HP StorageWorks
DAT Tape Drives
User Guide

Installation, Operating and Troubleshooting information for DAT USB tape drives

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HP StorageWorks DAT Tape Drives User Guide

Contents

About this guide

This guide provides information about:

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

Related documentation

In addition to this guide, please refer to other documents for this product:

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

These and other HP documents can be found on the HP documents web site: http://www.docs.hp.com.

Registering your tape drive

Once you have installed and tested your HP StorageWorks DAT tape drive, please take a few minutes to register your product. You can register via the web (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.

HP technical support

Telephone numbers for worldwide technical support are listed on the HP support web site: http://www.hp.com/support/.

Collect the following information before calling:

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

For continuous quality improvement, calls may be recorded or monitored.

HP strongly recommends that customers sign up online using the Subscriber's choice web site at http://www.hp.com/go/e-updates.

- Subscribing to this service provides you with e-mail updates on the latest product enhancements, newest versions of drivers, and firmware documentation updates as well as instant access to numerous other product resources.

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

HP-authorized reseller

For the name of your nearest HP-authorized reseller:

- In the United States, call 1-800-345-1518.
- Elsewhere, visit the HP web site: http://www.hp.com. Then click **Contact HP** to find locations and telephone numbers.

Helpful web sites

For third-party product information, see the following HP web sites:

- http://www.hp.com
- http://www.hp.com/go/connect/
- http://www.hp.com/go/storage/
- http://www.hp.com/support/
- http://www.docs.hp.com

1 Before you start

HP StorageWorks DAT models

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

- HP StorageWorks DAT 72
- HP StorageWorks DAT 40
- HP StorageWorks DAT 24

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

Figure 1 Front view of tape drive
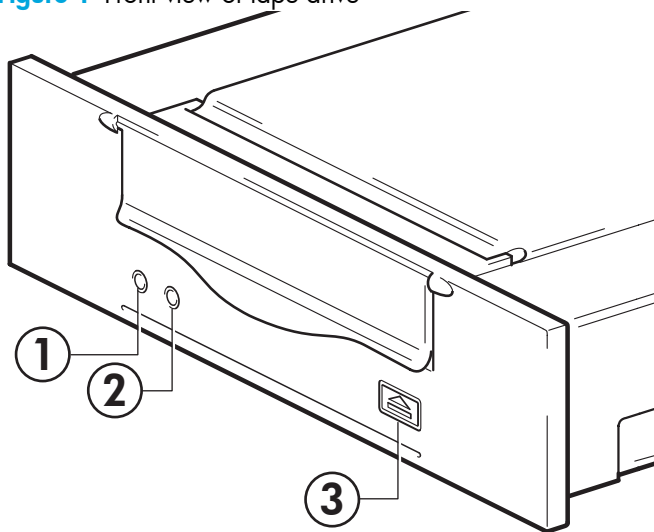
1	Tape LED
2	Clean LED
3	Eject button

Which operating systems are supported?

HP StorageWorks DAT USB drives can be connected to servers running under Microsoft Windows Server 2000, Server 2003, XP Professional and Linux Kernels 2.6.x. Refer to the "HP StorageWorks Tape Software Compatibility" topic on our World Wide Web site (www.hp.com/go/connect) for the most recent information about the operating system versions that are supported.

How do I connect the drive to my server?

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 Appropriate USB cables are supplied with your tape drive.

> **NOTE:** For internal drives, the USB 2.0 connection may be via an internal port on the server's system board (as in many newer ProLiants servers) or an external port on the server's rear panel.

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. Power requirements are:

Table 1 Power requirements

Voltage	Typical Current	Maximum Current
5 V	3.5 A	4.0 A
12 V	0.3 A	1.7 A

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: 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

Install drivers

Installing on Windows

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

- **hpdat**: This is the 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.
- **hp_usbstor**: This is a USB Storage device used by **hpdat** and it replaces the Microsoft **usbstor** driver for HP USB tape drives. The HP StorageWorks USB DAT drives will work with the Microsoft **usbstor** driver, however, HP strongly recommends the use of the **hp_usbstor** driver as it offers improved functionality.

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

Updates to the drivers may be provided from time to time on the HP support web site (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 StorageWorks CD
2. Select the **install drivers** link.
3. Run the automated installer and follow the process to load the two drivers onto the system.

When you attach or install the tape drive connecting to a USB 2.0 port, as described in this guide, and switch it on, the tape drive will be detected automatically and the correct drivers 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 CD-ROM.
2. Select the **install drivers** link on the CD-ROM.
3. Run the automated installer and follow the process to load the two 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 43.

Upgrade backup software

It is important to check www.hp.com/go/connect for software compatibility and install any recommended upgrades.

For optimum performance it is important to use a backup application that is appropriate for your system's configuration. In a direct attach configuration, where the tape drive is attached to a standalone server, you can use backup software that is designed for a single server environment. In network configurations you will need backup software that supports enterprise environments. HP, Veritas, Legato, Yosemite and Computer Associates all provide suitable products. Further details about these and other products that may be appropriate can be found on our connectivity web site.

1. Go to our connectivity web site: 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 35.)
4. Make sure you have a backup application that supports HP StorageWorks DAT tape drives and download any upgrades or patches, if required.

3 Installing an internal DAT tape drive

If you are installing an external DAT tape drive, please refer to Chapter 4.

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 42.

Prepare mounting bay

△ **CAUTION:** 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.

1. Assemble the necessary tools and materials:
   - Phillips screwdriver
   - Flat-bladed screwdriver (if your server uses slotted screws)
   - Torx screwdriver (if your server uses torx screws)
   - Your server manuals (for reference during installation)
2. Perform a normal system shutdown and turn off the server and any connected peripherals.
3. Remove the cover and front 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.

**Figure 2** Removing cover from typical ProLiant server
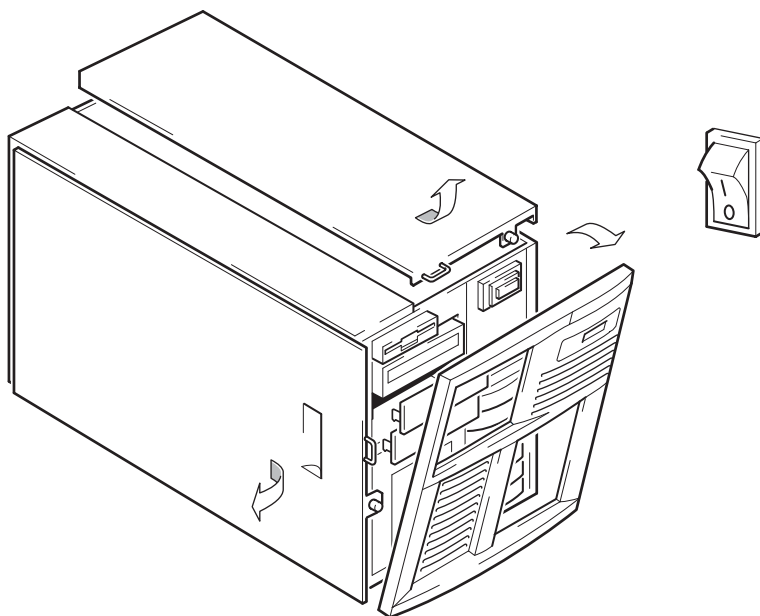
Figure 3 Removing cover from typical AlphaServer
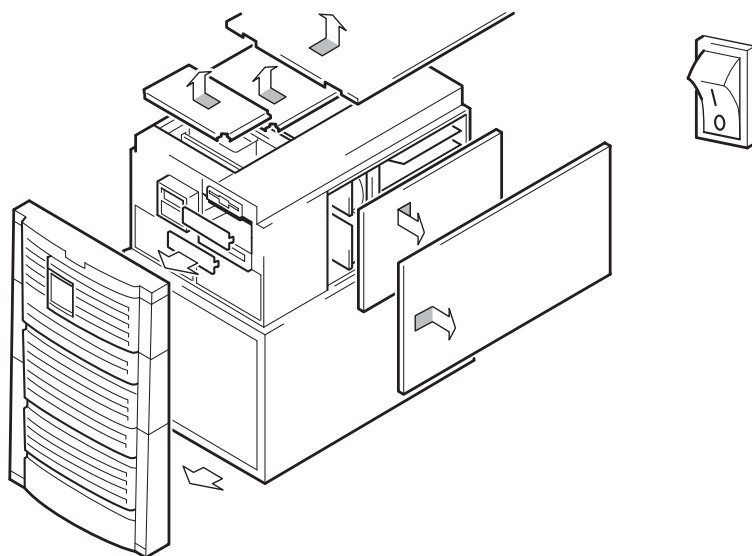
4. Remove the filler panel from a spare 5¼-inch bay of your server, as described in your server's documentation. Keep any screws for use in "Secure the drive" on page 21.
5. You are now ready to install your tape drive.

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 16 now.*

△ **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.

HP ProLiant servers

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

Different models of server require different mounting methods. The server may also incorporate a locking mechanism to hold the tape drive in place. See "Secure the drive" on page 21.

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.

Mounting rails

Some HP ProLiant servers, such as ML530 and ML570, require mounting rails. These may be metal or plastic rails attached to the filler panel of the server's drive bay.

1. Use a regular Phillips screwdriver to attach the appropriate rails. Use the M3 screws provided with the tape drive, as shown in Figure 4.

   Ensure you do use the M3 screws provided. The rails may be attached to the filler panel by screws of a different thread/size type and these should not be used. If in doubt, refer to your HP ProLiant server documentation.

Figure 4 Attaching mounting rails
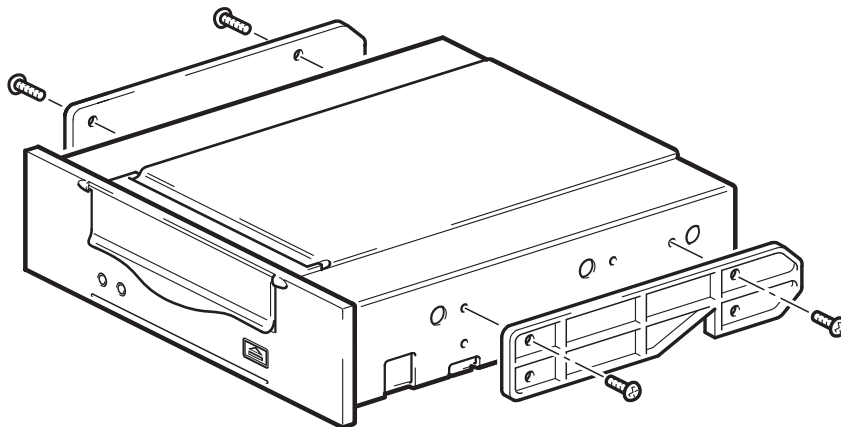
Mounting screws

Other HP ProLiant server models, such as ML350 and ML370, only require the use of special locating screws with no mounting rail.

1. Use a Torx screwdriver to attach the appropriate screws. You may need to purchase the M3 screws separately. Position the screws, as shown in Figure 5.

Figure 5 Attaching mounting screws
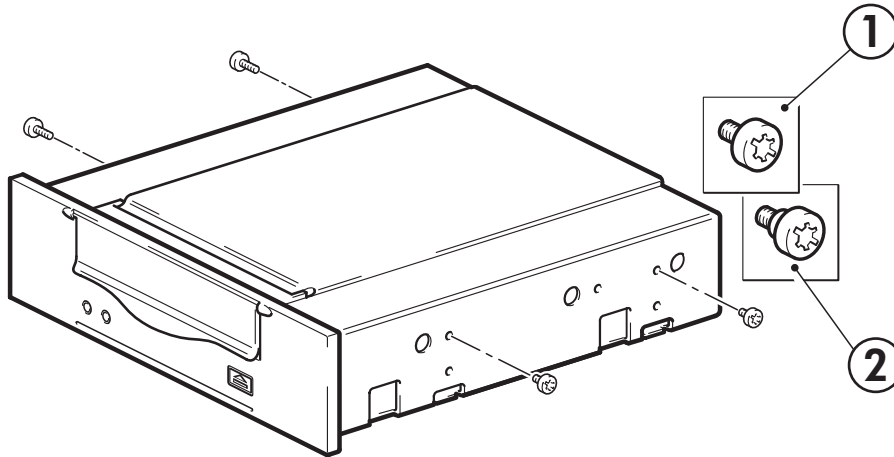
| 1 | M3 mounting screws |
| 2 | M3 offset mounting screws |

- HP ProLiant ML350: Use M3 mounting screws. These have a thicker head than the standard M3 screws.
- HP ProLiant ML370: Use M3 offset mounting screws. These have a thick offset piece and a thicker head than the standard M3 screws.

Other servers

1. Attach the appropriate mounting hardware. Refer to the manufacturer's documentation for instructions.
- If you are installing on a server that requires a tray, place the tape drive in the tray.
- If you are installing in a server that requires mounting rails, fasten the rails to the tape drive.
- Some servers have snap-on mounting rails attached to the filler panel. These can be removed and attached to the tape drive with screws.

Install drive

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

Figure 6 Installing tape drive
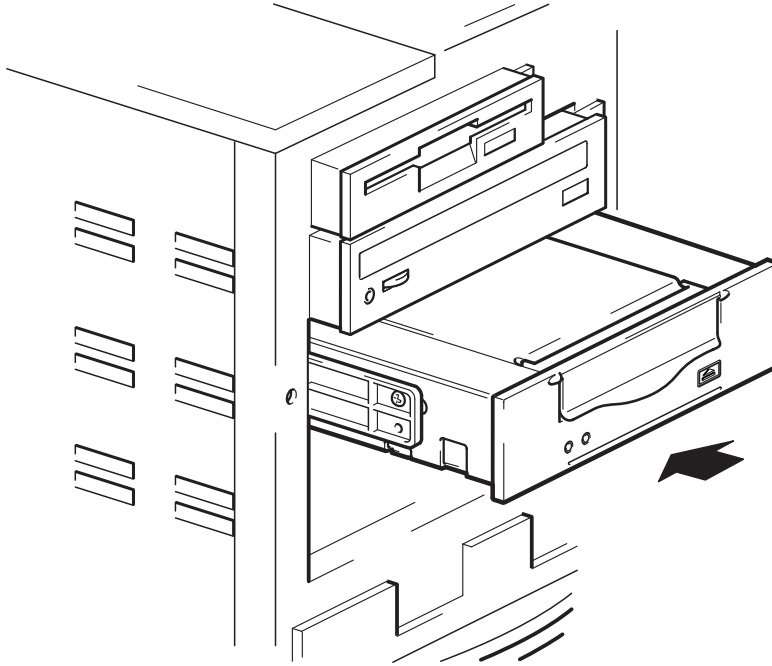
If your server does not use mounting hardware, check that the holes in the chassis are aligned with the holes in the side of the tape drive.

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

Decide which cable to use

Two USB cables are supplied with your tape drive because there are several options for connecting the tape drive to your server:

- To an internal 4-pin USB port on your server's system board; this option uses the special, 4-pin USB cable and is appropriate for many HP ProLiant servers
- To an internal standard USB port, possibly on your server's system board or on an internal USB card; this option uses the standard USB cable
- To an external USB port on your server; this option uses the Cable Routing kit and the standard USB cable

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.
- Many ProLiant servers have a 4-pin USB connector on the system board, which may be orientated vertically or horizontally.

Figure 7 Orientation of internal 4-pin connector
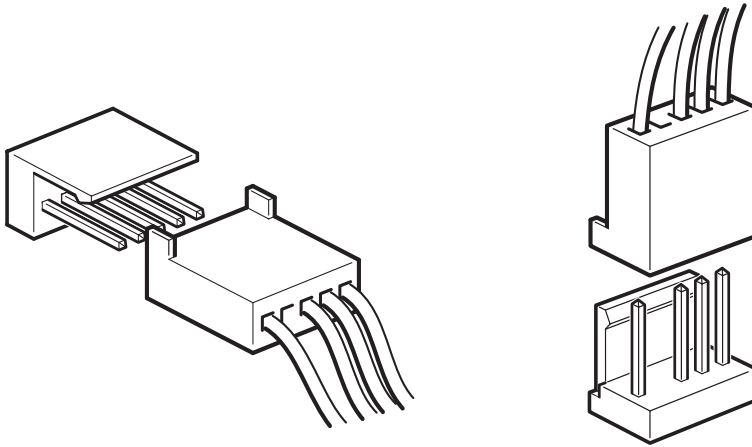
To connect to an internal USB 2.0 port (as in many ProLiant servers)

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.
2. Use the cable supplied with the tape drive to connect to the server.
   - If your server has a 4-pin USB port, use the supplied, special, 4-pin USB cable, as illustrated in Figure 8.

Figure 8 Connecting to a 4-pin USB port
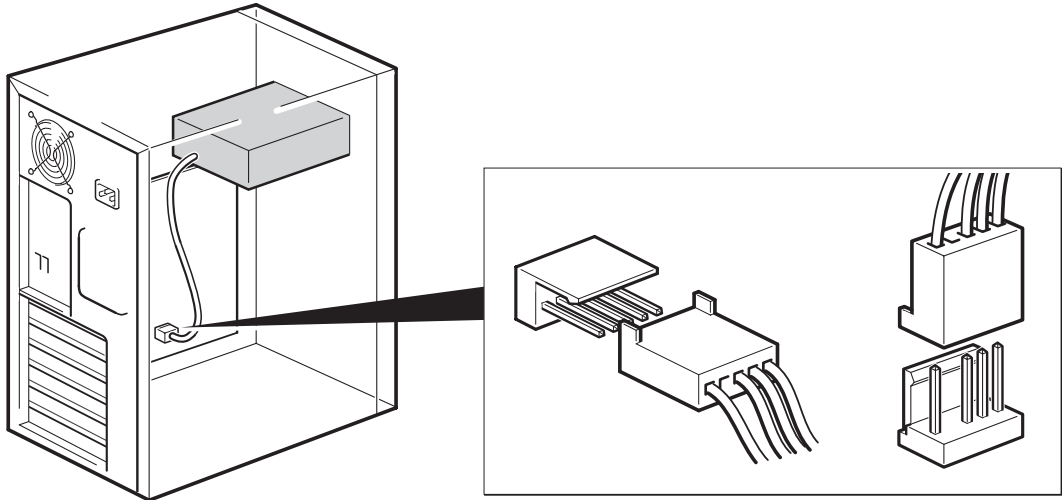
   - If your server has a standard USB port, use a standard USB cable. You can use the supplied standard USB cable and the cable ties to tidy excess cable length.

To an external USB 2.0 port

Use the standard USB cable and Cable Routing Kit supplied with the tape drive. The Cable Routing Kit consists of a grommet, bracket and cable ties. The tape drive (Type B) has a different type of USB connector to the server (Type A), so make sure you orientate the Cable Routing Kit correctly when you assemble it, see Figure 9.

1. Remove a spare blanking plate from the rear panel of the server.

2. Fit the grommet to the cable. Making sure the Type B connector is facing in towards the tape drive, slide the grommet into the bracket, as illustrated in Figure 9. Fix the bracket to the server and use the supplied cable ties to tidy up any excess cable.

Figure 9 Connecting USB cable
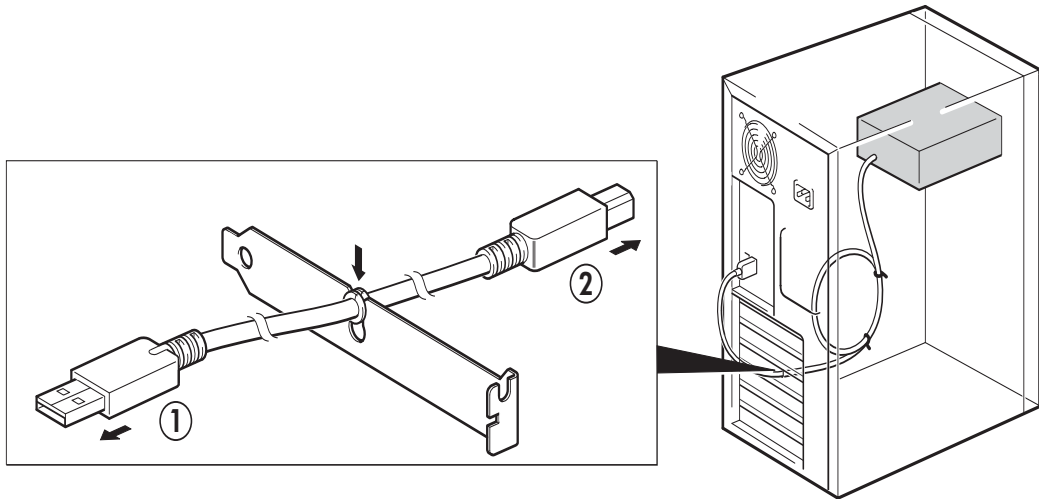
1	Type A connector, to server's external USB port
2	Type B connector, to tape drive

3. Attach the Type B connector on the cable to the tape drive and the Type A connector to the server's external USB port, as illustrated in Figure 9.

Attach power cable

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

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

Figure 10 Attaching power cable
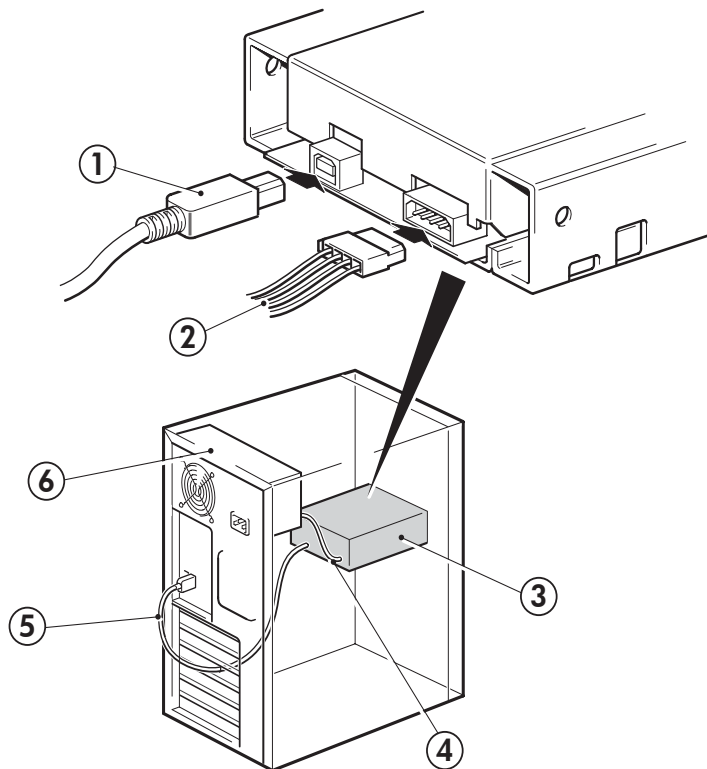
1 and 5	USB cable, to server's external USB port
2 and 4	power cable
3	tape drive
6	server's power supply

Secure the drive

📝 **NOTE:** The server latches and side views of your server model may not be exactly the same as shown in the illustrations. Please refer also to you server documentation.

Mounting hardware used (HP ProLiant)

Ensure that you use the correct mounting rails or locating screws, as described in "Attach mounting hardware" on page 13. The server also incorporates a locking mechanism to hold the tape drive in place.

1. Push the server latch down to lock the tape drive into position, as shown in Figure 11.

Figure 11 Securing drive, mounting hardware used
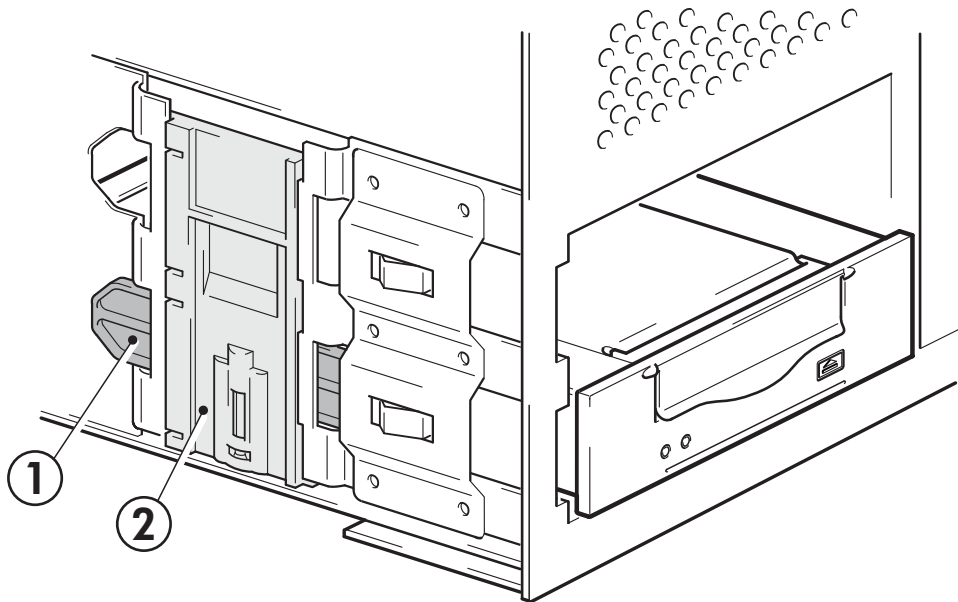
| 1 | plastic rail |
| 2 | server latch |

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

No mounting hardware used

1. Use the M3 screws provided with the tape drive. Check that the holes in the chassis are aligned with the holes in the sides of the drive and use a regular Phillips screwdriver to secure the M3 screws, as shown in Figure 12.

Figure 12 Securing drive, no mounting hardware used

1	M3 screws, supplied with tape drive
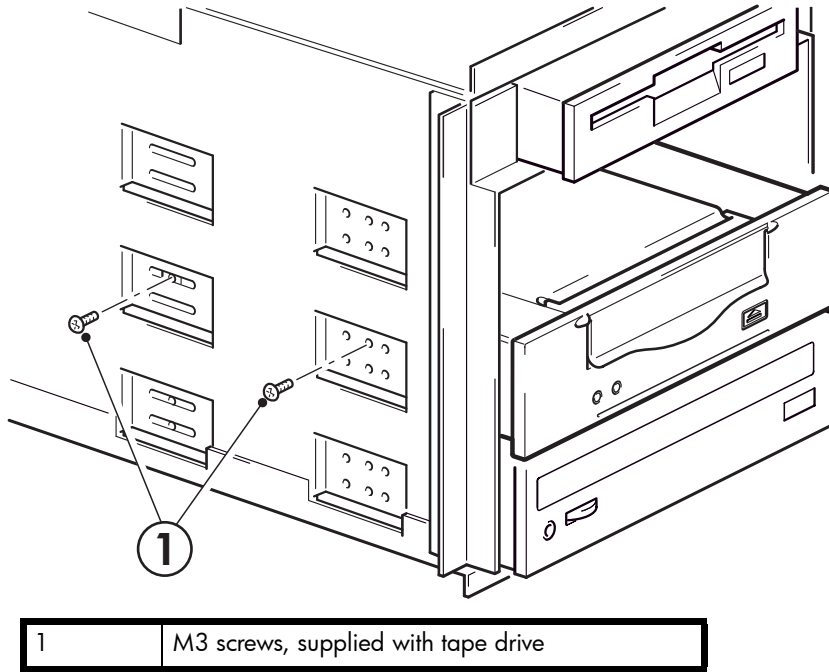
2. Ensure blanking plates are in place over empty bays and replace the cover on the server.

4 Installing an external DAT tape drive

If you are installing an internal DAT tape drive, please refer to Chapter 3.

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. Make sure that the drive is switched OFF (O side down). The power switch is on the rear panel.
2. 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.

Figure 13 Connecting power and USB cables
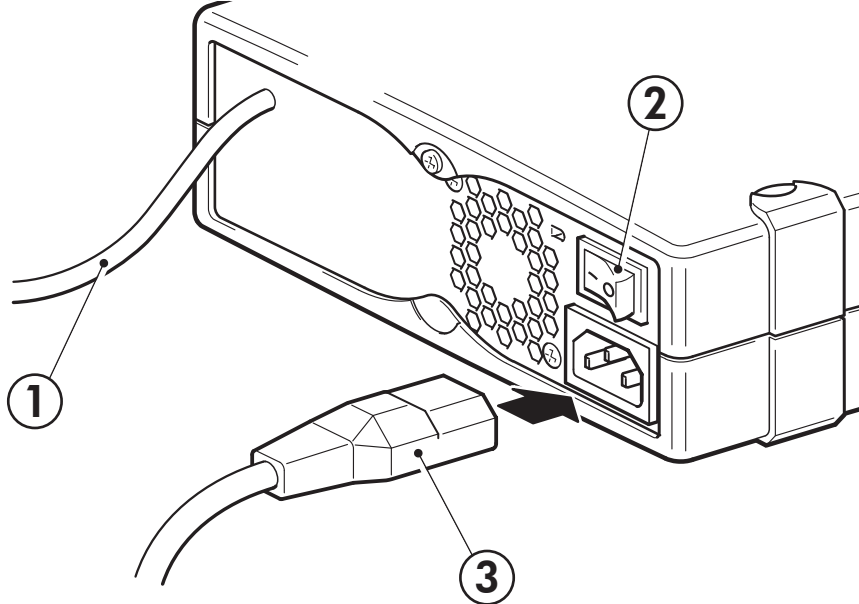
1	USB cable (pre-fitted)
2	on/off switch
3	power cable

3. 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 42.

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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.

1. Switch on the drive and the server.
2. The tape drive will run its hardware self-test, which takes about 5 seconds. At the end of the hardware self-test, both front panel lights should be off. See "Front panel" on page 27 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 9.) 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 42.

    • **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 9.

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

    Drivers are included with the operating system and should be loaded automatically. See also "Check drivers (Linux)" on page 43.
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 39 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 41 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 www.hp.com/go/connect for software compatibility and install any recommended upgrades.

6 Operating your tape drive

Front panel

Figure 14 Front panel, external drive
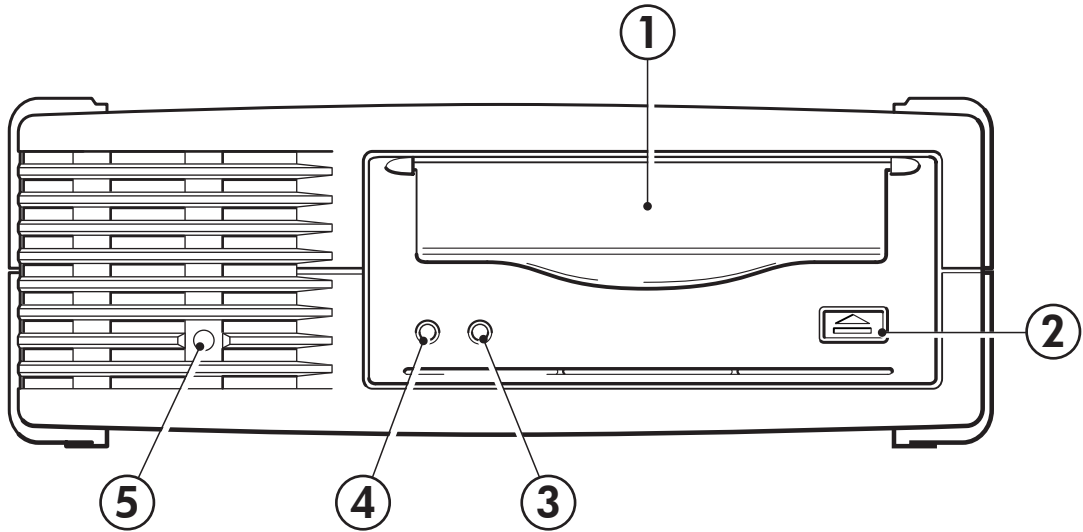
1	cartridge door
2	eject button
3	clean LED
4	tape LED
5	power LED (external drives only)

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.
any	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.
any	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 36).

Loading and unloading

Inserting cartridges

Figure 15 **Figure 15** Inserting a cartridge, external drive
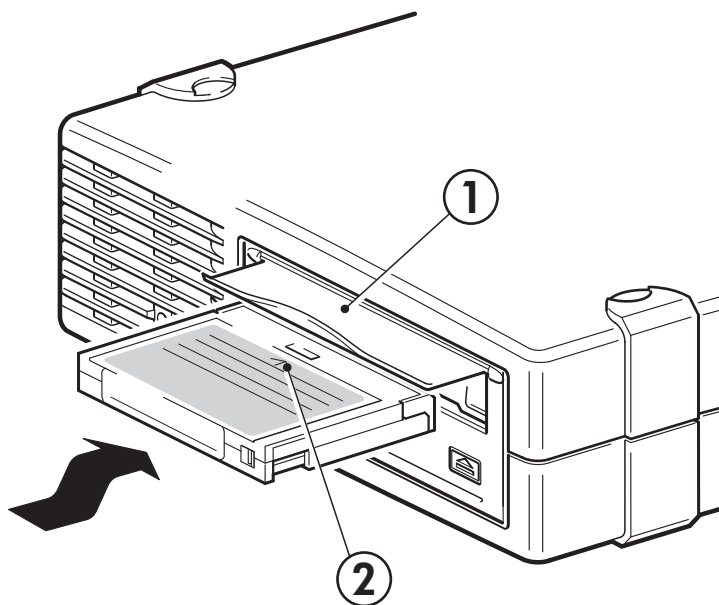
1	cartridge door
2	arrow indicates leading direction

1. Insert a cartridge into the slot on the front panel. As the cartridge is inserted, the drive takes it and performs a load sequence.
2. 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.

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1. Press the Eject button on the front panel.

Figure 16 Ejecting a cartridge, external drive

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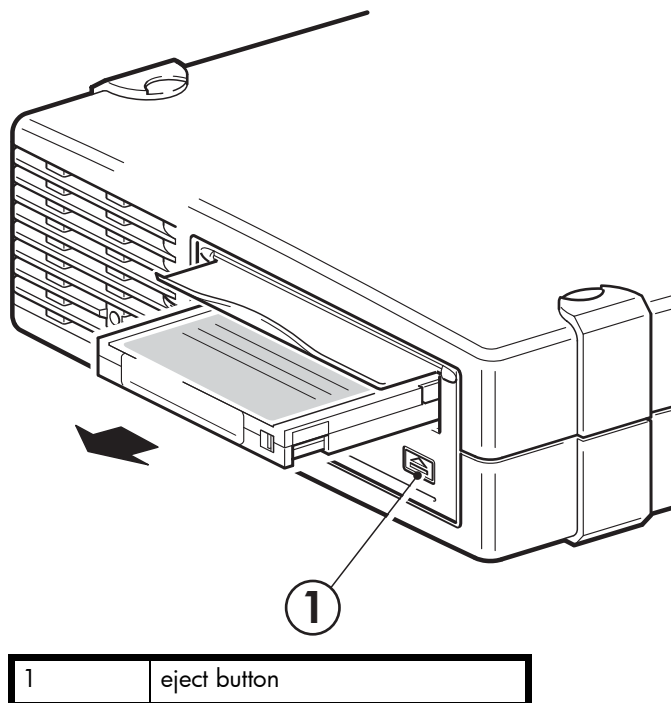
2. The drive completes any task it is currently performing, winds the tape to the beginning, and ejects the cartridge. The sequence will take about 25 seconds for a write-enabled cartridge and 10 seconds for a write-protected cartridge.

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:
www.hp.com/go/storagemedia. If you do not have internet access, refer to the User's Guide on the
HP StorageWorks Tape CD-ROM for ordering information for tape cartridges and cleaning cartridges.

Data cartridges

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 72 cartridges with DAT 72 tape drives
- HP's DDS-4 cartridges with DAT 40 tape drives
- HP's DDS-3 and DDS-2 cartridges with DAT 24 tape drives

Although HP StorageWorks DAT tape drives are fully backward compatible, old tape formats are
more abrasive than later generations and using older tape formats can reduce the life expectancy of
the tape drive. The compatibility between drive models and cartridges is summarized in Table 2.
Shaded boxes show the recommended media for each tape drive. Capacities assume a
compression ration of 2:1.

Table 2   Data cartridge compatibility

	DDS-2 120 meter	DDS-3 125 meter	DDS-4 150 meter	DAT 72 170 meter
HP StorageWorks DAT 72	not supported	read/write	read/write	**72 GB*** **C8010A**
HP StorageWorks DAT 40	read/write	read/write	**40 GB*** **(C5718A)**	not supported
HP StorageWorks DAT 24	**8 GB*** **C5707A**	**24 GB*** **C5708A**	not supported	not supported
* Capacity assumes 2:1 compression.				

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

Write-protecting cartridges

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

Figure 17 Write protecting a cartridge

| 1 | tab closed, cartridge write-enabled |
| 2 | tab open, cartridge write-protected |
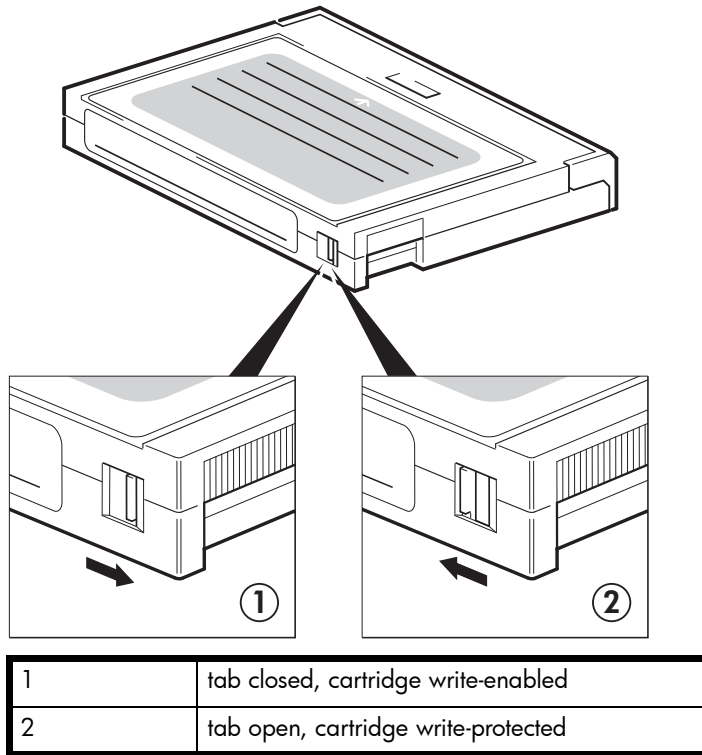
Always remove the cartridge from the tape drive before you change the write protection.

- 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).

Cleaning cartridges

HP recommends weekly cleaning of the tape drive using an HP 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.

   At the end of the cleaning cycle, the drive ejects the cartridge. The cleaning cycle takes approximately 30-60 seconds.

   HP StorageWorks DAT 40 and 24 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.

   HP StorageWorks 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.

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.

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 72 media for HP StorageWorks DAT 72, DDS-4 media for HP StorageWorks DAT 40).
- Use media for the recommended number of times (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 page 32.
- 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

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 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 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)
- 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 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 (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 (www.hp.com/go/obdr) for the latest information about software compatibility, firmware upgrades and troubleshooting before you use HP OBDR.

1. Insert the latest bootable cartridge in the tape drive. The cartridge must be written by a backup application that writes data to tape in CD-ROM format.

Figure 18 Inserting cartridge for OBDR
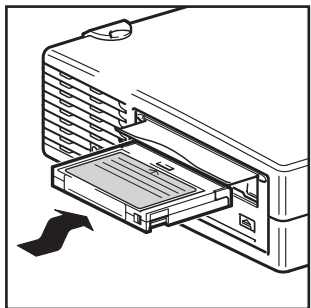
2. Hold down the eject button on the tape drive. Keeping the eject button pressed down, power on your tape drive (external drives only) and server. This activates the HP One-Button Disaster

Recovery process. Release the button as soon as the Tape light and the Clean light on the front panel flash alternately, which is the OBDR sequence.

Figure 19 Keeping eject button pressed down, power on in OBDR mode

external drives only,
switch on tape drive before
server
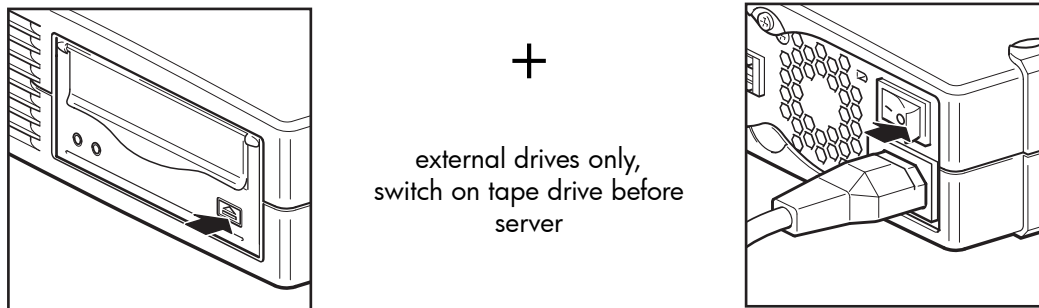
Keyboard shortcut for HP ProLiant servers

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 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 (www.hp.com/go/obdr) and do a search on OBDR for detailed troubleshooting information.

9 Diagnostic Tools and Performance

Diagnostic tools

HP Library & Tape Tools

HP StorageWorks Library & Tape Tools 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 www.hp.com/support/tapetools for compatibility information, updates and the latest version of the tool.

Checking drive installation with Library & Tape Tools

The tape drivers must already be installed to run this check. You will also need to provide a tape cartridge that can be written to during the test.

1. From the HP StorageWorks CD, select **install check**. This will run Library & Tape Tools directly from the CD (no installation on the server) in a special mode for installation checking.

2. Select the appropriate tests to verify the installation of your drive.
   - Verify device connectivity
   - Verify configuration (bus and driver configuration)
   - Verify drive health (writing and reading to a test cartridge)
   - Verify drive performance (data rates to the drive)
   - Verify system performance (data rates from the disk subsystem)
   - Verify drive cooling

3. At the end of the test you will be given a summary of the test results and recommendations to resolve any issues found.

Troubleshooting with Library & Tape Tools

1. From the HP StorageWorks CD, select **troubleshoot**.

   This will allow you to run Library & Tape Tools in standard mode, either directly from the CD (no installation on the server) or as an installation on your server. HP recommends installation of Library & Tape Tools, so that it can be quickly accessed at any time. HP Support will also request that you use Library & Tape Tools should you need to contact them in the future, so it is a good idea to have it installed.

2. When Library & Tape Tools is first run, it will scan for HP tape drives and libraries on your system and ask you to select the one to work with.

3. Once you have selected your device you have a number of choices for troubleshooting.
   - 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 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 (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 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 42.
- Have you installed the correct device drivers for your operating system and backup application? See "Install drivers" on page 9.
- 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.
- 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

Many users can use HP Library & Tape Tools to help them diagnose problems, see "Diagnostic tools" on page 39. We also recommend the detailed troubleshooting guide at 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. Check the power connectors and USB cabling.
3. 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 49.
4. Check the environmental conditions against the specified limits.
5. 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 the media chapter on page 31.
2. Check that you are using a DDS-labeled cartridge—not a DAT cartridge.
3. Use the correct media type, for example, DAT 72 media with DAT 72 drives.
   DAT 72 media will be ejected by DAT 40 drives.
   DDS-4 and DAT 72 media will be ejected by DAT 24 drives.
4. Has the cartridge been write-protected, see "Write-protecting cartridges" on page 32?
5. Clean the tape heads with the cleaning cartridge, see "Cleaning cartridges" on page 32.
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 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.

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
- Ensure that the **hp_usbstor** driver is being used

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. See Figure 20 on page 43.

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**. See Figure 20 on page 43 for an example showing a single tape device connected to a dedicated USB 2.0 root hub.

# Ensure that the hp_usbstor driver is being used (Windows)

The HP StorageWorks USB DAT drive will work with the Microsoft **usbstor** driver, however, HP strongly recommends that you use the **hp_usbstor** driver for improved performance.

To check the driver being used:

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 the tape drive is connected to the **HP USB Mass Storage Device**, it is configured correctly. See Figure 20.

Figure 20 Windows Device Manager, USB controllers
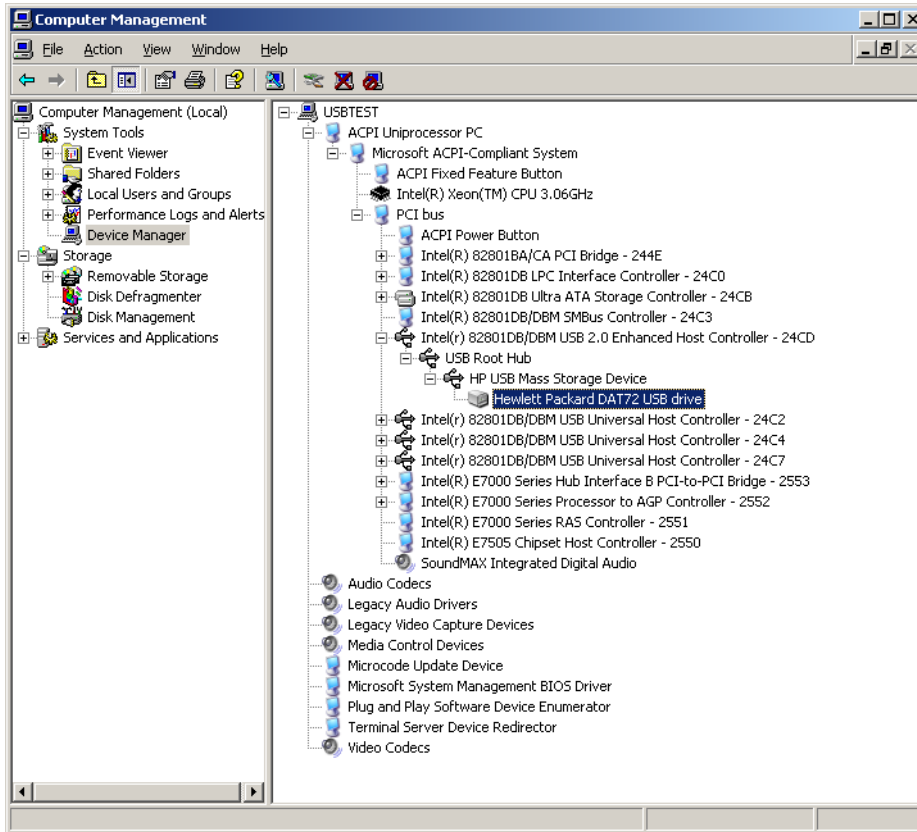
Check drivers (Linux)

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. It will not have installed the **hp_usbstor** 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 **hp_usbstor** 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?

Run the driver installer from the StorageWorks CD in order to install the **hp_usbstor** driver.

How can I check that my drive is installed correctly?

See "Verifying USB installation for optimum performance" on page 42.

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: www.hp.com/support.

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 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 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 page 31.
3. Make sure that you have loaded the cartridge with the correct orientation (see "Loading and unloading" on page 29).
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 page 39.

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.

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 page 13) remove any screws that are holding the tape drive in place.
5. Disconnect the drive from the server's power and USB cables 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.

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

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, better known as 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 of secondary importance verses 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.