

hp StorageWorks
DAT tape drive

getting started guide

internal model



DAT 40i, DAT 72i

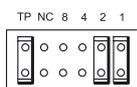
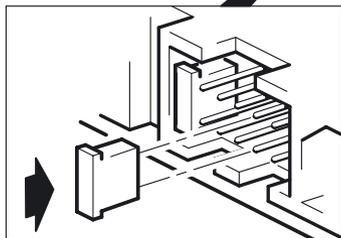
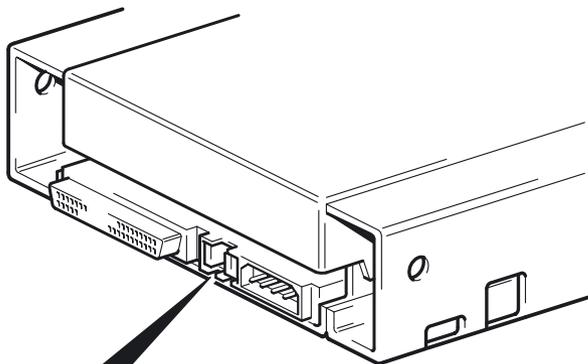


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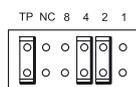
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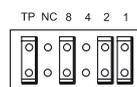
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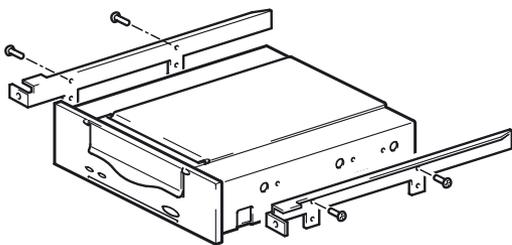


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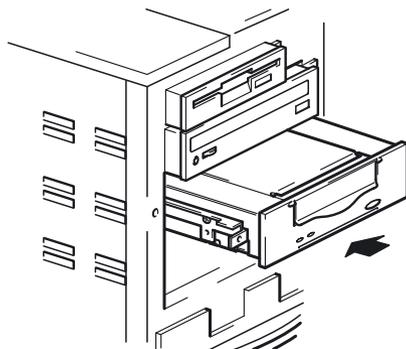
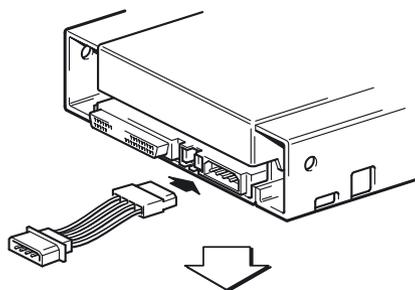


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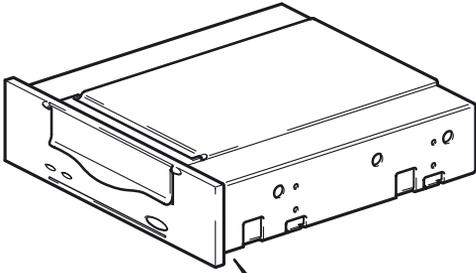


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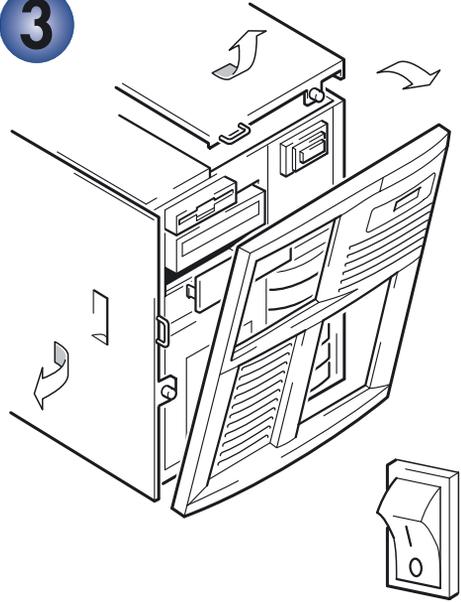


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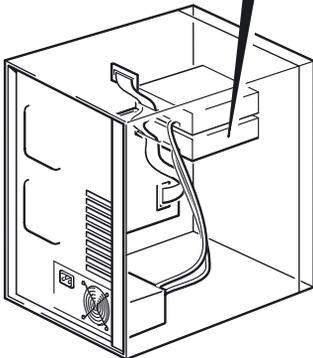
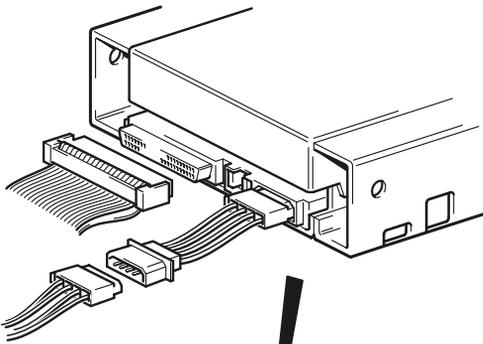
UNIX



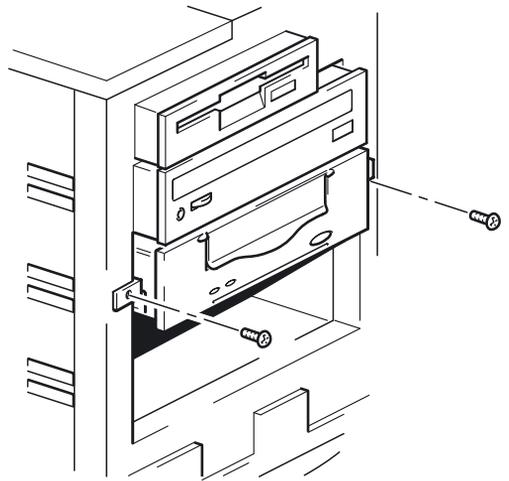
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Product Details

Write your tape drive details here so you can find them easily if you need them. The model name is on the front of the drive and the product and serial numbers are on a label on the bottom of the drive.

Model (type of drive):	
Model (number):	
Serial (number):	
Warranty Serial (number):	
Date purchased/installed:	
SCSI ID:	

Before you start

HP StorageWorks DAT models

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

- HP StorageWorks DAT 72
- HP StorageWorks DAT 40

Which operating systems are supported?

HP StorageWorks DAT drives can be connected to servers running under Windows®, NetWare, UNIX, Tru64 and Linux. Refer to the “HP StorageWorks Tape Software Compatibility” topic on our World Wide Web site (www.hp.com/go/connect) for more information about the operating system versions that are supported.

How do I connect the drive to my server?

The following guidelines apply:

- For optimum performance the drive should be the only device on the SCSI bus.
- Always terminate the SCSI bus.
- Do not attach the drive to the same SCSI bus as a your disk drive or to a RAID controller.

You will need a properly installed and configured SCSI host bus adapter (HBA) or a built-in SCSI controller on your server. Your tape drive is attached to the SCSI bus of the host server via a spare connection on the internal SCSI ribbon cable. The cable should be compatible with low voltage differential SCSI (LVDS) and it should have a spare 68-pin, high density (HD), wide SCSI connector. See “Checking the SCSI connection” on page 9. The cable must be terminated, see “Step 6: Attach power and SCSI cables” on page 21.

Why is the SCSI bus type important?

The SCSI bus type determines the speed at which data can be transferred between devices on the bus and the maximum length of cable that can be used. The drives support a burst transfer rate of 40 MB/sec. To benefit from this level of performance, it is important to ensure that the drives are connected to a SCSI bus of a similar or higher specification. This means that you need:

- **An Ultra Wide, Ultra2 Wide, Ultra3 (160) or Ultra4 (320) SCSI bus.** Ultra Wide SCSI supports the maximum bus speed of 40 MB per second, Ultra2, Ultra3 and Ultra4 SCSI exceeds this.
- **LVD-rated SCSI cabling and terminators.** The LVD interface enables the data to be transferred at the drive's maximum rate.

If you attach the drive to a lower specification SCSI bus, it may still work but data will not be transferred as quickly.

Note The drives are not compatible with high voltage differential (HVD) SCSI devices.

How can I check the SCSI bus type and SCSI ID?

For many operating systems, you can install HP Library & Tape Tools from www.hp.com/support/tapetools and run the "Install Check" to check your server's current SCSI configuration (see page 35). This will provide information about the SCSI bus and the SCSI IDs in use. See also the SCSI topic in the electronic User's Guide on the HP StorageWorks Tape CD-ROM for other ways of checking the SCSI bus type.

What are the mounting requirements for the 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:

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.

Do I need additional items for installation?

- You may need mounting hardware. See "What are the mounting requirements for the tape drive?" above.
- If you do not have a spare, suitably-rated SCSI connector on your server, you must install a new HBA (also known as a SCSI card). This should be of an Ultra Wide or higher SCSI specification. You will need to purchase and install the new HBA into an unused, 64-bit PCI expansion slot within your server before installing your tape drive. (The kit can also be installed in a 32-bit PCI expansion slot, but performance may be degraded.)

Refer to our World Wide Web site for recommended products, configurations and ordering information: www.hp.com/go/connect or www.hp.com/support.

Backup software and drivers

Backup software

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 33.)
- 4 Make sure you have a backup application that supports HP StorageWorks DAT tape drives and download any upgrades or patches, if required.

Drivers

Windows users

Before you install the tape drive, download the HP driver from our web site: www.hp.com/support. Refer to the accompanying README file for specific installation instructions for Windows NT, Windows 2000, Windows XP and Windows Server 2003 drivers. This will tell you whether you need to install the driver before or after installing the tape drive.

If you do not have internet access, you can also download drivers from the HP StorageWorks Tape CD-ROM, but these may not be the latest versions available.

UNIX users

The recommended backup applications use the operating system's standard, built-in device drivers. To upgrade drivers we recommend that you patch to the latest version of the operating system or configure device files, as described in the *UNIX Configuration Guide* on the CD-ROM.

IA64 users

If you are installing on an IA64 system, such as an HP Integrity server, check www.hp.com/go/connect for the latest information on the availability of backup application upgrades and drivers.

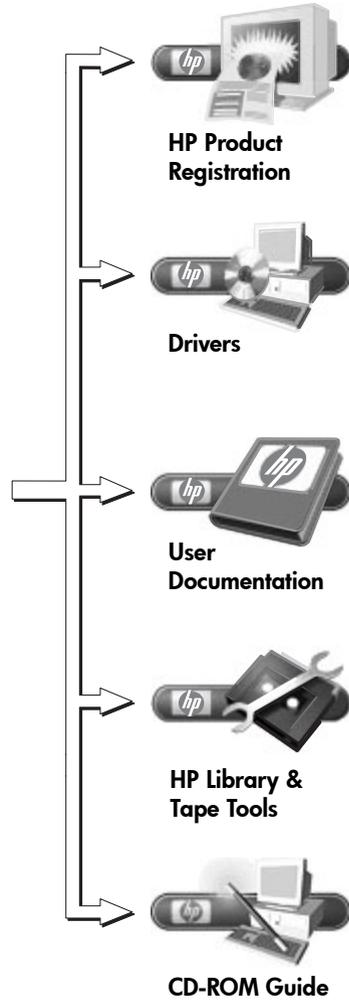


Figure 1: the HP StorageWorks Tape CD-ROM

Using the CD-ROM

The HP StorageWorks Tape CD-ROM contains drivers, useful utilities and information to help you install and use your tape drive. For most operating systems, HP Library & Tape Tools will help you check SCSI ID information on the SCSI bus before installation. The UNIX Configuration guide on the CD-ROM also contains information about checking SCSI IDs on UNIX systems.

HP product registration

To register your new tape drive electronically via the web, use the “Product Registration” link on the HP StorageWorks Tape CD-ROM.

Drivers

For detailed information about drivers, refer to the appropriate README file in the `DRIVERS` directories on the HP StorageWorks Tape CD-ROM. There is a separate sub-directory for each operating system.

User documentation

Refer to the “User Documentation” topic on the HP StorageWorks Tape CD-ROM for a UNIX Configuration guide and an online User’s Guide that provides more detailed information about using your HP StorageWorks DAT tape drive.

Refer to your backup application’s documentation for instructions on how to back up and restore data.

HP Library & Tape Tools

HP Library & Tape Tools software provides diagnostic and troubleshooting utilities. It allows you to identify your product correctly, check SCSI ID information on the SCSI bus, run tests, carry out firmware upgrades and, if necessary, generate comprehensive troubleshooting information for support calls. Use the link on the HP StorageWorks Tape CD-ROM to access our Support web site, www.hp.com/support/tapetools, and download the latest version of this software. For further details see page 35.

CD-ROM guide

The CD-ROM guide provides an overview of the CD directory structure and information about the languages in which the contents of the CD-ROM are available. It also contains a set of URLs and links for further information.

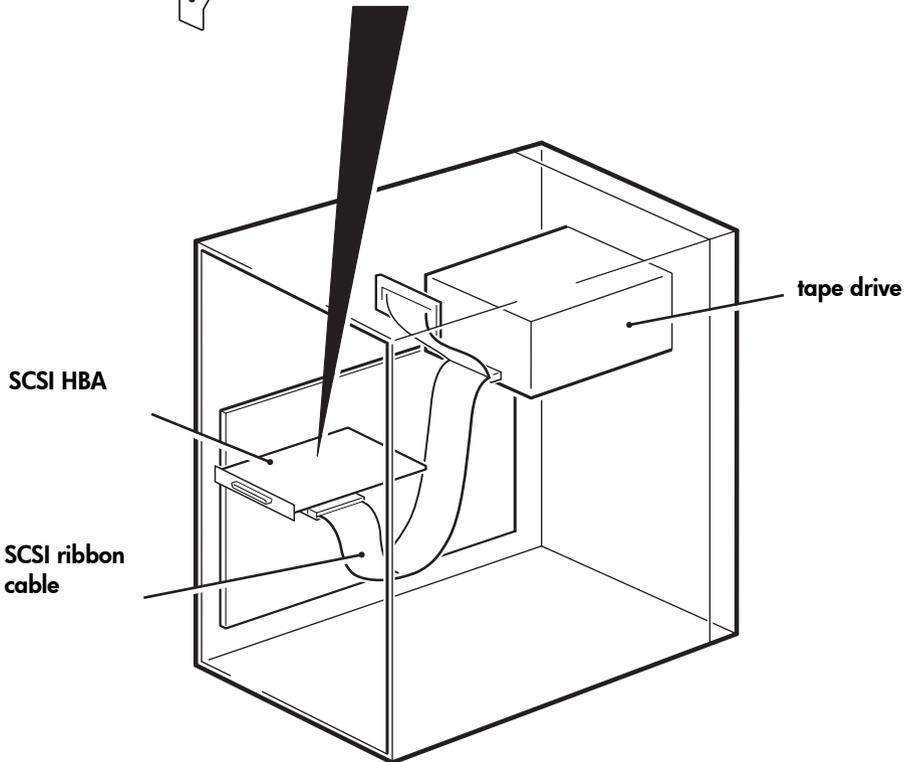
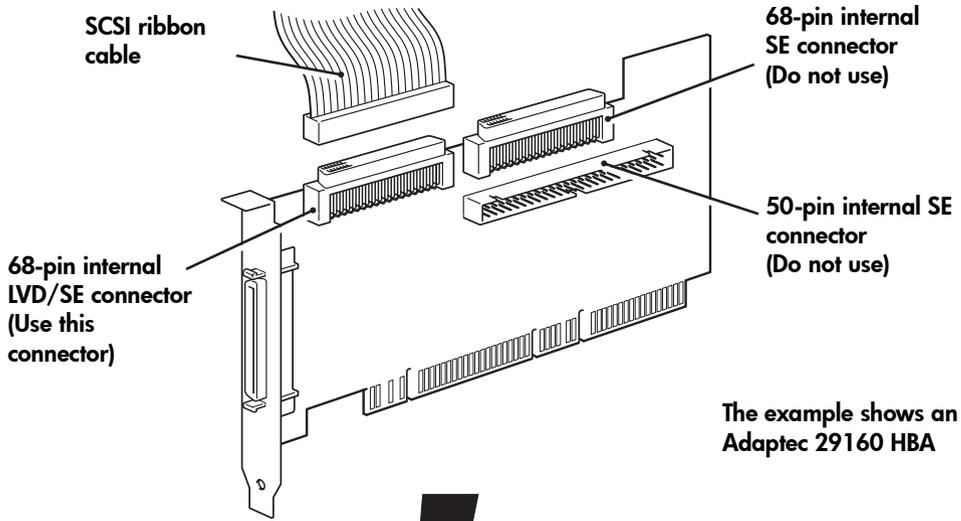
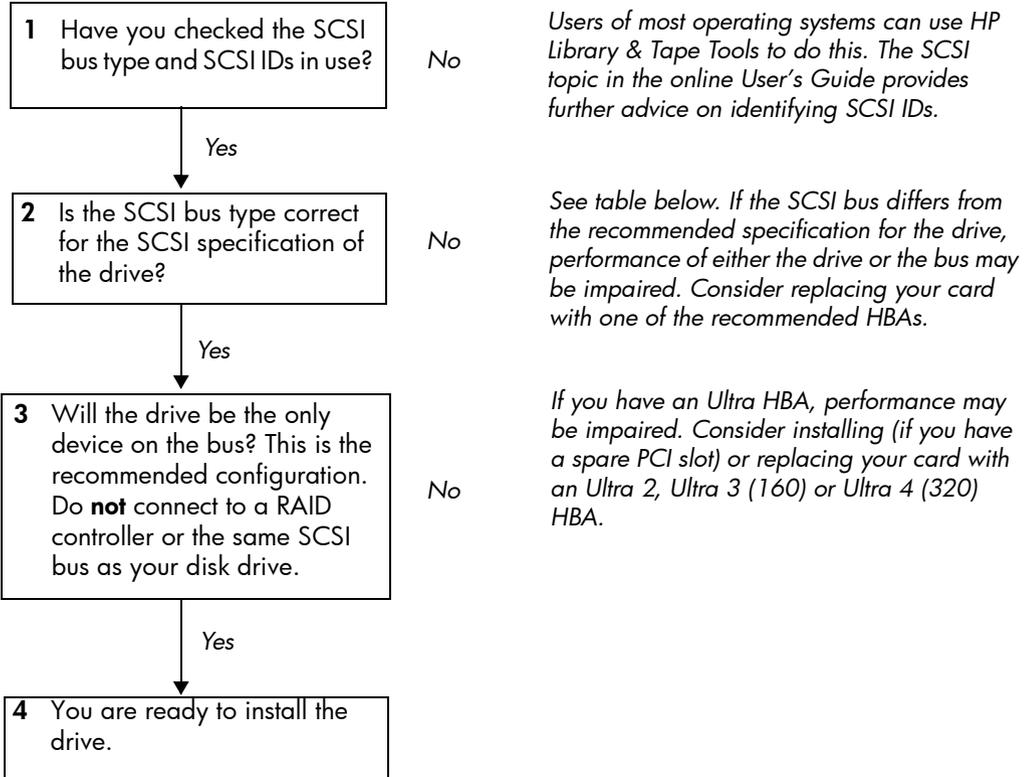


Figure 2: checking the SCSI connection

Checking the SCSI connection

Use the following questions to help you check your SCSI connection. As long as you have a spare drive bay in your server you should have a spare connection on the internal SCSI bus. You need to ensure it is the correct SCSI bus type. If you answer 'Yes' to all these questions, you are ready to install your tape drive. If you answer 'No', you will probably need to purchase and install additional items. For compatibility and product details, go to www.hp.com/go/connect.



SCSI Bus Type	Supported
Ultra wide LVD	Yes. This is a recommended configuration as long as the drive is the only device on the SCSI bus.
Ultra 2 LVD, Ultra 3 (160) LVD, Ultra 4 (320) LVD	Yes. These are recommended configurations, particularly if there are several devices on the SCSI bus.
Ultra wide, single-ended	Yes. But this is not a recommended configuration as it will restrict performance.
Ultra narrow, single-ended	Yes. But this is not recommended as it will severely restrict performance and you will need a suitable cable or adapter.
High Voltage Differential	No. The drive will not work and you may damage the drive or controller

table 1: supported SCSI bus types

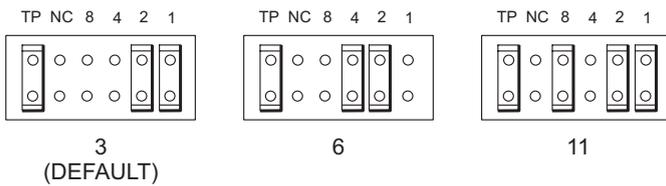
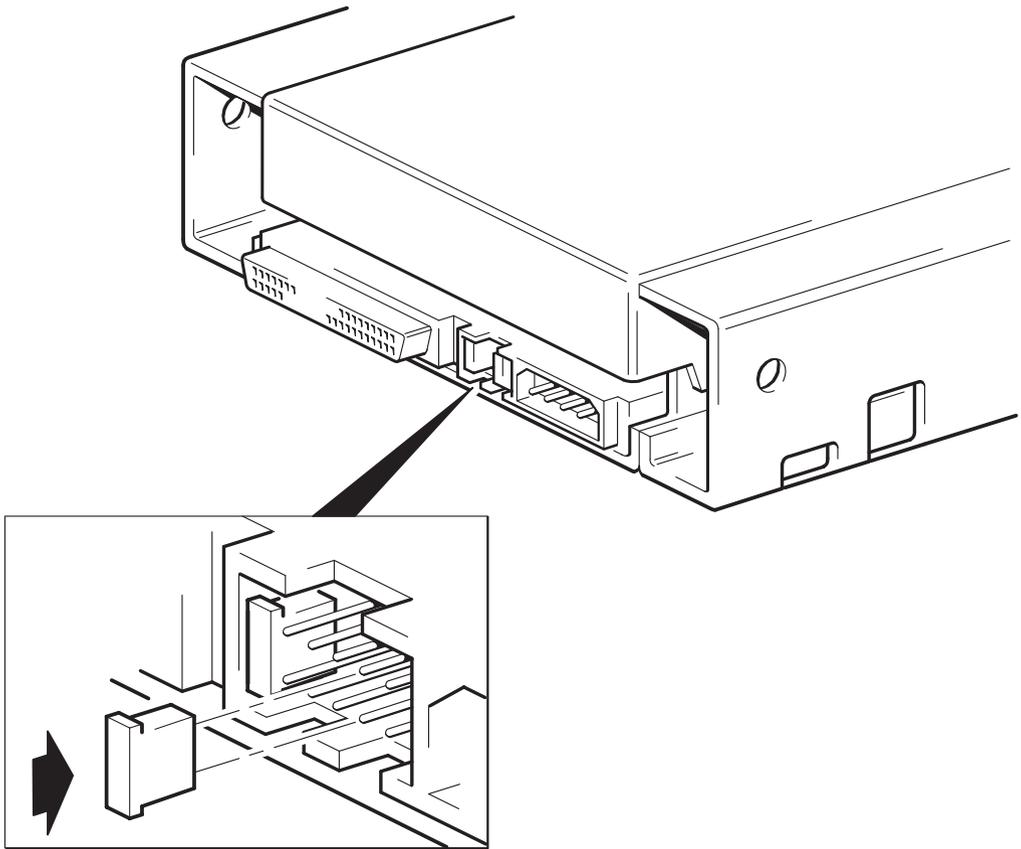


Figure 3: checking the SCSI ID

Step 1: Check the drive's SCSI ID

Your HP StorageWorks DAT drive is shipped with a default SCSI ID of 3. Each device on the SCSI bus must have a unique SCSI ID number. The drive can be assigned any *unused* ID between 0 and 15. Do not use SCSI ID 7, which is reserved for the SCSI controller. SCSI ID 0 is typically assigned to the boot disk and should also not be used unless the tape drive is on a dedicated SCSI bus.

Caution Static electricity can damage electronic components. Always wear an antistatic wriststrap if possible. If not, to equalize the electromagnetic charges, touch a bare metal part of the server (such as the back plate) before you remove the tape drive from its bag.

- 1 Determine whether you need to change the SCSI ID from the default of 3.

For many operating systems you can install HP Library & Tape Tools from the HP StorageWorks Tape CD-ROM and run the "Install Check" to check your server's current SCSI configuration (see page 35). This will provide information about the SCSI bus and the SCSI IDs in use.

The UNIX Configuration Guide on the HP StorageWorks Tape CD-ROM also contains instructions on how to determine the SCSI IDs of existing devices on UNIX servers.

- 2 Change the tape drive's SCSI ID, if necessary.

The SCSI ID is set using jumpers on a set of pins at the rear of the drive, as shown in figure 3. Use tweezers or small pliers to move the jumpers to the pattern corresponding to the ID you want. Do not remove the TP jumper. It should always be set.

Spare jumpers will be attached to the drive.

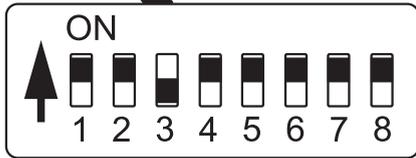
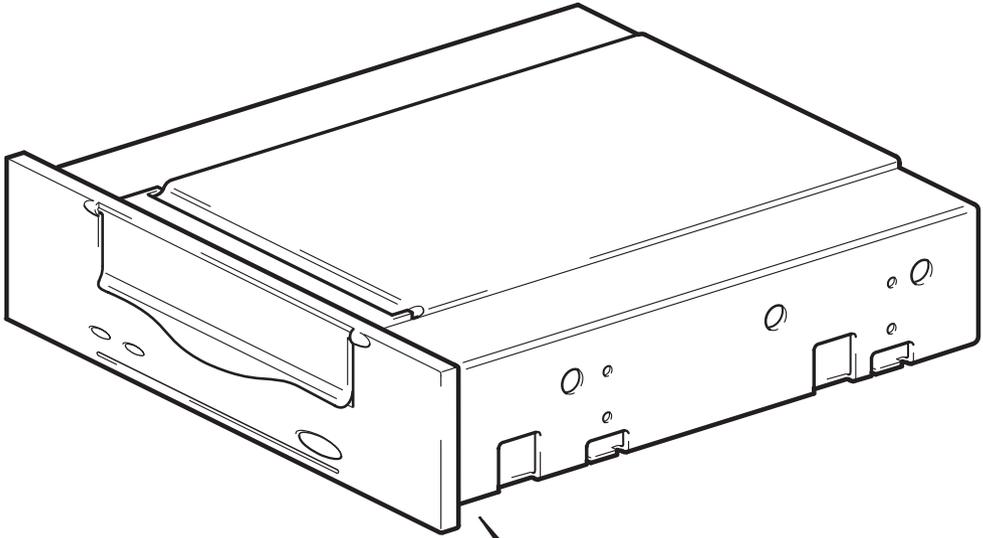


Figure 4: setting the UNIX configuration switches

Step 2: Set the configuration switches (UNIX systems)

Only read this section if you are installing your tape drive into a UNIX system. Go to “Step 3: Prepare the mounting bay” on page 15 if you are installing your drive into a Windows PC system.

- 1 Check the *UNIX Configuration Guide* on the HP StorageWorks Tape CD-ROM for specific advice for your operating system.

The following table summarizes the *typical* switch settings for different types of server.

System Type	Switch Number							
	1	2	3	4	5	6	7	8
Default and most PC systems	On	On	Off	On	On	On	On	On
HP Tru64 v.5.0 systems	On	On	Off	On	On	On	On	On
HP Tru64 v.4.0 systems	On	On	Off	On	On	On	On	Off
HP OpenVMS systems	On	On	Off	On	On	On	On	On
HP-UX systems	On	On	Off	On	On	On	On	On
IBM AIX systems	On	On	Off	On	On	On	On	On
Linux systems	On	On	Off	On	On	On	On	On
Sun Solaris, version 2.7 and higher	On	On	Off	On	On	On	On	On
Sun Solaris, version 2.6 and lower	On	On	Off	Off	On	On	Off	Off

- 2 If your UNIX configuration requires it, change the configuration switches located on the underside of the tape drive from the default settings shown in figure 4.

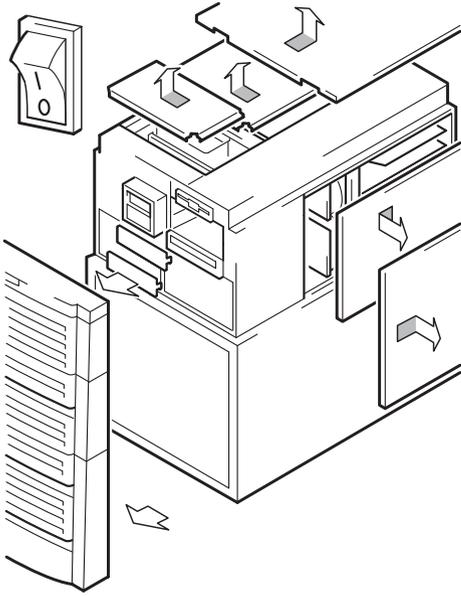


Figure 5a: preparing mounting bay in a typical HP AlphaServer

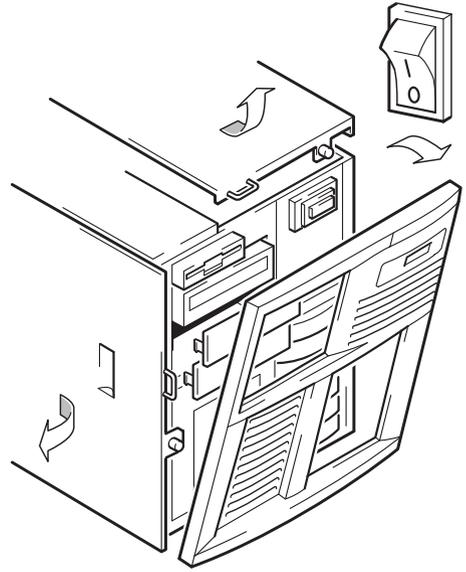


Figure 5b: preparing mounting bay in a typical HP ProLiant server



Figure 5c: preparing mounting bay in a typical IBM server

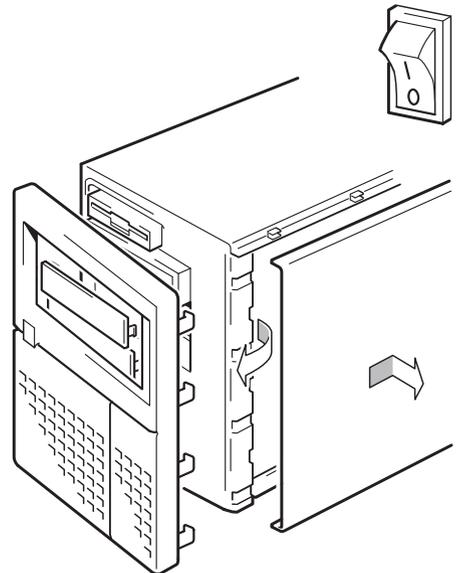


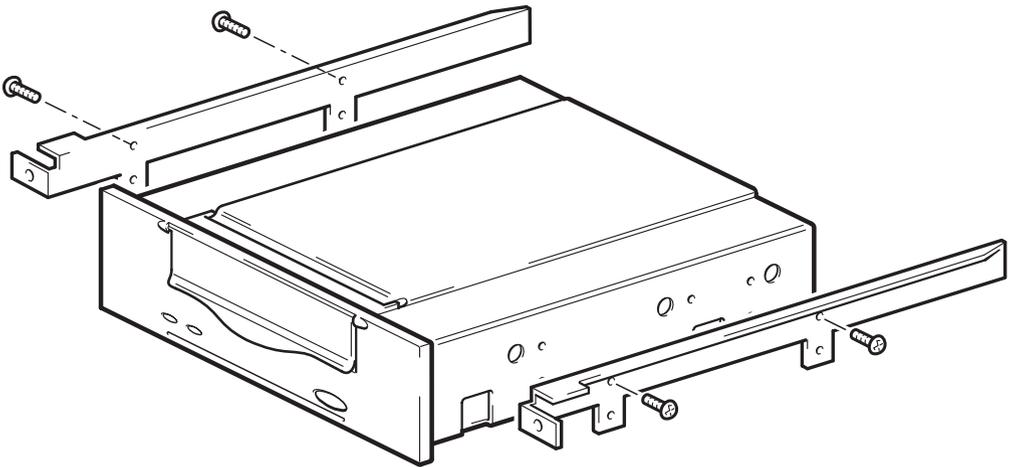
Figure 5d: preparing mounting bay in a typical Dell server

Step 3: Prepare the mounting bay

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 Assemble the necessary tools and materials:
 - Phillips screwdriverFlat-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 the SCSI cable or power cable 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. Keep any screws for use in "Step 7: Secure the drive" on page 23.



The diagram illustrates metal rails for use with a legacy HP ProLiant server. Other servers have different mounting hardware requirements. Please refer to your server documentation.

Omit this step if your server does not require mounting hardware.

Figure 6: HP ProLiant, attaching mounting rails

Step 4: Attach mounting hardware

If your server requires special rails or other hardware to install the tape drive, mount them on the tape drive in this step.

If your server does not require special mounting hardware, proceed to "Step 5: Attach power extension cable and install drive" on page 19 now.

HP ProLiant servers

Different models of server require different mounting methods.

- Some HP ProLiant servers require mounting rails. These may be metal or plastic rails attached to the server's drive bay filler panel. Metal rails and screw kits suitable for some legacy ProLiant server models may be shipped with your tape drive but these are being phased out. The rails are attached to the tape drive with M3 screws.
- Other HP ProLiant server models only require the use of special locating screws with no mounting rail, and the server may incorporate a locking mechanism to hold the tape drive in place. See "Step 7: Secure the drive" on page 23.

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.

1 Attach the appropriate mounting hardware.

- Attach metal rails to the tape drive, as shown in figure 6. Note that the screws locate through the upper of each pair of holes on the rails. Ensure that you use the M3 screws provided. Using longer screws may cause damage.
- Where plastic rails are provided with the server, attach these rails to the tape drive using the M3 screws supplied with the plastic rails. Ensure you do use M3 screws - 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.

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

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.

power cable
extension

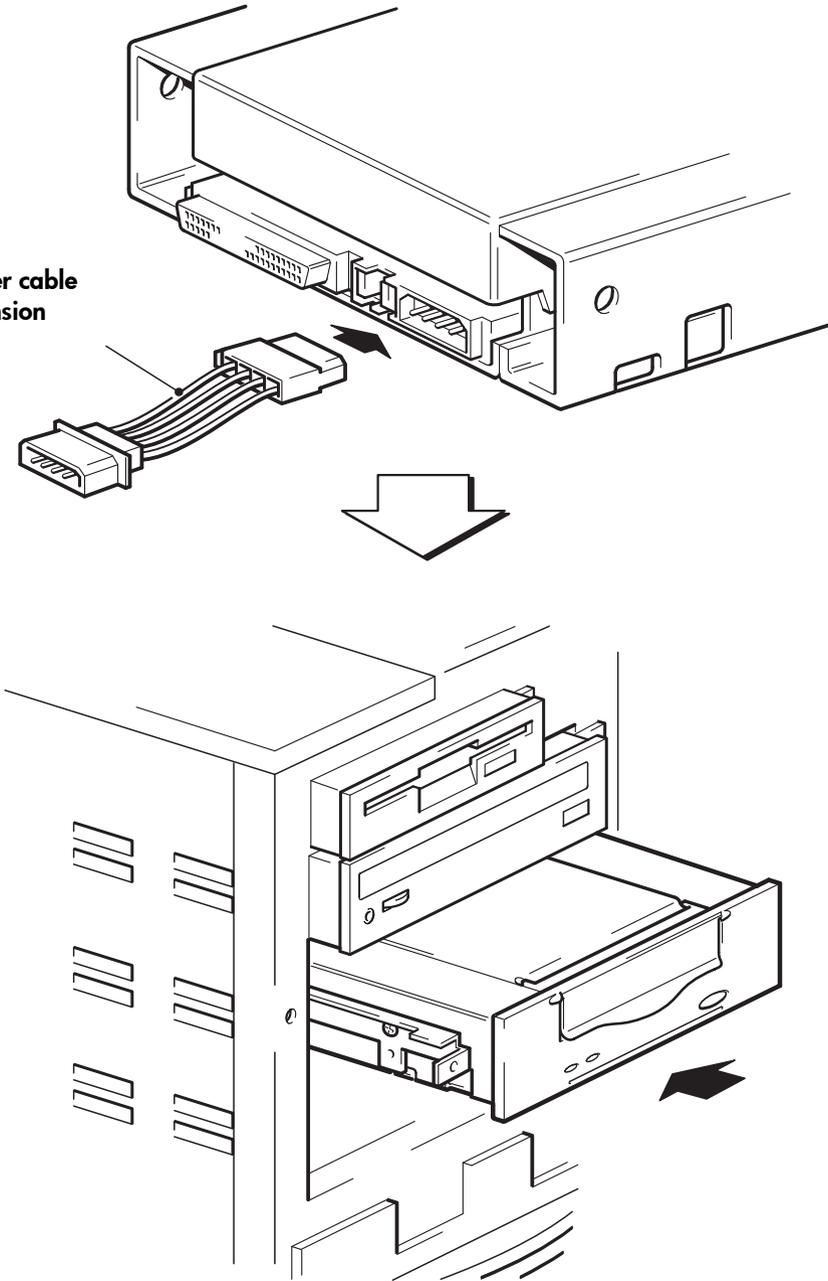


Figure 7: installing the drive

Step 5: Attach power extension cable and install drive

- 1 Attach the power cable extension to the power connector on the rear of the tape drive, as shown in figure 7.
- 2 Slide the tape drive into the open bay, aligning the tray or rails with the slots in the bay, as shown in figure 7.

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.

Note Install a SCSI host adapter in the selected server or workstation now, if necessary. For information on SCSI host requirements, see page 3.

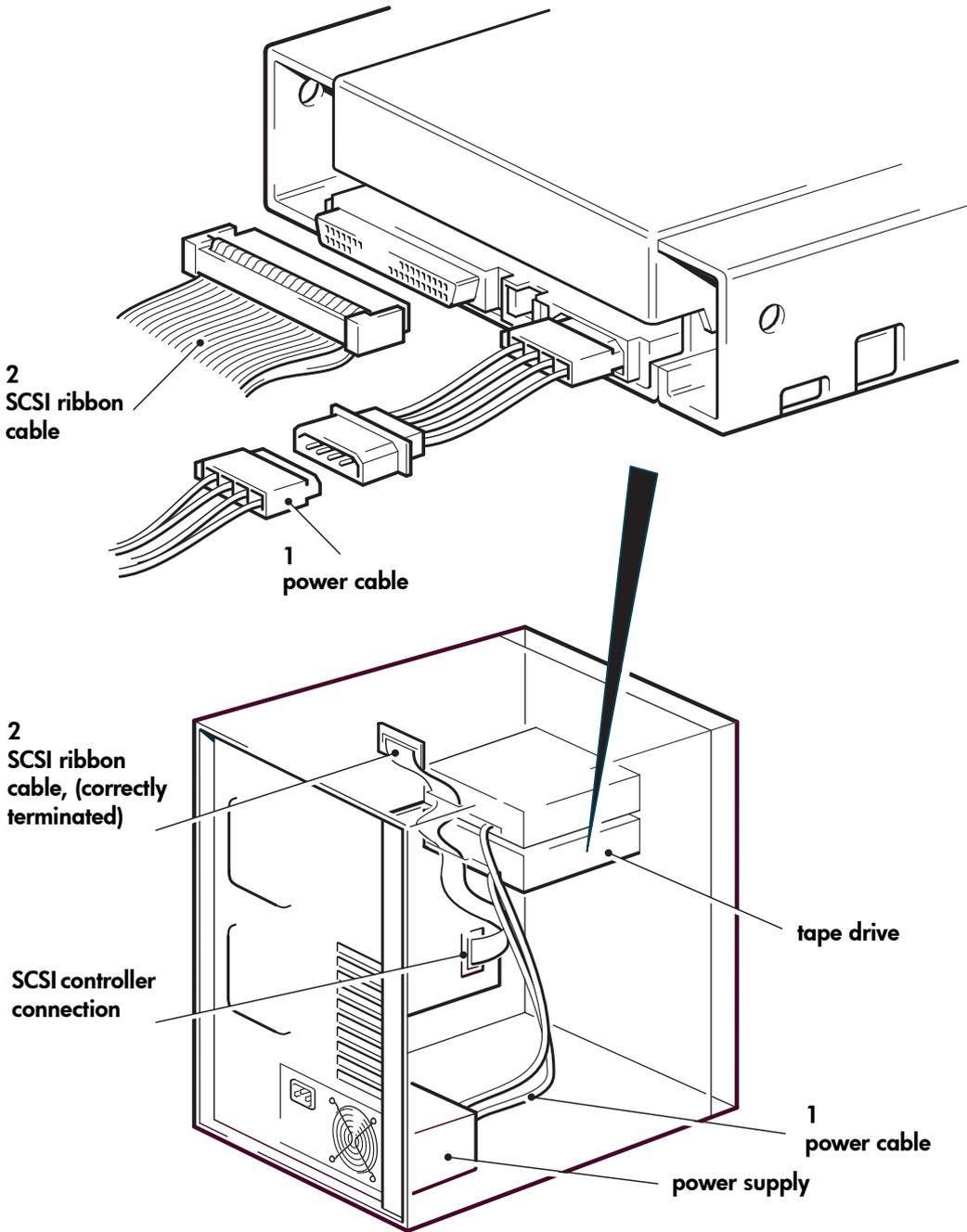


Figure 8: attaching power and SCSI cables

Step 6: Attach power and SCSI cables

- 1 Attach a spare power cable from the server's internal power supply to the power connector, as shown in figure 8, item 1.
- 2 Attach a spare connector on the server's built-in SCSI bus or HBA's SCSI ribbon cable to the SCSI connector of the drive, as shown in figure 8, item 2.
- 3 If the drive is the last device on the SCSI chain, make sure that the SCSI cable is terminated correctly.

Where should the SCSI terminator be?

Termination must be present at two and **ONLY** two positions on the SCSI bus—at the beginning of the SCSI bus and at the end of the SCSI bus. Termination is normally enabled by default on the HBA and most internal SCSI cables have a terminator attached. This will usually be a small, rectangular block of plastic attached to the cable end and marked 'SCSI Terminator'.

Therefore, assuming the HBA is the first device on the bus, you should check that the second terminator is placed after the last device, as shown in figure 8, item 2.

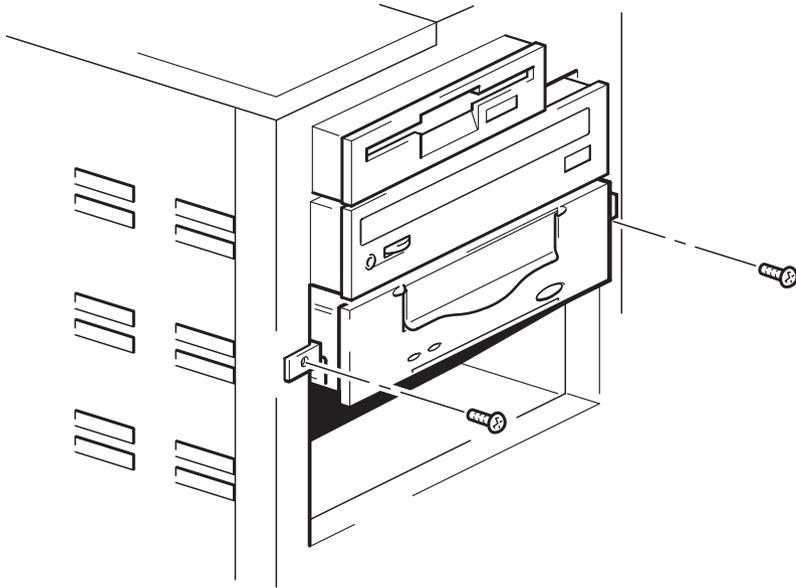


Figure 9a: securing drive to mounting hardware

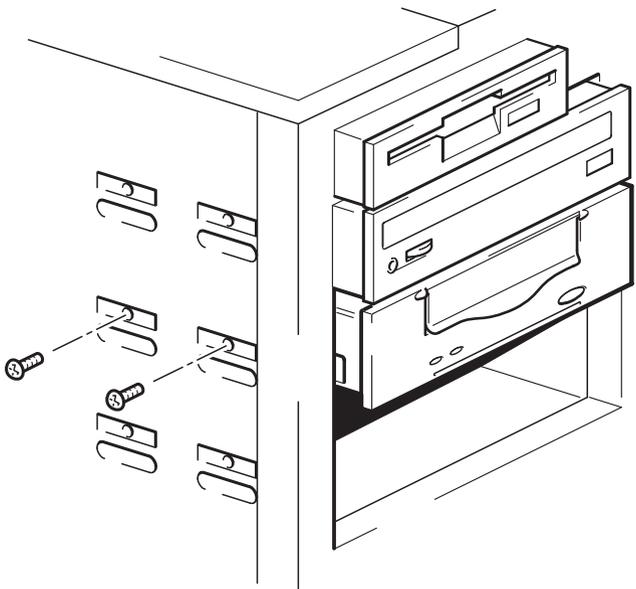


Figure 9b: securing drive, no mounting hardware

Step 7: Secure the drive

Mounting hardware used

- 1 Secure the tape drive into place. Use the screws you removed in “Step 3: Prepare the mounting bay” on page 15 to fix the drive in place, as shown in figure 9a.
- 2 Replace the cover on the server.

No mounting hardware used

- 1 Secure the tape drive into place. Check that the holes in the chassis are aligned with the holes in the sides of the tape drive and use the screws provided with the rail kit to secure the drive, as shown in figure 9b.

HP ProLiant servers: Ensure that you use M3 mounting screws. Some HP ProLiant server models will provide special M3 mounting or locating screws and these should be used. The server may incorporate a locking mechanism used in conjunction with the locating screws to hold the tape drive in place.

Other servers: Ensure that you use M3 mounting screws.

- 2 Replace the cover on the server.

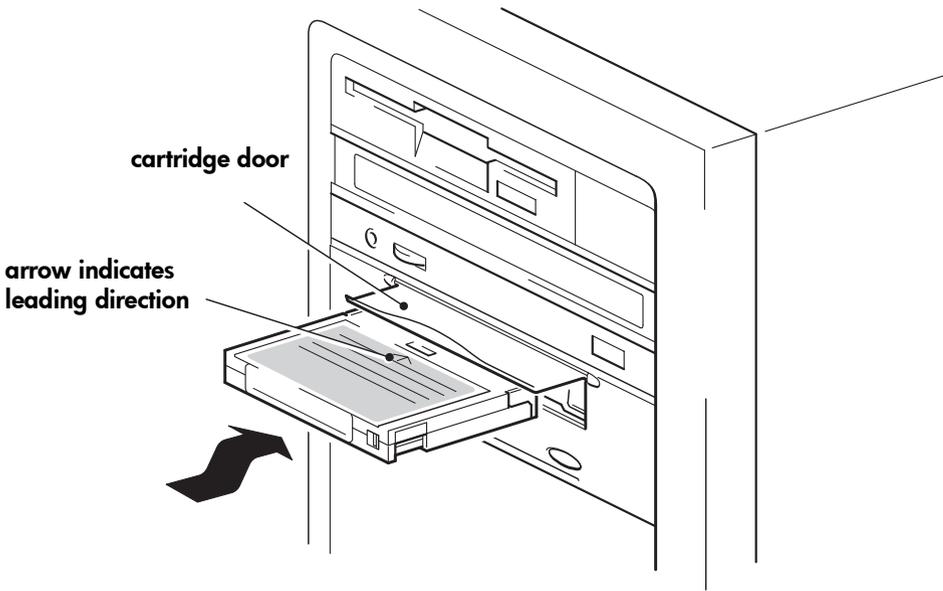


Figure 10a: loading a cartridge

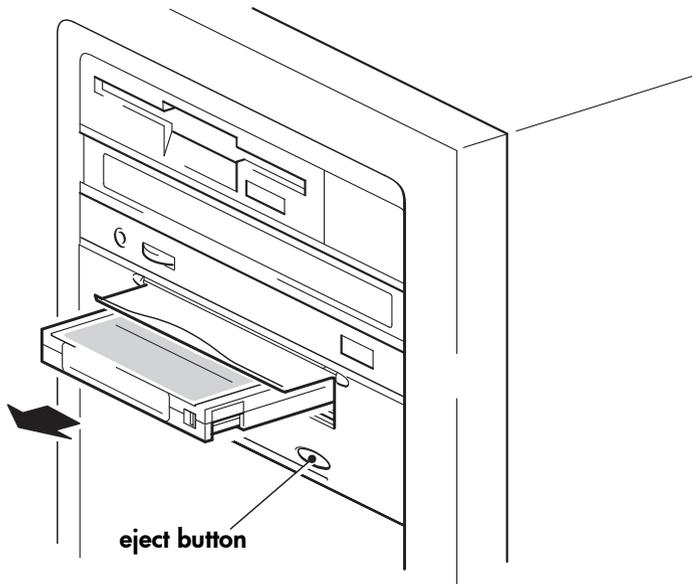


Figure 10b: unloading a cartridge

Step 8: Verify installation

Once you have installed the drive hardware, verify that the tape drive is functioning properly before you store your valuable data.

Check operation

Ensure that you have downloaded any drivers and upgrades necessary for your backup application (see page 5).

- 1 Switch on the drive and the server. 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 “Your HP StorageWorks DAT tape drive” on page 27 for more information about front panel lights.
- 2 Verify that the tape drive installation was successful.
For many operating systems you can use HP Library & Tape Tools as described on page 35. The UNIX Configuration Guide on the HP StorageWorks Tape CD-ROM also includes a verification procedure.

Note If you encounter a problem during this verification procedure, turn to “Troubleshooting” on page 37 for help in diagnosing and fixing the problem.

- 3 You are now ready to carry out a backup and restore test to check that the drive can write data to tape. Use the blank cartridge supplied with the tape drive.

To load a cartridge

- 1 Lift the cartridge door on the front of the tape drive and insert the cartridge into the slot in front of the drive with the white arrow uppermost and facing the drive door. Apply gentle pressure until the drive takes the cartridge and loads it. (See figure 10a.)
- 2 The Tape light flashes green while the drive performs its load sequence. When the cartridge is loaded, the Tape light shows steady green.

To perform a backup and restore test

Refer to your backup application documentation for specific instructions.

- 1 Perform a trial backup of data to tape.
- 2 Perform a trial restore of data from tape.

To unload a cartridge

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

- 1 Press the Eject button on the front panel. (See figure 10b.)
- 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.

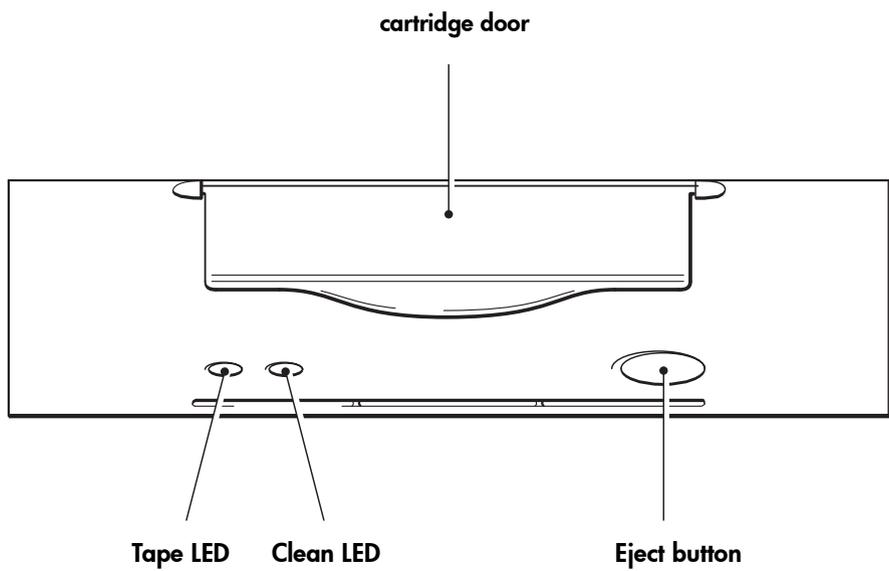


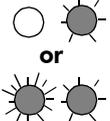
Figure 11: tape drive controls and indicators

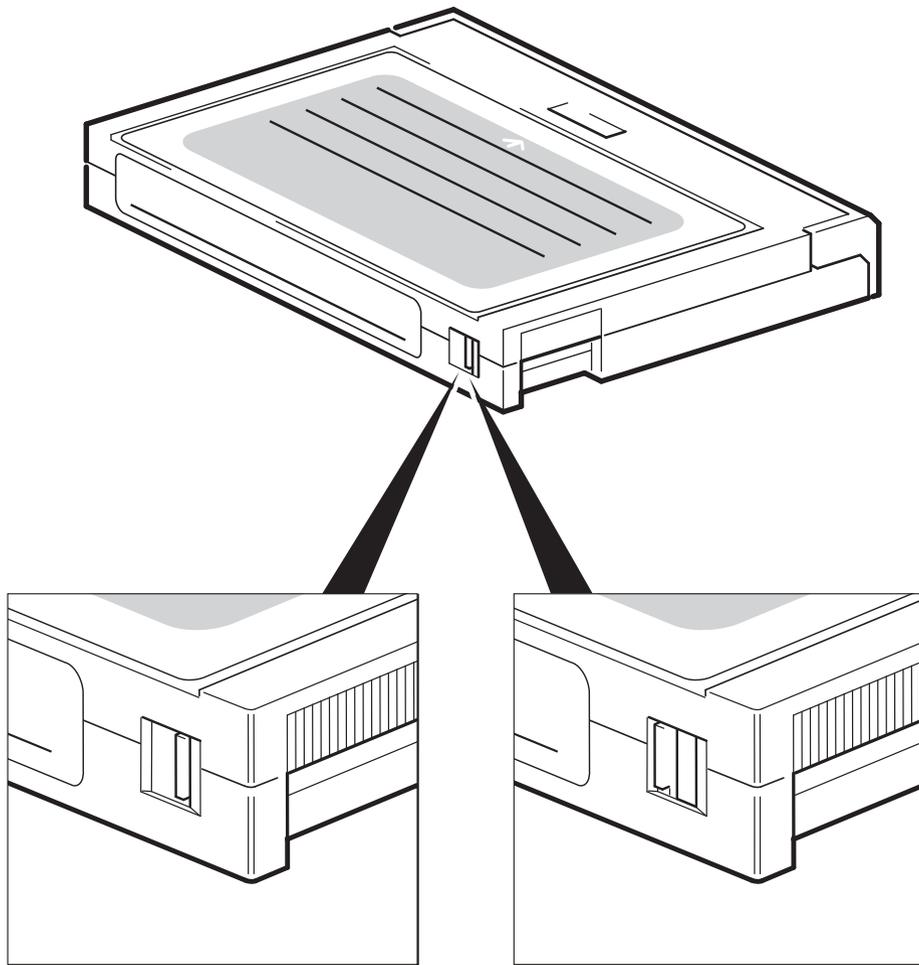
Your HP StorageWorks DAT tape drive

There are two LEDs and an eject cartridge button on the front panel of your tape drive. See page 25 for more information about loading and unloading cartridges and page 41 for information about forcing ejection.

Front panel LEDs

There are two LEDs, labeled Tape and Clean. (See figure 11.)

	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	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. (See page 35.)
	off or flashing rapidly	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 34).



**tab closed, cartridge
write-enabled**

**tab open, cartridge
write-protected**

Figure 12: write-protecting cartridges

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 DDS-4 cartridges with DAT 40 tape drives and HP's DAT 72 cartridges with DAT 72 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 the following table. Shaded boxes show the recommended media for each tape drive.

	DDS-1 90 meter	DDS-2 120 meter	DDS-3 125 meter	DDS-4 150 meter	DAT 72 170 meter
HP StorageWorks DAT 40	read only	read/write	read/write	40 GB* (C5718A)	not supported
HP StorageWorks DAT 72	not supported	not supported	read/write	read/write	72 GB* C8010A

* Capacity assumes 2:1 compression.

table 2: data cartridge compatibility

Write-protecting cartridges

If you want to protect the data on a cartridge from being altered or overwritten, you can write-protect the cartridge. (See figure 12.)

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 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 29.
- 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.

Register 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 we can meet your needs.

Note HP and its subsidiaries are committed to respecting and protecting your privacy. For further information, please visit our World Wide Web site (www.hp.com) and click on Privacy Statement.

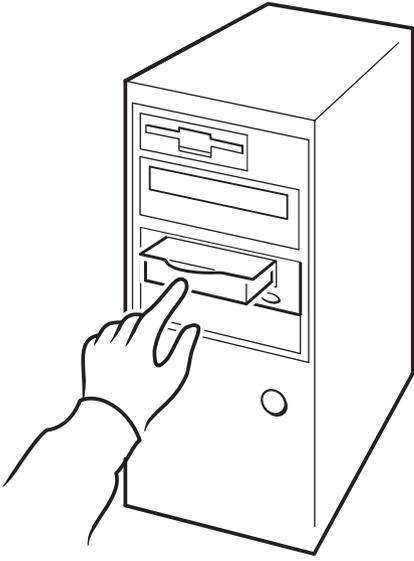


Figure 13a: hp obdr, step 1



Figure 13b: hp obdr, step 2

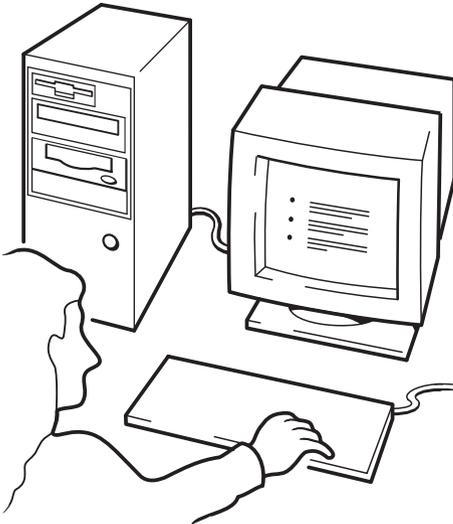


Figure 13c: hp obdr, step 3

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.

Note HP OBDR is not applicable to HP-UX and other non-Intel UNIX operating systems, and it is not compatible with Intel-based Solaris systems. HP OBDR is supported on a server with a RAID controller if the tape drive is connected directly to a host bus adapter (HBA).

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 (see figure 13a). The cartridge must be written by a backup application that writes data to tape in CD-ROM format.
- 2 Hold down the eject button on the tape drive. Keeping the eject button pressed down, power on your server (see figure 13b). 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.

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. (See figure 13c.) 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.

Diagnostic tools

HP Library & Tape Tools

HP Library & Tape Tools does not work on all operating systems. Compatibility information, updates, and the latest version of this software can be found at www.hp.com/support.

HP Library & Tape Tools software provides free diagnostic and troubleshooting utilities. It allows you to:

- Quickly identify, diagnose and troubleshoot drive and media problems.
- Verify that the drive is installed correctly and check drive health.
- Upgrade to the latest drive firmware (you will need internet connection to do this)

You can also install HP Library & Tape Tools from the link on the HP StorageWorks Tape CD-ROM.

Note You may notice the internal identifier for the tape drive when you use HP Library & Tape Tools. This is also the name that appears on the bootup screen for Windows users and is used to identify the tape drive when configuring UNIX device files.

Drive model	Internal Identifier
HP StorageWorks DAT 40	HP C5683A
HP StorageWorks DAT 72	HP C7438A

Performance Assessment Tool

Use our free Performance Assessment Toolkit, PAT, to check tape performance and test the speed at which your disk sub-system can supply data.

PAT does not work on all operating systems. Compatibility information, updates and the latest version of this software can be found at www.hp.com/support/pat.

Optimizing performance

Various factors can affect tape drive performance, particularly in a network environment or if the drive is not on a dedicated SCSI 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 suitably-rated built-in SCSI bus or HBA, see “Why is the SCSI bus type important?” on page 3. Suitably-rated means an Ultra Wide or higher SCSI specification.
- Is the tape drive on a dedicated SCSI bus? For optimum performance, we recommend that the tape drive is the only device on the SCSI bus. If it is not, ensure other devices are the same SCSI specification as your tape drive model. If they are single-ended, the bus will switch to single-ended mode with a lower transfer speed.
- Do not put tape drives and hard disks on the same SCSI bus.
- Is the SCSI bus terminated correctly. The last device on the SCSI bus must be terminated.
- Have you installed the correct device drivers for your operating system and backup application? See “Backup software and drivers” on page 5.
- 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.

Troubleshooting

The first step in problem-solving is establishing whether the problem lies with the cartridge, the drive, the host server and its connections, or with the way the system is being operated.

Most modern SCSI host bus adapters locate and display attached devices when the system is booting up. On Windows systems, if you swap or connect a product when your system is running, you will need to reboot the system. IA32 systems also usually need to be rebooted. UNIX systems may have pluggable drivers, which allow drives to be attached to a running system and detected without rebooting.

If the device is not detected on boot up, there is probably a problem with the physical hardware: cables, termination, connections, power or the host bus adapter itself. If the device is displayed during boot up but cannot be found in the operating system, this is more likely to be a software problem.

- If you encounter a problem during installation and need further clarification, refer to “Problems encountered during installation” below.
- If a problem arises during testing after you have installed the drive, refer to the symptom-based section “Testing after installation” on page 39.
- For information about cartridges, refer to “Problems with cartridges” on page 41.
- If you need to replace your drive, refer to “Replacing your tape drive” on page 44.

Many users can use HP Library & Tape Tools to help them diagnose problems.

Problems encountered during installation

Unpacking

Description	Further information
Some parts appear to be missing or damaged.	Contact your vendor if any parts need replacing.

The screws or mounting hardware are not suitable for the server

Description	Further information
Additional parts may be required for fitting the tape drive into the server.	The HP StorageWorks DAT internal tape drive will fit into most servers without the need for additional hardware other than that originally shipped with your system. If additional parts are required, or the original parts have been lost, contact your server vendor. Mounting hardware is provided with your tape drive for mounting in HP ProLiant servers. See “Step 4: Attach mounting hardware” on page 17.

It is unclear which SCSI ID to use

Description	Further information
It is uncertain which ID numbers are available.	Use HP Library & Tape Tools (see page 35) to provide information on your current SCSI settings. The HP StorageWorks DAT drive has its SCSI ID set to 3 by default. This should be left unchanged unless this number is already in use. Full instructions on how to change the SCSI ID are given on page 11.

How should the SCSI bus be configured?

Description	Further information
Correct configuration of the SCSI bus with multiple drives can be a complex area and more help may be required.	Refer to the SCSI Configuration section in the online HP StorageWorks User's Guide on the HP StorageWorks Tape CD-ROM.

How should the SCSI bus be terminated?

Description	Further information
It is unclear if the bus is already terminated or where an additional terminator should be placed.	Refer to the SCSI Configuration section in the online HP StorageWorks User's Guide on the HP StorageWorks Tape CD-ROM. Typically, when connecting an internal drive to the ribbon cable already inside your server then both the host bus adapter and the end of the ribbon cable will already be terminated and no further action is required.

Is the correct SCSI host bus adapter installed?

Description	Further information
The server already has a SCSI host bus adapter but it is difficult to determine what type it is.	If your server is in its original configuration (no SCSI adapters have been added or removed) then use www.hp.com/go/connect to check the compatibility of your system.
The server may not have a SCSI host bus adapter installed.	Use HP Library & Tape Tools (see page 35) to check whether you have a SCSI host adapter on your system. If not, you will need to purchase one. Refer to the www.hp.com/go/connect web site.

Do drivers need to be installed and, if so, which ones

Description	Further information
It is unclear whether there is a need to install drivers onto the system, and more help is required.	Detailed information specific to your system can be found on the www.hp.com/go/connect web site. Windows drivers can be obtained from the HP StorageWorks Tape CD-ROM or from www.hp.com/support . For support on UNIX systems, see the UNIX Configuration Guide on the HP StorageWorks Tape CD-ROM. (Backup software that states support for HP StorageWorks DAT tape drives also provides the required drivers.)
The required drivers do not appear to be available.	Future drivers will be provided via the support web site when they become available.

Testing after installation

Remember that the system recognizes devices during boot-up. If you swap or connect a product when your system is running, you will need to reboot the system. Rebooting the system will reset devices and will often resolve problems. It is good practice to reboot every time you add a driver or install firmware.

Caution Never power off the drive during a firmware upgrade.

The server does not reboot after installation

Possible reason	Recommended action
You have connected the tape drive to an existing SCSI bus that has other devices connected to it and the SCSI address of your HP StorageWorks DAT drive is probably identical to the address used by another device.	Make sure that each device on the SCSI bus has a unique ID. We recommend that the HP StorageWorks DAT tape drive is connected to a dedicated host bus adapter. Do not connect the drive to a disk RAID controller.
You have installed an additional SCSI host bus adapter and its resources are clashing with an existing adapter.	Remove the new host bus adapter and check the server documentation.
You have disconnected the power or SCSI cable from the server's boot disk during the drive installation process.	Check that the cables to all devices are firmly connected.

The server boots but does not recognize the tape drive

Possible reason	Recommended action
The power or SCSI cable is not connected properly.	Check that the cables to the tape drive are firmly connected. Ensure that the SCSI cable does not have any bent pins. Replace, if necessary.
The SCSI bus is not terminated correctly.	Check that the SCSI bus is actively terminated. (Refer also to the documentation for your SCSI controller and any other SCSI devices you may have.)
The tape drive's SCSI ID address is not unique.	Make sure that each device connected to the SCSI controller has a unique SCSI ID. Remember that 7 is normally reserved for the host bus adapter. (Users of most operating systems can run HP Library & Tape Tools to check the SCSI IDs of each device attached to the SCSI bus, see page 35.)

The application does not recognize the tape drive

Possible reason	Recommended action
The application does not support the tape drive.	Use HP Library & Tape Tools to check that the drive is installed properly. Refer to our World Wide Web site (www.hp.com/go/connect) for details of backup applications that support the HP StorageWorks DAT tape drive. Load any service packs as necessary.
Some applications require drivers to be loaded.	Check that the correct SCSI and tape drive drivers are installed. Consult the backup application's installation notes for details.

The drive does not work

Possible reason	Recommended action
If the drive does not power up, the power cable may not be connected to the drive properly.	Check the power cable connection and try another cable if necessary. If the drive still does not power up, call for service.
If the self-test fails, there may be a hardware or firmware failure.	If there is a cartridge in the drive, remove it. Power down the drive and power it up again. If the self-test still fails, call for service.
There is a hard error on the drive.	The Media Caution (Clean) LED shows steady amber. Try powering the system off and then on again. If the error condition signal still shows, call for service.

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 practise 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 29.
- 3 Make sure that you have loaded the cartridge with the correct orientation (see "To load a cartridge" on page 25).

- 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 and that it can be seen on the SCSI bus. Use HP Library & Tape Tools, see page 35.

Other sources of information

You will also find troubleshooting information and contact details on the HP StorageWorks Tape CD-ROM and the HP web site. In particular:

- The online *User's Guide* on the HP StorageWorks Tape CD-ROM contains an extensive troubleshooting topic.
- The HP support web site contains a link to www.hp.com/support/dat that takes you to HP's Customer Care web site for a wide range of up-to-date information about your product.
- The HP web site at www.hp.com/go/connect provides details of recommended products and configurations.
- The HP web site at www.hp.com/go/obdr provides detailed information about HP One-Button Disaster Recovery.

How to contact HP

You can also use the HP Customer Call Centers for specialist technical help. Contact details can be found at www.hp.com. Click on the link to "contact HP".

To make the best use of this service, we ask that you work with our Support Specialists to resolve any issues with your drive. This may include downloading diagnostic software, that will assist in the rapid resolution of your problems.

Replacing your 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 any other devices that are on the same SCSI bus.
- 3 Remove the cover from the server, see page 15.
- 4 Observing normal anti-static precautions (see page 15) remove any screws that are holding the tape drive in place.
- 5 Disconnect the drive from the server's power and SCSI 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.

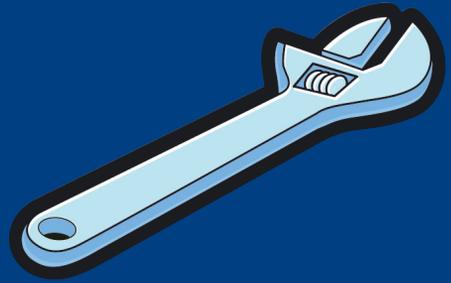
To reconnect your tape drive

Follow the step-by-step instructions in this Getting Started guide.



i n v e n t

<http://www.hp.com/go/storagemedia>



<http://www.hp.com/support/dat>



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