter the key?

Encryption is primarily designed to protect the media once it is offline and to prevent it being accessed from another machine. Often, you will be able to read and append the encrypted media without being prompted for a key as long as it is being accessed by the machine and application that first encrypted it. However, this depends entirely on the backup application and its Key Management capabilities.

There are two main instances when you must know the key:

- If you try to import the media to another machine or another instance of the backup application
- If you are recovering your system after a disaster

What happens if I don't remember the key?

If you are unable to supply the key when requested to do so, neither you nor Technical Support will be able to access the encrypted data.

This guarantees the security of your data, but also means that you must be careful in the management of the encryption key used to generate the tape. It is very important to back up the backup application's key storage to prevent data loss. The tape drive itself clears keys on power cycles and numerous other backup application defined events.

⚠ WARNING!

You should keep a record or backup of your encryption keys and store them in a secure place separate from the computer running the backup software.
Not even data recovery services will be able to recover encrypted data without the key!

Does encryption affect tape drive performance?

Hardware encryption can be used with or without compression and without speed or capacity penalties.

Does the tape drive encrypt media in an earlier DAT format?

No. Encryption is supported only on DAT 320 GB media.

DAT 320 GB TB tapes encrypted on DAT 320 tape drives can be read on any compatible DAT 320 tape drive that supports hardware encryption.

DAT 320 tape drives can read DAT 160 GB media and write DAT 160 GB media, but hardware encryption is not supported on these formats.

Where can I get more information?

For detailed instructions about enabling encryption please refer to the documentation supplied with your backup application. This will also highlight any default states, for example when copying tapes, that may need changing if using encrypted tapes.

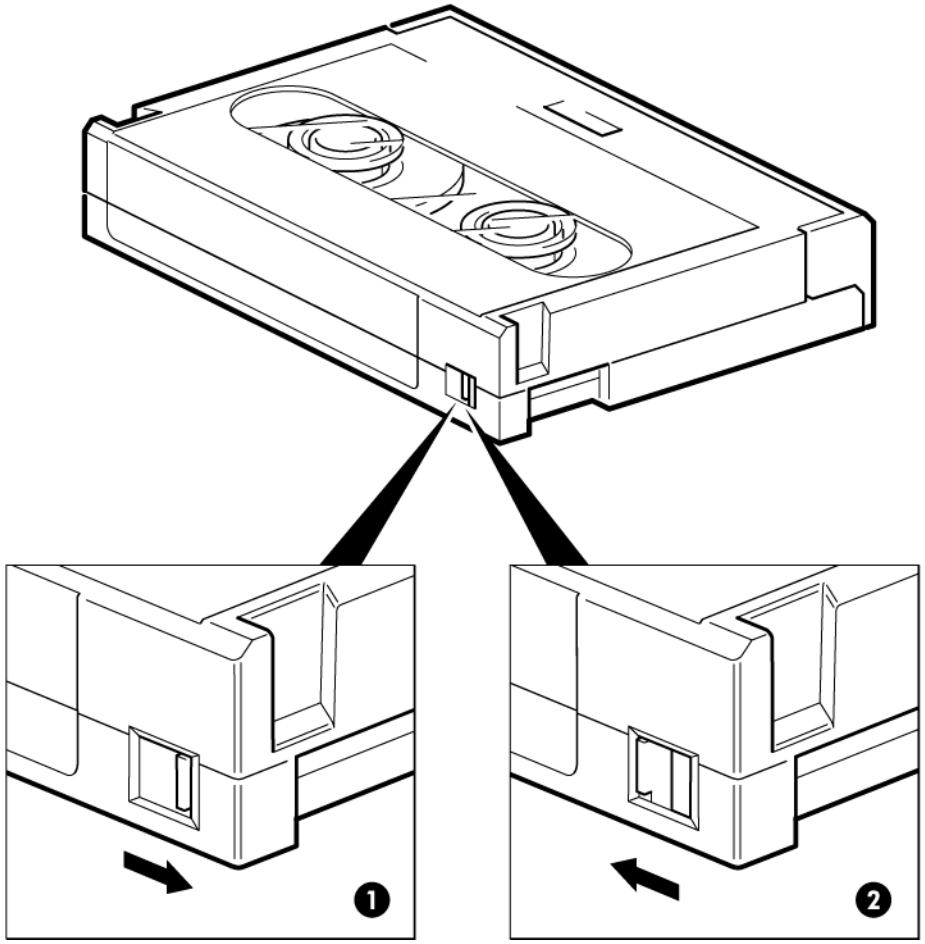
Write-protecting cartridges

If you want to protect the data on a cartridge from being altered or overwritten, you can write-protect the cartridge.

Always remove the cartridge from the tape drive before you change the write protection.

- To write-protect a cartridge, slide the tab on the rear of the cartridge so that the recognition hole is open.
- To write-enable a cartridge, slide the tab back so that the hole is closed.

Write-protection will not protect your cartridges against magnets (or bulk erasers).



1. tab closed, cartridge write-enabled
2. tab open, cartridge write-protected

Figure 21 Write protecting a cartridge

Cleaning cartridges

You must use the correct type of cleaning cartridge for your tape drive, see Table 6 on page 49.

DAT 320 tape drives: Only clean the tape drive when the Clean LED is flashing.

All other models: HP recommends weekly cleaning of the tape drive using an HP cleaning cartridge.

Table 6 Cleaning cartridge compatibility

Tape drive model	Cleaning cartridge required
HP StorageWorks DAT 320 tape drives	You must use a DAT 320 cleaning cartridge, part number Q2039A
HP StorageWorks DAT 160 tape drives	You must use a DAT 160 cleaning cartridge, part number C8015A

Tape drive model	Cleaning cartridge required
All other HP StorageWorks DAT tape drives	You must use a standard cleaning cartridge, part number C5709A

Do not use swabs or other means of cleaning the heads. The cleaning cartridge uses a special tape to clean the tape heads. A cleaning cartridge can only be used 50 times or as instructed on the cartridge packaging. Always place a check mark in a box each time you use the cartridge to clean the drive. Replace the cleaning cartridge when all the boxes are checked. New cleaning cartridges are available from HP.

1. Insert a cleaning cartridge into the drive. The tape drive automatically loads the cartridge and cleans the heads. The Clean LED remains flashing and the Ready LED starts to flash.

   At the end of the cleaning cycle, the Clean LED turns off and the drive ejects the cartridge. The cleaning cycle takes approximately 30-60 seconds.
2. Remove the cleaning cartridge from the drive.

   The drive's TapeAlert feature will send a message to your backup application when the tape heads need cleaning or a cleaning cartridge has expired.

Expired cleaning cartridges

HP StorageWorks DAT 320 drives: If an expired cleaning cartridge is placed into the drive, the Clean LED remains flashing, and the Ready LED and Tape LED start to flash. The expired cleaning tape ejects automatically. (The Ready LED turns off, the Clean and Tape LEDs continue to flash. Discard the cleaning cartridge). Recovery from this condition is to insert a good cleaning cartridge. (The Tape LED will turn off immediately.)

HP StorageWorks DAT 160 and DAT 72 drives: If the cleaning cartridge is not ejected, it has probably expired. In this case, press the Eject button, discard the cleaning cartridge and repeat the operation with a new one.

HP StorageWorks DAT 40 drives: If the cleaning cartridge ejects in less than 20 seconds, it has probably expired. In this case, discard the cleaning cartridge and repeat the operation with a new one.

Handling cartridges

- Do not touch the tape media.
- Do not attempt to clean the tape path or tape guides inside the cartridge.
- Do not leave cartridges in excessively dry or humid conditions.
- Do not leave cartridges in direct sunlight or in places where magnetic fields are present (for example, under telephones, next to monitors or near transformers).
- Do not drop cartridges or handle them roughly.
- Do not stick more than one label onto the cartridge label area; extra labels can cause the cartridges to jam in the drive. Stick labels onto the label area only.
- See the insert included with the tape cartridge for storage conditions.

Getting the most out of cartridges and drives

- Use mostly the matching media type (DAT 320 media for HP StorageWorks DAT 320, DAT 160 media for HP StorageWorks DAT 160, DAT 72 media for HP StorageWorks DAT 72, DDS-4 media for HP StorageWorks DAT 40).
- Use media for the recommended number of times (DAT 320, DAT 160, DAT 72 and DDS-4=100 full backups). Overuse of the tape will cause it to degrade and possibly shed tape debris in the drive. Too many new tapes can also cause wear of the drive as they are rougher than used ones.
- Do not verify (DDS does read-after-write checking automatically).
- Do not overload the server during backups. Maximize the transfer rate (run overnight with no other processes) and use incremental backups if convenient.
- Do not overuse your tape drive—it is designed for approximately three hours of tape pulling per day, not constant usage—and clean the drive regularly. See "Cleaning cartridges" on page 49.
- If you want to bulk erase cartridges, this should be done in a controlled environment. You need to make sure there are no other cartridges with sensitive information on them anywhere near the bulk eraser when in use. All data will be lost on cartridges that are bulk erased.

8 Using HP OBDR

In this chapter:

- "Compatibility" on page 53
- "What does HP OBDR do?" on page 53
- "Remote disaster recovery (ProLiant servers only)" on page 54
- "Testing for compatibility" on page 54
- "Running HP OBDR" on page 54

Compatibility

HP One-Button Disaster Recovery is a standard feature on all HP StorageWorks DAT tape drives. However, it can only be used with specific configurations and will only recover the server to which the tape drive is directly connected.

To check whether your system (hardware, operating system and backup software) is OBDR-compatible, please refer to our World Wide Web site http://www.hp.com/go/connect.

For more specific information concerning the benefits of OBDR and the latest new features please refer to our World Wide Web site http://www.hp.com/go/obdr.

If your system does not support HP One-Button Disaster Recovery, you can still use your tape drive normally to back up and restore data. However, you must remember to create a separate set of emergency recovery disks for your operating system whenever you change your system configuration.

What does HP OBDR do?

Using just the tape drive and the most recent backup cartridge HP OBDR allows you to recover from the following types of system disaster:

- Hard disk failures, as long as the replacement hard disk is the same size or larger than the original and uses the same interface (for example, replace a SCSI hard disk with another SCSI disk or replace a SAS hard disk with another SAS disk)
- Hardware failures where the server is replaced by an identical component
- File corruption because of an operating system error
- File corruption because of an application software error
- Viruses that prevent you from booting your system correctly
- User errors that stop you from booting your system correctly

When you run HP One-Button Disaster Recovery, your tape drive goes through the following sequence:

1. It goes into a special disaster recovery mode that enables it to restore your operating system and reboot. It acts like a bootable CD-ROM. (Your system's ability to boot from CD-ROM is normally enabled by default. If you have changed this setting, you will need to enable it again. Refer to your system BIOS manual for further details.)
2. It returns to normal tape drive mode and restores the data.

Remote disaster recovery (ProLiant servers only)

The HP Remote Insight Lights-Out Edition (RILOE) on ProLiant servers gives the IT Administrator the ability to completely recover a failed server at a remote location without physically traveling to where the server resides. The on-site non-technical person need only insert the bootable cartridge into the tape drive when asked to do so by the administrator.

Refer to the HP OBDR web site at http://www.hp.com/go/obdr for more information about using this feature and compatibility.

Testing for compatibility

We recommend that you perform a full disaster recovery immediately after installation—if possible, onto a blank hard disk. If you do not have a blank hard disk and do not want to overwrite your system, you can safely cancel the disaster recovery process at step 3 in the following procedure.

Refer to our connectivity web site (http://www.hp.com/go/connect) for more information about suitable backup applications.

Running HP OBDR

HP OBDR can only be used with backup applications that support one-button disaster recovery and methods of operating OBDR will vary between different software companies. Check our World Wide Web site (http://www.hp.com/go/obdr) for the latest information about software compatibility, firmware upgrades and troubleshooting before you use HP OBDR.

1. Power on the drive and insert the latest bootable cartridge in the tape drive (you may also need to power on the server to do this). The cartridge must be written by a backup application that writes data to tape in CD-ROM format.

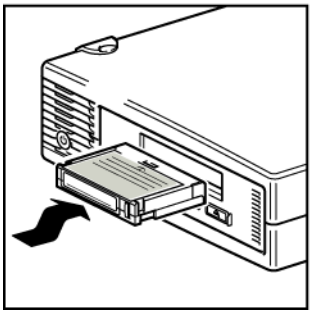


Figure 22 Inserting cartridge for OBDR

2. Hold down the eject button on the tape drive and keep it pressed down while power cycling the tape drive. This activates the HP One-Button Disaster Recovery process. Release the button as soon as the LEDs flash in OBDR sequence, which is:

   HP StorageWorks DAT 320 and DAT 160 tape drives: The Ready light shows a repeated pattern of flashing-steady on-flashing.

   HP StorageWorks DAT 72 and DAT 40 tape drives: The Tape light and the Clean light on the front panel flash alternately.

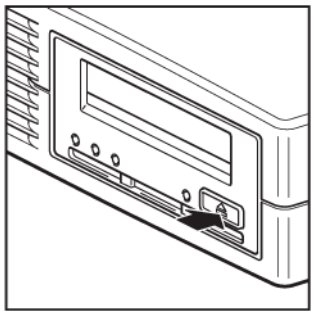


Figure 23 Keeping eject button pressed down, power on in OBDR model

Keyboard shortcut for HP ProLiant servers

There is no need to press the Eject button. Just power on your server and press the [F8] function key during the Power On Self Test (POST). This invokes OBDR to restore your system. For more information and specific instructions please refer to our World Wide Web site at http://www.hp.com/go/obdr.

3. Follow the on-screen instructions to set up the operating system. Normally, you can accept the default response to all the prompts, for example just press <Enter>.
4. The LEDs will flash in OBDR mode (as described in step 2) while the tape drive restores your operating system to a state where it can run a normal data restore.
5. Once the operating system has been set up and rebooted, the Tape LED display on the tape drive changes to constant green and you can remove the backup cartridge, if you wish. You are now ready to run a normal data restore. Follow the normal process for your restore application.

If restore fails

If the restore fails for any reason, refer to our World Wide Web site (http://www.hp.com/go/obdr) and do a search on OBDR for detailed troubleshooting information.

9 Diagnostic Tools and Performance

In this chapter:

- "Diagnostic tools" on page 57
- "Performance Assessment Tools" on page 59

Diagnostic tools

HP Library & Tape Tools

HP StorageWorks Library & Tape Tools (L&TT) is the recommended diagnostic and support tool for your HP tape storage product. It is available on the CD shipped with your product or as a free download from the HP web site. It is supported on nearly all major operating systems. See http://www.hp.com/support/tapetools for compatibility information, updates and the latest version of the tool.

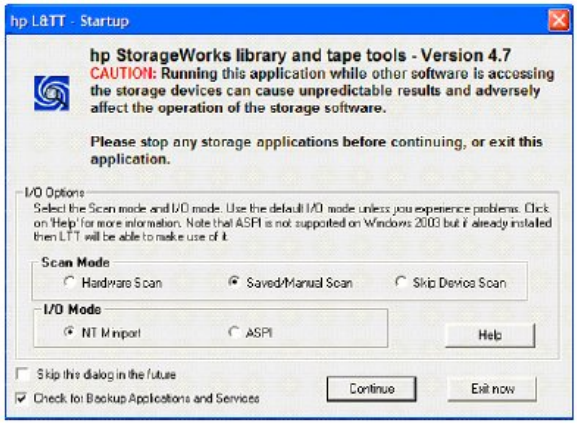
Installing L&TT

The download version is preferred as it is the latest version.

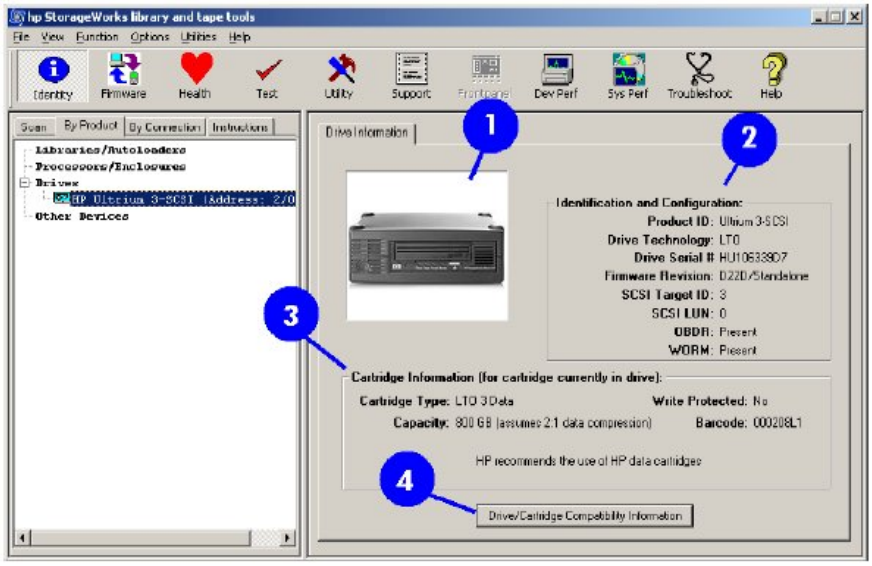
- Install L&TT on any server that can "see" your drive.
- This is most likely to be the backup server, but it could be another server if you are using a SAN.
- You will need the tape driver installed to run the performance tests.

Running L&TT

1. Install L&TT.
2. Turn off services that may lock the tape drive, such as backup software services and Removable Storage Service (RSM).
3. Double click on the desktop icon.
4. Use defaults in pop-ups.



5. Wait for L&TT to scan and find your devices.
6. Select the device you want to work with.



1. A visual representation of the product	2. General information about the product and its configuration
3. Cartridge information, if a data cartridge is loaded	4. Click to display a list of compatible media

Troubleshooting with Library & Tape Tools

Once you have selected your device you have a number of choices for troubleshooting. These are available from the toolbar across the top of the screen. Please refer to the Library & Tape Tools user guide for detailed instructions on using these tools.

- Device identification: shows part number, serial number and information about any cartridge loaded
- Firmware upgrade: allows you to locate and upgrade to the latest firmware. You will need to be connected to the internet for this.
- Run tests: allows you to run proactive tests on your drive, such as the drive assessment test, which will verify the functionality of your drive in around 20 minutes. HP recommends running this test before calling HP Support. You will need to provide a 'trusted' cartridge that can be written to during this test.
- Generate a support ticket: this is a full dump of the drive logs along with interpretation and is used by HP Support to learn about the condition of your drive. Most useful is the device analysis section which is the output from approximately 20 rules forming a comprehensive analysis of the health of your drive. These rules may give advice such as cleaning the head or trying a different tape if issues are found. The support ticket can be sent to HP Support for further analysis.
- Run the performance tests: the tests to measure the write/read performance of your tape drive and the data generation rates of your disk subsystem are also integrated into Library & Tape Tools. Use these tests to find the performance bottleneck in your system.

Performance Assessment Tools

You can use our free, standalone performance assessment tools to check tape performance and test whether your disk subsystem can supply data at the maximum transfer rate.

The tools are located online at http://www.hp.com/support/pat along with a complete guide to understanding the performance needs of your backup system and recommendations on finding and fixing performance issues. In nearly all cases when performance is not as expected, it is the data rates of the disk subsystem that cause the bottleneck. Please follow the guide and try the tools before calling HP Support.

Note that the performance tools are also integrated into HP Library & Tape Tools, which is available both online (http://www.hp.com/support/tapetools) and on the CD-ROM supplied with your tape drive.

Optimizing performance

Various factors can affect tape drive performance, particularly in a network environment or if the drive is not on a dedicated bus.

If your tape drive is not performing as well as expected, consider the following points before contacting HP Support at http://www.hp.com/support.

- Is the tape drive connected to a USB 2.0 port and is it the only device (other than a keyboard or mouse) using the USB bus? See "Verifying USB installation for optimum performance" on page 63.
- Have you installed the correct device drivers for your operating system and backup application? See "Install drivers " on page 19.
- Are you backing up across a network? The network load may be affecting the speed of transfer or your backup application may only be appropriate for a single-server environment.
- Are you using the correct media for your model of tape drive? See "Use the correct media" on page 45.
- Is the backup application writing buffers at the correct speed? You may need to tune the transfer, buffer and block size settings to optimize the speed that the application writes data to the tape drive. HP StorageWorks DAT tape drives have an internal buffer of 8 MB.

10 Troubleshooting

In this chapter:

- "General Procedure" on page 61
- "Verifying USB installation for optimum performance" on page 63
- "Frequently asked questions about USB drivers" on page 64
- "Problems with cartridges" on page 65

Many users can use HP Library & Tape Tools to help them diagnose problems, see "Diagnostic tools" on page 57. We also recommend the detailed troubleshooting guide at http://www.hp.com/go/support for comprehensive troubleshooting information.

General Procedure

If a problem occurs, the first step is to try to establish whether the problem lies with the cartridge, the drive, the host computer and connections, or the way the system is being operated.

Has the system just been installed?

There could be an installation problem:

1. Check through the information in the relevant installation chapter of this guide.
2. Are you connected to a USB 2.0 port? Are there any other devices attached to the same USB hub/controller? See also "USB Configuration Guide" on page 69.
3. Check the environmental conditions against the specified limits.
4. Are appropriate drivers and application software installed on the host?

Are you using new cartridges or a different brand of cartridge? Have you been using the particular cartridge for a very long time?

The problem could lie with the cartridge:

1. Check through "Use the correct media" on page 45.
2. Check that you are using a DDS-labeled cartridge—not a DAT cartridge.

3. Use the correct media type, for example:
   - DAT 320 media with DAT 320 drives.
   - DAT 160 media with DAT 160 drives.
   - DAT 72 media with DAT 72 drives.
   - DDS-4 media with DAT 40 drives.

NOTE:

When using the NT backup application with HP StorageWorks DAT 160 or DAT 320 tape drives, the user must choose 4 mm even when using 8 mm tape cartridges.

Remember that although tape drives may be able to read earlier-format media, see Table 5 on page 46, the media itself is not backward-compatible

- DAT 320 media will be ejected by all drives other than DAT 320 drives
- DAT 160 media will be ejected by all drives other than DAT 320 and DAT 160 drives
- DAT 72 media will be ejected by DAT 320 and DAT 40 drives.
- DDS-4 media will be ejected by DAT 320 and DAT 160 drives.

4. Has the cartridge been write-protected, see "Write-protecting cartridges" on page 48?
5. Clean the tape heads with the cleaning cartridge, see "Cleaning cartridges" on page 49. Be sure to use the correct cleaning cartridge.
   - DAT 320 cleaning cartridges (Q2039A) with DAT 320 tape drives.
   - DAT 160 cleaning cartridges (C8015A) with DAT 160 tape drives.
   - Standard cleaning cartridges (C5709A) with all other HP StorageWorks DAT tape drives
6. Try the operation again.
7. If the problem still occurs, try using a different cartridge.
8. If the problem is still there, the problem probably lies with the drive or the host computer.

Has the drive been moved recently? Have any cables been disconnected and reconnected? Has the environment changed—unusually hot, cold, damp or dry? Has there been dust or dirt near the drive. Have reasonable precautions against static been taken?

The problem could lie with the drive:

1. Check the cables and connectors.
2. Clean the tape heads with the cleaning cartridge.
3. If the problem persists, check the environmental conditions against the specified limits (refer to http://www.hp.com). Perhaps move the drive to a more suitable site.

Has a new operating system been installed in the host computer? Has new backup software been installed?

The problem could lie with the host or the software. Consult the computer's operating manuals, the software manual, or seek help from a service engineer.

Certain backup applications require you to use their own Tape driver instead of the HP Tape driver.

Verifying USB installation for optimum performance

To confirm that an HP StorageWorks USB DAT drive is installed correctly:

- Check that a USB 2.0 port is being used
- Ensure that the tape drive is the only device on a USB hub
- For DAT models prior to DAT 320 ensure that the **HPUSBMSC.SYS** driver is being used (DAT 320 tape drives use the Microsoft usbstor driver)

Check for USB 2.0 port (Windows)

It is important to ensure that you connect your drive to a USB 2.0 port. The drive will work on a USB 1.1 port but performance will be severely degraded.

To check the port on a Windows system:

1. Go to **Device Manager** and select **Devices by connection** from the View menu.
2. Expand **Universal Serial Bus controllers** and locate the tape drive.
3. If a USB driver is listed as **Enhanced**, the port is USB 2.0.

Ensure that the tape drive is the only device on a USB hub (Windows)

On some computers multiple physical USB 2.0 ports will be connected to the same master port, known as a "root hub". Connecting multiple devices to one root hub may degrade tape drive performance degradation.

USB Mass Storage devices like HP DAT tape drives have the lowest priority of all device types on the USB bus, so devices such as webcams should never be connected to the same root hub.

To check the devices connected to a root hub:

1. Go to **Device Manager** and select **Devices by connection** from the View menu.
2. Expand **Universal Serial Bus controllers** and locate the tape drive.
3. Trace the tree of devices back to the USB Root Hub and check that the only device connected is the tape drive via the **HP USB Mass Storage Device**.

For models prior to DAT 320 ensure that the HPUSBMSC.SYS driver is being used (Windows)

NOTE:

This section is not relevant for HP StorageWorks DAT 320 tape drives, because they use the Microsoft USBSTOR driver.

For all models prior to DAT 320, the HP StorageWorks USB DAT drive will work with the Microsoft **USBSTOR** driver, however, HP strongly recommends that you use the **HPUSBMSC.SYS** driver for improved performance.

To check the driver being used:

1. Ensure that the USB DAT drive is attached to the system and switched on.

2. Right click on the My Computer icon on the desktop, then click **Manage**.
3. Click **Device Manager** from the right hand pane of the management console.
4. Select **Devices by connection** from the View menu.
5. Navigate through the hardware tree in the right hand pane to locate the tape device.
6. Immediately above the device in the tree will be the USB Mass Storage layer driver, this should display HP USB Mass Storage Device. If it displays simply USB Mass Storage Device, the Microsoft driver is loaded and should be replaced

Check drivers (Linux)

Use the following procedure to check that both drivers are present:

1. **usb_storage** driver
   - At the command prompt type:
     `lsmod | grep usb_storage`
   - The output of this command should contain a line similar to:
     `usb_storage 61193 0`
   - If this line is not present, type:
     `modprobe usb_storage`
     at the command line to load the usb-storage driver.
2. **st** tape driver
   - At the command prompt type:
     `lsmod | grep st`
   - The output of this command should contain a line similar to:
     `st 35933 0`
   - If this line is not present, type:
     `modprobe st`
     at the command line to load the st driver.

Frequently asked questions about USB drivers

I installed my HP USB tape drive then powered on my server. Windows didn't run the Found New Hardware wizard and the drive appears to work OK. Is there anything I need to do to make my drive function optimally?

It is likely that Windows installed a driver for the tape drive using Windows Update when the system booted up.

- **DAT 320 models:** It will have installed the Microsoft **usbstor** driver, which is correct for this tape drive, but it may be running an out-of-date **hpdat** driver. Run the installer from the StorageWorks CD in order to update the **hpdat** driver.
- **All other models:** It will not have installed the **HPUSBMSC.SYS** driver, which is recommended, and may be running an out-of-date **hpdat** driver. Run the installer from the StorageWorks CD in order install the **HPUSBMSC.SYS** driver and, if necessary, update the **hpdat** driver.

I plugged in the HP USB tape drive with my server powered on and installed drivers from the StorageWorks CD when prompted by the "Found New Hardware" Wizard. Do I need to do anything else?

- **DAT 320 models:** No.
- **All other models:** Run the driver installer from the StorageWorks CD in order to install the **HPUS-BMSC.SYS** driver.

How can I check that my drive is installed correctly?

See "Verifying USB installation for optimum performance" on page 63.

Problems with cartridges

If you experience any problems using HP branded cartridges, check:

- The cartridge case is intact and that it contains no splits, cracks or damage.
- The cartridge has been stored at the correct temperature and humidity. This prevents condensation. See the insert included with the tape cartridge for storage conditions.
- The write-protect switch is fully operational. It should move from side to side with a positive click.
- The World Wide Web site for more detailed troubleshooting information: http://www.hp.com/support.

NOTE:

When using the NT backup application with HP StorageWorks DAT 160 or DAT 320 tape drives, the user must choose 4 mm even when using 8 mm tape cartridges.

The cartridge is jammed

If the cartridge is jammed or the backup application is unable to eject it, you can force eject the cartridge. Once the cartridge is successfully ejected, it is good practice to upgrade the firmware. If the failure occurs regularly, contact customer service at http://www.hp.com/support.

1. Either press and hold the Eject button on the front of the tape drive for at least 15 seconds. Or press the Eject button three times within 5 minutes.
2. Wait for the cartridge to be ejected. The drive waits until 35 seconds have passed from the time of the first press, to give the normal eject procedure a chance to proceed. After this period, it immediately releases the tape and ejects the cartridge, regardless of what operation it was performing. It is important that you allow sufficient time for the drive to complete this process. If you interrupt it, you may damage the media or the tape drive. The drive is then reset as though you had turned the power off and then on again.

   You may lose data if you force eject a cartridge. The tape may also become unreadable because an EOD (End of Data) mark may not be properly written.
3. If the cartridge is still jammed, the tape drive has failed. Contact customer service at http://www.hp.com/support.

The drive will not accept the cartridge (or ejects it immediately)

The cartridge may have been damaged, for example dropped, or the drive may have a fault. If it is a cleaning cartridge, it has probably expired and should be discarded immediately. For data cartridges:

1. Check that the drive has power (the power cable is properly connected and the Tape LED is on).

2. Check that you are using the correct media for the tape drive, see "Use the correct media" on page 45.
3. Make sure that you have loaded the cartridge with the correct orientation (see "Loading and unloading" on page 42).
4. Check for damage to your media and discard it if it is damaged.
5. Use a new or known-good piece of media and see if it loads. If it does, the original cartridge is faulty and should be discarded.
6. Check if another DAT drive of the same model will accept the cartridge. If it does, the original drive may be faulty. Before calling customer service, please check that the tape drive is responding. Use HP Library & Tape Tools, see "HP Library & Tape Tools" on page 57.

11 Replacing an internal tape drive

If your tape drive proves to be faulty and cannot be repaired and it is still covered by the original warranty, it will be replaced. HP will provide a replacement tape drive free of charge. Based on availability and where geography permits, the replacement tape drive will be shipped for next business day delivery. Same day or four-hour delivery may be offered at an additional charge where geography permits. If you request HP to install the replacement tape drive, you will be charged for the travel and labor costs of this service.

To disconnect your drive

1. Unpack your replacement drive, and retain the packaging.
2. Power off the server and disconnect from the mains power supply.
3. Remove the cover from the server.
4. Observing normal anti-static precautions (see caution in "Attach mounting hardware" on page 24) remove any screws that are holding the tape drive in place.
5. Disconnect the drive from the server and slide it carefully out of the mounting bay.
6. Put the drive into the packaging that contained the replacement drive.
7. Return the faulty drive to your local HP Service Center. Instructions on where to return faulty drives will be shipped with the replacement drive.

   You must ship the defective drive back to HP within a defined period of time, normally five (5) business days. The defective part must be returned with the associated documentation in the provided shipping material. Failure to return the defective part may result in HP billing you for the replacement. HP will pay all shipping and part return costs and determine the courier/carrier to be used.

NOTE:

If you are not replacing the drive immediately, you should insert a blanking plate into the empty bay. Replace the cover on the server and secure with screws, as appropriate.

To reconnect your tape drive

Follow the step-by-step instructions in this User Guide.

A USB configuration guide

In this chapter:

- "USB in HP StorageWorks DAT devices" on page 69
- "USB terminology" on page 69
- "Setting up a USB network" on page 70
- "USB cables" on page 70

USB in HP StorageWorks DAT devices

The HP StorageWorks DAT tape drive is a USB 2.0 logo certified device. It supports the high-speed USB transfer rate with a theoretical maximum transfer of over 50 MB/s. (The actual backup rate will be less. This is defined by the transfer rate of the tape drive and the compressibility of the data.)

To benefit from the high-speed performance of the USB 2.0 interface, the USB StorageWorks DAT tape drive should be connected to its host system via a USB 2.0 port. Any USB hubs between the tape drive and the system port should also be USB 2.0 compliant.

To maximize tape drive performance, minimize the use of other USB devices when using the USB tape drive.

USB terminology

The Universal Serial Bus, USB, is a communication interface where an intelligent host controls all the network activity. A command from the host to a particular device is broadcast to all devices on the network. A device waits for a command addressed to itself and then responds as requested. The host determines how much of the overall USB network bandwidth a given device can use at any time. Any given USB network has only one host.

Hubs act as command repeaters and multipliers. This allows many devices to be supported by one host. A host command can arrive at the upstream port of the hub and be transmitted via the downstream ports to many other device and hubs. (Likewise, device commands arriving at a downstream port are also repeated upstream.) There is a special hub called a root hub. The root hub's upstream port is connected directly to the host. All USB systems have a root hub. This is why a system typically has more than one USB port. All the USB ports on the system are connected to the host system via the root hub.

USB devices are not treated equally by the host.

- Periodic devices, which consist of interrupt and isochronous devices, are given a higher priority than bulk transfer devices.
- Interrupt devices, such as keyboards and mice, typically send brief but important input information to the system.
- Isochronous devices, such as web cameras, typically require timely transmission of data, such as a video stream.
- Bulk transfer, such as printers and CD-ROM, must receive or transmit 100% accurate data. But how fast or often the data is transmitted is not as important as the accuracy of the data.

The host will give network bandwidth priority to periodic devices and will share any remaining bandwidth equally among any active bulk transfer devices.

USB supports many types of devices and three data transfer rates, low speed, full speed, and high speed. (A keyboard does not need to transfer data to the system at the same speed as a cable modem.)

The transfer speed capabilities of a device are often referred to by the USB specification revision in which the transfer rate was defined. Therefore a USB 2.0 Hub will support high, full and low speed, but a USB 1.1 hub will only support full and low speed.

The USB specification was developed and is maintained by the USB organization. The USB organization also conducts a certification program. The USB organization will issue the USB logo to a device, which has passed a series of tests that verify the device has correctly implemented the USB interface, as defined by the USB specification. There are many types of USB logos depending on which features of the USB specification a device supports. A USB 2.0 logo-ed device correctly supports high, full, and low speed data transfer.

Setting up a USB network

USB is very user friendly. The interface automatically assigns addresses to devices; you simply need to connect a USB device to a USB port on a system using a USB cable. If you have many USB devices or need to place a device away from your system, you may place up to a maximum of five USB hubs between the device and host system and connect them with additional cables.

If you are using a high-speed (USB 2.0) device, make sure that the USB host at the system and all the hubs between the device and host support high-speed (USB 2.0) transfer.

When using a bulk transfer device, such as a tape drive, do not use other USB devices that will place restrictions on the USB bandwidth available to the bulk transfer device.

If several USB device requiring large amounts of the USB network bandwidth are to operate simultaneously, an additional host must be added to the system. Each device must then be placed into the separate networks starting at the different hosts. An additional host is typically a new USB HBA, which plugs into the host system's PCI slot, creating a new USB host that resides on the network. (Note: if several USB adapters are placed into a system, demands on the bandwidth of the system bus will constrain the USB devices' performance.)

Always use USB logo-ed components in your USB network. This is the best and easiest method to ensure reliable operation.

USB cables

USB cables are available in a variety of lengths. The maximum cable length is 5 meters. If you need to place a USB device further than 5 meters from the system, you must use a hub.

Do not use USB cable extenders or couples. These are not recognized or approved by the USB organization. The USB specification does not allow their use and they are likely to reduce the reliability of the USB network or cause it not to work completely.

Internal and external USB devices use the same USB cables.

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