



dlt1 tape drive user's guide

data protection

→ [contact hp](#)

[home page](#)

→ [before you start](#)

→ [operation](#)

→ [cartridge care](#)

→ [cleaning](#)

→ [specifications](#)

→ [media compatibility](#)

→ [diagnostics](#)

→ [troubleshooting](#)

→ [FAQs](#)

→ [SCSI configuration](#)

→ [UNIX configuration](#)

→ [ordering supplies](#)

[install](#)

[operate](#)



[cartridges](#)

[troubleshoot](#)

This is the User's Guide for HP Surestore DLT1 internal and external tape drives. It describes how to use HP Surestore DLT1 drives.

To start, click on one of the above topics or select a topic from the navigation pane on the left. For example, click on **specifications** for a detailed description of the HP Surestore DLT1 internal and external drives.

Use the **index of topics** page to search for a particular topic.

Use the **contact hp** page to find out contact details for your nearest Customer Care Center.

notice

The information contained in this document is subject to change without notice.

Hewlett-Packard makes no warranty of any kind with regard to the material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Hewlett-Packard shall not be liable for errors contained herein or direct, indirect, special, incidental or consequential damages in connection with the furnishing, performance, or use of this document.

This document contains propriety information which is protected by copyright. All rights reserved. No part of this document may be photocopied, reproduced or translated to another language without the prior written consent of Hewlett-Packard.

copyright

Copyright 2000 Hewlett-Packard. All rights reserved.

Windows and Windows NT are U.S. registered trademarks of Microsoft Corp.

UNIX is a registered trademark of X/Open Company in the U.S. and other countries.

Adobe and Acrobat are trademarks of Adobe Systems Incorporated.

revision history

| Edition | Date | Comments |
|---------|--------------|----------|
| 1.0 | October 2000 | |



data protection

contact hp

- [americas](#)
- [europe](#)
- [asia pacific](#)

- [warranty](#)
- [customer service form](#)

how to contact hp

obtaining technical support

contents of this section

- [before calling for service or support](#)
- [obtaining service](#)
- [contacting hp](#)
- [hp service agreements](#)
- [returning your tape drive for service](#)
- [worldwide online services](#)

before calling for service or support

If you need help, your dealer has the latest information regarding HP products and services and can provide support under HP's comprehensive menu of reseller services. If your dealer is not able to help, you can obtain support from HP directly either through online services or by telephone.

Before calling for service or support, check that:

- Check that your HP Surestore Tape Drive is installed correctly
- Check the printed Getting Started Guide and the troubleshooting advice in this online User's Guide

obtaining service

Please use the [Customer Service Form](#) to collect the details that our Customer Service Representative will need to help solve your problem.

During the warranty period: HP provides a free telephone support service during the warranty period. Contact your local HP dealer or the appropriate HP technical support contact for your area, by selecting the region required from the navigational buttons in the left hand pane. Obtain the telephone number from the list of countries supplied. You will be connected to a responsive team waiting to help you.

After the warranty period: If you require support after your warranty has expired, you can receive support for a fee through the same telephone numbers. The fee is charged on a per incident basis. Alternatively, you can contact your local HP dealer who will be able to advise you and arrange for service.

contacting hp

A full listing of HP's service and support centres worldwide can be found at http://www.hp.com/cposupport/mail_support.html

If you do not have internet access, click on the appropriate region from the side navigation bars for a list of contact numbers correct at time of printing.

hp service agreements

HP offers a number of service agreements to meet your needs. Contact your local dealer or nearest HP office for further information.

returning your tape drive for service

Your HP Surestore tape drive comes with a 24-hour Express Exchange warranty (not available in all countries).

Before returning an HP Surestore tape drive, call the Customer Support Center for your area. When you call, make sure that you have the following information available:

- The product name and serial number (see label on the back of the appliance server)
- Date of purchase
- A description of the product fault
- A contact name for details of the failure
- A contact telephone number
- Your shipping address

The telephone service agent will verify that the unit is faulty and will make sure that a replacement unit is sent to you within 24 hours. When you receive the replacement unit, remove it from the packaging and use the packaging material for returning the faulty unit. All shipment costs are prepaid by HP.

When returning the drive to HP, any damage caused as a result of inadequate packaging is your responsibility. Use the original packing materials whenever possible.

worldwide online services

HP offers electronic services that give you a fast, interactive way to access information and help on setup, configuration, installation and operation of your product. The online services are available on the World Wide Web and FTP, as well as the country-specific resources listed later in this section.

World Wide Web

Product and support information are available from HP's web site on the Internet at <http://www.hp.com/go/tape>

FTP

Product and support information are available from our FTP site on the Internet at ftp.hp.com/pub/information_storage/surestore

America Online

Download support documents and discuss issues in user forums. Find us with keyword `hpstor`.



how to contact hp

data protection

→ [contact hp](#)

americas

→ [europe](#)

→ [asia pacific](#)

→ [warranty](#)

→ [customer service form](#)

north and south america

contents of this section

- [check the web for up to date contact information](#)
- [hp support in north america](#)
 - [canada](#)
 - [united states](#)
- [hp support in south america](#)
 - [argentina](#)
 - [brazil](#)
 - [colombia](#)
 - [guatemala](#)
 - [chile](#)
 - [mexico](#)
 - [puerto rico](#)
 - [venezuela](#)

check the web for up to date information

If you have internet access, click on the URL below:

http://www.hp.com/cposupport/mail_support.html

From time to time, telephone numbers and addresses may change; accessing contact details over the web will ensure you have the latest information.

If you do not have internet access, refer below for a list of contact numbers correct at time of printing:

hp support in north america

Customers in North America can contact HP on the telephone support lines listed, by country, below.

Major Account Customers in the Enterprise Market

Tape drives shipped to major North American account customers carry one of the following product numbers (as stated on the label on the base of your drive):

| products for major account customers | |
|--------------------------------------|----------------|
| tape drive | product number |
| ultrium 230, internal | C7400A |
| ultrium 230, external | C7401A |
| ultrium 230, rack mounted | C7470A |

If your drive carries one of these product numbers, you should contact the US Response Center on:

800-633-3600

canada

Telephone 905-206-4663 905-206-4663

Hours of operation: 8:00 a.m. to 8:00 p.m.

Monday through Friday

Horaires de disponibilité :

Lundi - Vendredi, 8 h 00 - 20 h 00

united states

Telephone (970) 635-1500

Hours of operation: 6:00 a.m. to 6:00 p.m. MST

Monday through Friday

hp support in south america

Customers in South America can contact HP on the telephone support lines listed, by country, below.

Major Account Customers

Where a second number is listed under the sub-heading "Major Account Customers", this number should be used by major account customers where the product number (as stated on the label on the base of your drive) is as follows:

| products for major account customers | |
|--------------------------------------|----------------|
| tape drive | product number |
| ultrium 230, internal | C7400A |
| ultrium 230, external | C7401A |
| ultrium 230, rack mounted | C7470A |

argentina

Telephone 0810 555 5520 (from within Argentina) (5411) 4778 8380 (outside Argentina) 0810 555 5520 (5411) 4778 8380

Hours of operation: 8:30 a.m. to 7:30 p.m. Monday through Friday

Horas de atención: Lunes a Viernes de 8:30 a 19:30 h

Major Account Customers

Telephone +54 1781 4061

+54 1781 4061

brazil

Telephone Great São Paulo: (11) 3747-7799 Grande São Paulo: (11) 3747-7799

Other regions: 0800 157751

Demais regiões: 0800 157751

Hours of operation: 8:00 a.m. to 7:00 p.m. Monday through Friday

horário de funcionamento: Prévendas Televentas : 2a a 6a feira das 08 às 22h

Sábado das 09 às 18h

Pós-ventas: 2a a 6a feira das 08 às 19h

Major Account Customers

Telephone +55 11 725 1588

+55 11 725 1588

chile

Telephone 800 22 5547 800 22 5547

Hours of operation: 9:00 a.m. to 6:00 p.m. Monday through Friday

Horas de atención: Lunes a Viernes de 9:00 a 18:00 h

colombia

Telephone 9 800 91477 9 800 91477

Hours of operation: 9:00 a.m. to 6:00 p.m. Monday through Friday

Horas de atención: Lunes a Viernes de 9:00 a 18:00 h

guatemala

Telephone 800 999 5305 800 999 5305

Hours of operation: 9:00 a.m. to 6:00 p.m. Monday through Friday

Horas de atención: Lunes a Viernes de 9:00 a 18:00 h

Saturdays from 9:00 a.m. to 1:00 p.m.

mexico

Mexico City Telephone 52-58-9922 52-58-9922

Hours of operation: 8:30 a.m. to 22:00 p.m. Monday through Friday

Horas de atención: Lunes a Viernes de 8:30 a 22:00 h

9:00 a.m. to 14:00 p.m. on Saturday

Outside Mexico City

Telephone 01-800-472 6684 01-800-472 6684

Hours of operation: 8:30 a.m. to 22:00 p.m. Monday through Friday

Horas de atención: Lunes a Viernes de 8:30 a 22:00 h

9:00 a.m. to 14:00 p.m. on Saturday

Major Account Customers

Telephone +52 5258 4500

+52 5258 4500

puerto rico

Telephone 1 877 2320 589 1 877 2320 589

Hours of operation: 9:00 a.m. to 5:00 p.m. Monday through Friday

Horas de atención: Lunes a Viernes de 9:00 a 17:00 h

venezuela

Telephone 800 47 777 (Caracas 207 8488) 800 47 777 (Caracas 207 8488)

Hours of operation: 8:00 a.m. to 5:00 p.m. Monday through Friday

Horas de atención: Lunes a Viernes de 8:00 a 19:00 h

+58 2 239 2423

Major Account Customers

Telephone +58 2 239 2423



how to contact hp

europa, medio oriente e africa

contenuto di questa sezione

- [check the web for up to date contact information](#)
 - [hp support in europe, middle east & africa](#)
 - [austria](#)
 - [belgium \(dutch\)](#)
 - [belgium \(french\)](#)
 - [czech republic](#)
 - [denmark](#)
 - [finland](#)
 - [france](#)
 - [germany](#)
 - [greece](#)
 - [hungary](#)
 - [ireland](#)
 - [israel](#)
 - [italy](#)
 - [netherlands](#)
 - [norway](#)
 - [poland](#)
 - [portugal](#)
 - [russian federation \(moscow\)](#)
 - [russian federation \(st petersburg\)](#)
 - [russian federation \(ukraine\)](#)
 - [south africa \(inside RSA\)](#)
 - [south africa \(outside RSA\)](#)
 - [spain](#)
 - [sweden](#)
 - [switzerland](#)
 - [turkey](#)
 - [united arab emirates](#)
 - [united kingdom](#)
- [other european countries - english](#)

check the web for up to date information

If you have internet access, click on the URL below:

http://www.hp.com/cposupport/mail_support.html

From time to time, telephone numbers and addresses may change; accessing contact details over the web will ensure you have the latest information.

If you do not have internet access, refer below for a list of contact numbers correct at time of printing:

hp support in europe, middle east & africa

There is no charge for technical support during the warranty period (unless otherwise stated). A per-incident charge applies after the warranty period.

Customers in Europe, the Middle East and Africa can contact HP on the telephone support lines listed, by country, below.

Major Account Customers

Where a second number is listed under the sub-heading "Major Account Customers", this number should be used by major account customers where the product number (as stated on the label on the base of your drive) is as follows:

| products for major account customers | |
|--------------------------------------|----------------|
| tape drive | product number |
| ultrium 230, internal | C7400A |
| ultrium 230, external | C7401A |
| ultrium 230, rack mounted | C7470A |

or major account customers in Africa and the Middle East can call +41 22 780 41 11

austria

Telephone +43 (0)810 00 6080 +43 (0)810 00 6080

Hours of operation: 8:30 to 18:00
Monday through Friday

Geschäftszeiten: Montag - Freitag, 08.30 - 18.00 Uhr

Major Account Customers
Telephone +43 (0)222 25000/250 or +43 (0)125 0000

+43 (0)222 25000/250 or +43 (0)125 0000

belgium (dutch)

Telephone +32 (0)2 626 88 06

Hours of operation: 8:00 to 18:00
Monday through Thursday

belgium (french)

Telephone +32 (0)2 626 88 07 +32 (0)2 626 88 07

Hours of operation: 8:30 to 18:00
Monday through Friday

Horaires de disponibilité: Lundi - Vendredi , 8 h 30 - 18 h 00

Major Account Customers
Telephone +32 (0)2 778 38 00

+32 (0)2 778 38 00

czech republic

Telephone +42 (0)2 6130 7310

Hours of operation: 8:00 to 18:00
Monday to Thursday,

8.00 to 16:30
Friday

Major Account Customers
Telephone +42 (0)2 61 307 751 or +42 (0)2 47 17 321

denmark

Telephone +45 39 29 4099

Hours of operation: 8:30 to 18:00
Monday through Friday

Major Account Customers
Telephone +45 99 19 19 or +45 4599 10 00

finland

Telephone +358 (0)203 47 288

Hours of operation: 8:30 to 18:00
Monday through Friday

Major Account Customers
Telephone +358 9 8872 2808 or +358 0887 21

france

Telephone +33 (0)1 43 62 34 34 +33 (0)1 43 62 34 34

Hours of operation: 8:30 to 18:00
Monday through Friday

Horaires de disponibilité: Lundi - Vendredi , 8 h 30 - 18 h 00

Major Account Customers
Telephone +33 (0)5 49 76 66 07 or +33 1698 2 6060 +33 (0)5 49 76 66 07 or +33 1698 2 6060

germany

Telephone +49 (0)180 52 58 143 +49 (0)180 52 58 143

Hours of operation: 8:30 to 18:00
Monday through Friday

Geschäftszeiten: Montag - Freitag, 08.30 - 18.00 Uhr

Major Account Customers
Telephone +49 (0)180 53 53 539 or +49 2102 441 133 +49 (0)180 53 53 539 or +49 2102 441 133

greece

Telephone +30 (0)1 619 64 11

Hours of operation: 9:00 to 17:00
Monday through Friday

Major Account Customers
Telephone +30 (0)1 68 96 503/4 or +30 1689 6411

hungary

Telephone +36 (0)1 382 1111

Hours of operation: 8:30 to 18:00
Monday through Friday

Major Account Customers
Telephone +36 (0)1 461 81 11 or +36 (0)1 252 4505

ireland

Telephone +353 (0)1 662 5525

Hours of operation: 8:30 to 18:00
Monday through Friday

Major Account Customers
Telephone +353 (0)1 284 4560

israel

Telephone +972 (0)9 952 4848

Hours of operation: 9:00 to 18:00
Sunday through Thursday

Major Account Customers
Telephone +972 (0)9 952 4848

italy

Telephone +39 (0)2 264 10350 +39 02 264 10350

Hours of operation: 8:30 to 18:00
Monday through Friday

Orario d'apertura: Lunedì-Venerdì, 8:30 - 18:00

Major Account Customers
Telephone +39 (0)2 9212 2779 or +39 (0)2 9212 2778 +39 (0)2 9212 2779 or +39 (0)2 9212 2778

netherlands

Telephone +31 (0)20 606 8751

Hours of operation: 8:30 to 18:00
Monday through Friday

Major Account Customers
Telephone +31 (0)20 547 7444 or +31 (0)20 547 9666

norway

Telephone +47 22 11 6299

Hours of operation: 8:30 to 18:00
Monday through Friday

Major Account Customers
Telephone +47 22 73 5601 or +47 22 735 600

poland

Telephone +48 22 519 06 00

Hours of operation: 8:00 to 17:00
Monday through Friday

Major Account Customers
Telephone +48 22 608 74 00 or +48 22 375 065

portugal

Telephone +351 21 317 6333 +351 21 317 6333

Hours of operation: 8:30 to 18:00
Monday through Friday

Horário de operação: Segunda - Sexta, 8:30 - 17:00

Major Account Customers
Telephone +351 482 8555 or +351 1301 7344 +39 (0)2 9212 2779 or +351 1301 7344

russian federation (moscow)

Telephone +7 095 797 3520

Hours of operation: 9:00 to 18:00
Monday through Friday

Major Account Customers
Telephone +7 095 797 3500 or +7 095 938 6885

russian federation (st petersburg)

Telephone +7 812 346 7997

Hours of operation: 9:00 to 18:00
Monday through Friday

Major Account Customers
Telephone +7 812 259 3557 or +7 095 938 6885

russian federation (ukraine)

Telephone +7 (380-44) 490-3520

Hours of operation: 9:00 to 18:00
Monday through Friday

south africa (inside RSA)

Telephone 086 000 1030

Hours of operation: 8:00 to 17:00
Monday through Friday

south africa (outside RSA)

Telephone +27-11 258 9301

Hours of operation: 8:00 to 17:00
Monday through Friday

Major Account Customers
Telephone +27 11 806 1010

spain

Telephone +34 902 321 123 +34 902 321 123

Hours of operation: 8:30 to 18:00
Monday through Friday

Horas de atención: Lunes a Viernes de 8:30 a 18:00 h

Major Account Customers
Telephone +34 902 22 00 30 or +34 1631 1600 +34 902 22 00 30 or +34 1631 1600

sweden

Telephone +46 (0) 8 619 2170

Hours of operation: 8:30 to 18:00
Monday through Friday

Major Account Customers
Telephone +46 (0)8 444 23 83 or +46 8750 2300

switzerland

Telephone +41 (0) 848 80 11 11

Hours of operation: 8:30 to 18:00
Monday through Friday

Major Account Customers
Telephone +41 (0)800 55 53 83 or +41 31 980 3111

turkey

Telephone +90 (0)212 221 69 69

Hours of operation: 8:30 to 18:00
Monday through Friday

Major Account Customers
Telephone +90 (0)212 224 59 25 or +90 (0)312 468 8770

united arab emirates

Telephone 971 4 883 8454

Hours of operation: 8:30 to 18:00
Monday through Friday

For customers in: UAE, Bahrain, Qatar, Saudi Arabia, Jordan, Palestine, Egypt, Yemen, Lebanon, Kuwait and Oman (languages supported - English and Arabic)

Major Account Customers
Telephone +44 (0)1344 366 366

united kingdom

Telephone +44 (0)207 512 52 02

Hours of operation: 8:30 to 18:00
Monday through Friday

Major Account Customers
Telephone +44 (0)1344 366 366 or +44 (0)1344 360 000

other european countries (english)

Telephone +44 (0)207 512 52 02

Hours of operation: 8:30 to 18:00
Monday through Friday

Major Account Customers
Telephone +41 22 780 81 11



how to contact hp

data protection

→ [contact hp](#)

→ [americas](#)

→ [europe](#)

[asia pacific](#)

→ [warranty](#)

→ [customer service form](#)

asia pacific

contents of this section

→ [check the web for up to date contact information](#)

→ [hp support in asia pacific](#)

→ [australia](#)

→ [china \(PRC\)](#)

→ [hong kong](#)

→ [india](#)

→ [indonesia](#)

→ [japan](#)

→ [korea, republic of](#)

→ [malaysia](#)

→ [new zealand](#)

→ [philippines](#)

→ [singapore](#)

→ [taiwan](#)

→ [thailand](#)

→ [vietnam](#)

check the web for up to date information

If you have internet access, click on the URL below:

http://www.hp.com/cposupport/mail_support.html

From time to time, telephone numbers and addresses may change; accessing contact details over the web will ensure you have the latest information.

If you do not have internet access, refer below for a list of contact numbers correct at time of printing:

hp support in asia pacific

Customers in Asia Pacific region can contact HP on the telephone support lines listed, by country, below.

Major Account Customers

Where a second number is listed under the sub-heading "Major Account Customers", this number should be used by major account customers where the product number (as stated on the label on the base of your drive) is as follows:

| products for major account customers | |
|--------------------------------------|----------------|
| tape drive | product number |
| ultrium 230, internal | C7400A |
| ultrium 230, external | C7401A |
| ultrium 230, rack mounted | C7470A |

or call 852 599 700

australia

Telephone (03) 8877 8000

Hours of operation: 9:00
a.m. to 5:00 p.m.
Monday through Friday

Spare parts 1800 670 054

Hours of operation: 9:00
a.m. to 5:00 p.m.
Monday through Friday

Major Account Customers

Telephone 61 3272 2895

china (PRC)

Telephone +86 (0)10 6564 5959

+86 (0)10 6564 5959

Hours of operation: 8:30
to 17:30
Monday through Friday

+86 1505 3888

Major Account Customers

Telephone +86 1505 3888

hong kong

Telephone 800 96 7729

800 96 7729

Hours of operation: 8:30
to 17:30
Monday through Friday

Major Account Customers

Telephone 852 599 7777

852 599 7777

india

Telephone +91 11 682 6035

Hours of operation: 9:30
a.m. to 5:30 p.m.
Monday through Friday

indonesia

Telephone +62 (21) 350 3408

Hours of operation: 8:00
a.m. to 5:00 p.m.
Monday through Friday

japan

Telephone +81 3 3335 8333

+81 3 3335 8333

Hours of operation: 9:00
to 12:00 and 13.00 to
17:00
Monday through Friday

+81 42 534 1831

Major Account Customers

Telephone +81 42 534 1831

korea, republic of

within Seoul only

Telephone +82 (2) 3270 0700

+82 (2) 3270 0700

Hours of operation: 9:00
a.m. to 6:00 p.m.
Monday through Friday.

9:00 a.m. to 1:00 p.m. on
Saturdays

080 999 0700

outside Seoul only

Telephone 080 999 0700

Hours of operation: 9:00
a.m. to 6:00 p.m.
Monday through Friday.

9:00 a.m. to 1:00 p.m. on
Saturdays

+81 42 534 1831

Major Account Customers

Telephone +81 42 534 1831

malaysia

Telephone +60 (3) 295 2566

Hours of operation: 8:30
a.m. to 5:30 p.m.
Monday through Friday

Major Account Customers

Telephone +60 (3) 298 6555

new zealand

Telephone +64 (9) 356 6640

Hours of operation: 9:00
a.m. to 5:30 p.m.
Monday through Friday

philippines

Telephone +63 (2) 867 3351

Hours of operation: 8:30
a.m. to 5:30 p.m.
Monday through Friday

singapore

Telephone +65 272 5300

Hours of operation: 8:30
a.m. to 5:30 p.m.
Monday through Friday

Major Account Customers

Telephone +65 293 2911

taiwan

Telephone +886 (2) 2717 0055

+886 (2) 2717 0055

Hours of operation: 8:30
a.m. to 5:30 p.m.
Monday through Friday

+886 (2) 712 0404

Major Account Customers

Telephone +886 (2) 712 0404

thailand

Telephone +66 (2) 661 4000

Hours of operation: 8:30
a.m. to 5:30 p.m.
Monday through Friday

vietnam

Telephone +84 (0) 8823 4530

Hours of operation: 8:00
a.m. to 5:00 p.m.
Monday through Friday

8.00 a.m to 12:00 p.m on
Saturday



how to contact hp

data protection

→ [contact hp](#)

→ [americas](#)

→ [europe](#)

→ [asia pacific](#)

warranty

→ [customer service form](#)

warranty

contents of this section

→ [warranty conditions](#)

→ [exclusions](#)

→ [limitations](#)

→ [limited warranty statement for USA, Canada, Australia and New Zealand](#)

warranty conditions

This warranty gives you specific legal rights. You may also have other rights which vary according to where you are located.

Hewlett-Packard warrants its Surestore tape drives against defects in materials and workmanship for a period of three years, either from the date of delivery or, where the purchase price includes installation by Hewlett-Packard, from the date of installation. If a new HP Surestore tape drive is purchased as a component of an HP computer system, the tape drive warranty is automatically upgraded to the system warranty.

You are entitled to:

- automatic three-year, next day unit exchange
- system matching warranty on HP systems (internal and external units), when purchased as a component of that system
- free technical call center assistance during the product support life (does not include telephone call cost)

Further information is available via the web at: www.hp.com/support/tapewarranty

During the first three years, the 24-hour Express Exchange program (not available in all countries) allows you to receive a replacement unit by next-day delivery upon verification of a faulty tape drive. Hewlett-Packard will, at its option, either repair or replace products that prove to be defective. Should Hewlett-Packard be unable to repair or replace the product within a reasonable period of time, a refund of the purchase price may be given upon return of the product.

If you choose not to use Express Exchange, your HP Surestore tape drive must be serviced by one of the authorized repair depots within the country in which it was originally purchased. You must prepay shipping charges (together with all duty and taxes) for products returned for service. Except for products returned to you from another country, Hewlett-Packard will pay for return of products to you. If the drive is repaired by an authorized dealer, you will need to negotiate the method and cost of returning the drive with the dealer.

exclusions

The warranty on your HP SureStore tape drive does not apply to defects resulting from:

- improper or inadequate maintenance by the customer
- Customer-supplied software or interfaces
- Unauthorized modification or misuse
- Use of unsupported media
- Operation outside the environmental specifications for the product
- Improper site preparation and maintenance

limitations

Any implied warranty of merchantability or fitness is limited to the three-year duration of this written warranty. Some states or provinces do not allow limitations on how long an implied warranty lasts, so limitations or exclusions may not apply to you.

limited warranty statement for USA, Canada, Australia and New Zealand

HP warrants to you, the end-user customer, that HP hardware, accessories and supplies will be free from defects in materials and workmanship after the date of purchase, for the period specified above. If HP receives notice of such defects during the warranty period, HP will, at its option, either repair or replace products which prove to be defective. Replacement products may be either new or like-new.

1. HP warrants to you that HP software will not fail to execute its programming instructions after the date of purchase, for the period specified above, due to defects in material and workmanship when properly installed and used. If HP receives notice of such defects during the warranty period, HP will replace software media which does not execute its programming instructions due to such defects.
2. HP does not warrant that the operation of HP products will be uninterrupted or error free. If HP is unable, within a reasonable time, to repair or replace any product to a condition as warranted, you will be entitled to a refund of the purchase price upon prompt return of the product.
3. HP products may contain remanufactured parts equivalent to new in performance or may have been subject to incidental use.
4. Warranty does not apply to defects resulting from (a) improper or inadequate maintenance or calibration, (b) software, interfacing, parts or supplies not supplied by HP, (c) unauthorized modification or misuse, (d) operation outside of the published environmental specifications for the product, or (e) improper site preparation or maintenance.
5. HP MAKES NO OTHER EXPRESS WARRANTY OR CONDITION WHETHER WRITTEN OR ORAL. TO THE EXTENT ALLOWED BY LOCAL LAW, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, SATISFACTORY QUALITY, OR FITNESS FOR A PARTICULAR PURPOSE IS LIMITED TO THE DURATION OF THE EXPRESS WARRANTY SET FORTH ABOVE. Some countries, states or provinces do not allow limitations on the duration of an implied warranty, so the above limitation or exclusion might not apply to you. This warranty gives you specific legal rights and you might also have other rights that vary from country to country, state to state, or province to province.
6. TO THE EXTENT ALLOWED BY LOCAL LAW, THE REMEDIES IN THIS WARRANTY STATEMENT ARE YOUR SOLE AND EXCLUSIVE REMEDIES. EXCEPT AS INDICATED ABOVE, IN NO EVENT WILL HP OR ITS SUPPLIERS BE LIABLE FOR LOSS OF DATA OR FOR DIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFIT OR DATA), OR OTHER DAMAGE, WHETHER BASED IN CONTRACT, TORT, OR OTHERWISE. Some countries, states or provinces do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

FOR CONSUMER TRANSACTIONS IN AUSTRALIA AND NEW ZEALAND: THE WARRANTY TERMS CONTAINED IN THIS STATEMENT, EXCEPT TO THE EXTENT LAWFULLY PERMITTED, DO NOT EXCLUDE, RESTRICT OR MODIFY AND ARE IN ADDITION TO THE MANDATORY STATUTORY RIGHTS APPLICABLE TO THE SALE OF THIS PRODUCT TO YOU.

Consumer Warranty Sept 16/97



invent

how to contact hp

data protection

→ [contact hp](#)→ [americas](#)→ [europe](#)→ [asia pacific](#)→ [warranty](#)

customer service form

customer service form

contents of this section

- [contact information](#)
- [tape drive information](#)
- [computer system information](#)
- [SCSI bus configuration](#)
- [backup information](#)
- [information about the problem](#)

Please complete the following information about your system and the problem you are having before you call the HP Customer Support Center. You can print this form and fill in the necessary information before you call, or you can print and fax the completed form to the Customer Service Center.

contact information

Company or Organization:

Contact Person/Title:
(e.g., Mr. John Smith,
Network Administrator)

Contact Telephone Number:

Fax Number:

E-Mail Address:

Mailing Address:

tape drive information

Model Name:
(example:
HP Surestore Ultrium 230i)

Model Number:
(example: HP C1555B)

Serial Number:

Firmware Revision:

Date Purchased:

Date of Last Cleaning:

How many times has cleaning tape been used?

computer system information

Computer Make and Model:
(example:
HP NetServer E-series)

Processor and Clock Speed:
(example: Pentium 550)

Amount of RAM:
(example: 64 MB)

Number of SCSI Controllers:

Computer Operating System/Release:
(example:
Novell NetWare 4.0, Windows NT 3.51, HP-UX 10.0)

Operating System Patches Installed:
(example: Service Pack 4)

Number of Hard Disks/Size/Partitions:
(example:
Disk 1: 1.2 GB, 1 partition
Disk 2: 1.8 GB, 2 partitions)

Logical or Physical Mapping of Disks:
(example:
Disk 1 = C:/, Disk 2 = S:/)

SCSI bus configuration

Host Adapter Make and Model:
(example:
Adaptec AHA-2940)

SCSI bus
(narrow or wide)

| SCSI ID | Device | Termination | Internal / External | Devices' Bus Type |
|---------|-----------------|-------------|---------------------|-------------------|
| .. | | | | |
| .. | | | | |
| .. | | | | |
| .. | | | | |
| .. | | | | |
| .. | | | | |
| .. | | | | |
| 7 | SCSI Controller | | | |

EXAMPLE

| SCSI ID | Device | Termination | Internal / External | Devices' Bus Type |
|---------|------------------------|-------------|---------------------|-----------------------|
| 0 | Hard disk | No | Internal | Narrow / Single-ended |
| 1 | CD-ROM | No | Internal | Narrow / Single-ended |
| 3 | Tape Drive (HP C1533A) | No | Internal | Narrow / Single-ended |
| 5 | Tape Drive (DLT7000) | Yes | External | Wide / Single-ended |
| 7 | SCSI Controller | Automatic | HBA | Wide / Single-ended |

backup information

Backup Application Name and Version or Release:

Are you using HP One Button Disaster Recovery?

Do you back up user data only?

Do you back up system information separately?
(example:
Windows registry files,
NetWare NDS or bindery files)

information about the problem

Light Pattern During Problem:

Any Audible Signals:

Error Messages/Code Generated:

Does the problem occur every time you try the operation?

Does the problem occur if you use another backup device?

What type of media are you using?
(Brand, Capacity, Batch No.)

Can you read the problem tape cartridge on another drive?

What result do you get when you try a new cartridge?

If you have an autoloader, are all cartridges affected the same way?

**Have you run any kind of diagnostics program, such as TapeAssure?
What result was reported?**

Detailed Description of Problem:



dlt1 tape drive user's guide

data protection

→ [contact hp](#)→ [home page](#)

before you start

→ [operation](#)→ [cartridge care](#)→ [cleaning](#)→ [specifications](#)→ [media compatibility](#)→ [diagnostics](#)→ [troubleshooting](#)→ [FAQs](#)→ [SCSI configuration](#)→ [UNIX configuration](#)→ [ordering supplies](#)

before you start

contents of this section

→ [pre-installation check list](#)→ [installation](#)→ [how to identify your model](#)→ [computer and backup software requirements](#)→ [computer systems](#)→ [backup software](#)

pre-installation check list

Before you install your HP Surestore DLT1 tape drive:

1. Check that your computer meets the [requirements for installation](#).
2. [Make a note of the model name, product number, and serial number of your tape drive](#).
3. Collect information about the SCSI configuration of your computer and any other devices attached to it and decide how you are going to configure the drive on the SCSI bus. If you are installing on a Windows NT 4, Windows 2000, or Novell NetWare system, you can use the [HP Library & TapeTools](#) software. If you are not familiar with how to configure a SCSI bus, you may also want to read the [SCSI Background](#) information provided in this guide.
4. Select a free bay for an internal or a removable drive
or
Select a site for an external drive.

installation

The *Getting Started* guide provides detailed installation instructions.

Click below for a PDF version of the appropriate guide:

- [HP Surestore DLT1 internal drives: Getting Started guide](#)
- [HP Surestore DLT1 external drives: Getting Started guide](#)

You need a copy of Adobe Acrobat Reader to read the PDF files. If you do not have a copy of this software, you can link to [Adobe's web site](#) to download a free copy.

how to identify your model

For internal drives, the model name is on the front panel and the product and serial numbers are on a label on the top of the drive.

For external drives, the model name is on the front panel and the product and serial numbers are on a label on the bottom of the drive.

computer and backup software

The HP Surestore DLT1 tape drive has the following hardware and software requirements:

computer systems

If you are installing the tape drive on a UNIX system, refer to the [UNIX instructions](#) for further information about the systems supported and installation instructions.

For the latest list of operating systems that support HP Surestore DLT1 drives, please consult our World Wide Web site (www.hp.com/go/connect).

HP Surestore DLT1 tape drives are Ultra SCSI-2 wide devices designed to operate on a low voltage differential SCSI bus (LVDS) with a burst transfer rate of 40 MB/sec. Using the drive on a single-ended (SE) SCSI bus restricts performance. Do not use on the same bus as other single-ended devices as this will switch the LVDS host adapter into single-ended mode and restrict performance. We recommend that a dedicated host bus adapter is used for the tape drive. A suitable adapter is available from HP as an accessory (see [Ordering Information](#)).

Your computer must have a properly installed and configured SCSI host adapter or a SCSI controller on the motherboard (SCSI-2 or SCSI-3 compliant) with driver software that supports the HP Surestore DLT1 drive. Check the server documentation for the specification of any built-in SCSI channels. Do not connect to a RAID controller channel; these are for disk drives only. Consult your supplier for details.

For an internal drive, you will need:

- A wide, Ultra SCSI-2 LVDS or SE SCSI bus
- LVDS-compliant SCSI ribbon cable with termination (normally supplied with the host bus adapter)
- Available 5¼-inch, full-height mounting bay (or two adjacent, half-height bays)
- Mounting hardware, if required
- Backup software that supports the tape drive

For external drives, the cable provided with HP Surestore DLT1 tape drives will attach to a computer with a wide LVDS SCSI connector (68 pins). Connecting the drive to an SE SCSI connector or a narrow SCSI host bus adapter will restrict performance. HP recommends that a dedicated host bus adapter is used for the tape drive. If your server or host bus adapter is equipped with a very high density (VHD) wide SCSI connector, you will need to order a High-End Tape Connect Kit (adapter with VHD-to-HD cable) or 68-pin VHD-to-HD cable. (See [Ordering Information](#).)

backup software

You need backup software that supports the HP Surestore DLT1 drive. A TapeWare CD-ROM containing backup software by Yosemite Technologies is supplied with your tape drive.

As a general rule, native backup applications (such as NTBackup and tar) do not provide the required data streaming rate to get the full performance of your HP Surestore DLT1 drive. We recommend using a backup application which provides better memory management as well as other useful features, such as TapeAlert. HP, Computer Associates, Veritas and Legato all provide suitable products that have been tested with HP Surestore DLT1 drives. For the latest list of backup packages that support HP Surestore DLT1 drives, please consult our World Wide Web site (www.hp.com/go/connect).

Suitable backup applications will include driver software that establishes the interface between the tape drive and the software. Applications usually recognize tape drives by their manufacturers' ID string rather than their model number, so check the table below for the appropriate reference.

| Drive Model | ID String |
|------------------------------|--------------|
| HP Surestore DLT1 tape drive | BNCHMARKDLT1 |



dlt1 tape drive user's guide

data protection

→ [contact hp](#)

→ [home page](#)

→ [before you start](#)

operation

→ [the front panel lights](#)

→ [loading & unloading](#)

→ [cartridge care](#)

→ [cleaning](#)

→ [specifications](#)

→ [media compatibility](#)

→ [diagnostics](#)

→ [troubleshooting](#)

→ [FAQs](#)

→ [SCSI configuration](#)

→ [UNIX configuration](#)

→ [ordering supplies](#)

operation

contents of this section

- [switching on the drive](#)
- [if you have problems during self test](#)
- [resetting the drive](#)

related topics

- [interpreting the front panel lights](#)
- [cartridges](#)
- [labeling and write-protecting](#)
- [loading and unloading](#)
- [caring for](#)

switching on the drive

Internal drives are powered on when you switch on your computer.

Switch on **external drives** using the power switch on the rear of the drive, and then switch on the computer.

if you have problems during self test

If all the LED lights on the front panel are flashing at the end of the self-test, this indicates a fault has occurred:

- If you have just installed the drive, check the installation for loose connections and repeat the self-test.
- Try the [troubleshooting procedures](#) to determine what the problem is.
- If the fault condition persists, call for [assistance](#).

resetting the drive

The drive can be reset without powering off the drive and computer, for example, if the drive stops responding. To reset the drive, press and hold the eject button until all three LEDs come on (which takes about 6 seconds), then release the button.

If the eject button is held down until the LEDs come on (6 seconds) and is continued to be held down, until the lights go off (another 4 seconds), no reset is performed.

If you press and hold the eject button again until the first two LEDs flash, the drive goes into a state ready for the firmware upgrade tape. The drive will return to its normal state after 30-45 seconds of inactivity.



dlt1 tape drive user's guide

data protection

→ [contact hp](#)

→ [home page](#)

→ [before you start](#)

→ [operation](#)

the front panel lights

→ [loading & unloading](#)

→ [cartridge care](#)

→ [cleaning](#)

→ [specifications](#)

→ [media compatibility](#)

→ [diagnostics](#)

→ [troubleshooting](#)

→ [FAQs](#)

→ [SCSI configuration](#)

→ [UNIX configuration](#)

→ [ordering supplies](#)

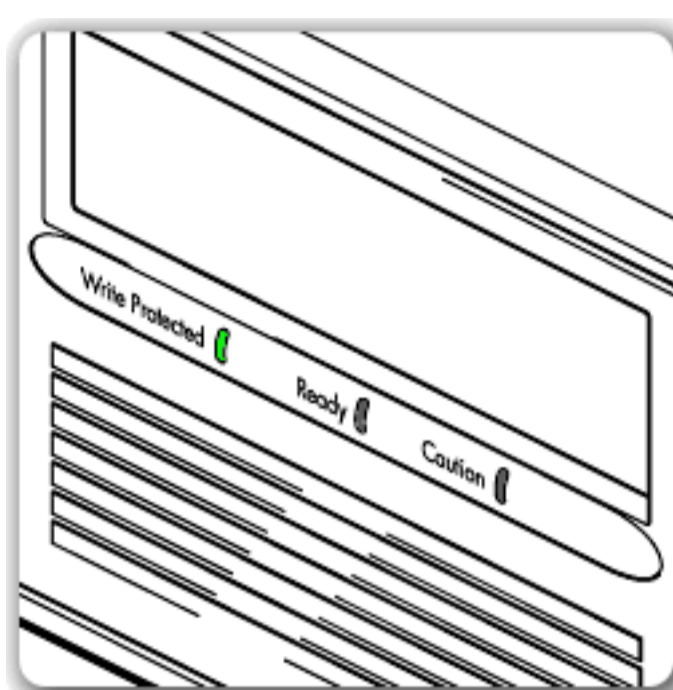
the front panel lights

contents of this section

→ [front panel lights](#)

front panel lights

The front panel of your HP Surestore DLT1 tape drive has three lights (LEDs) as shown below.

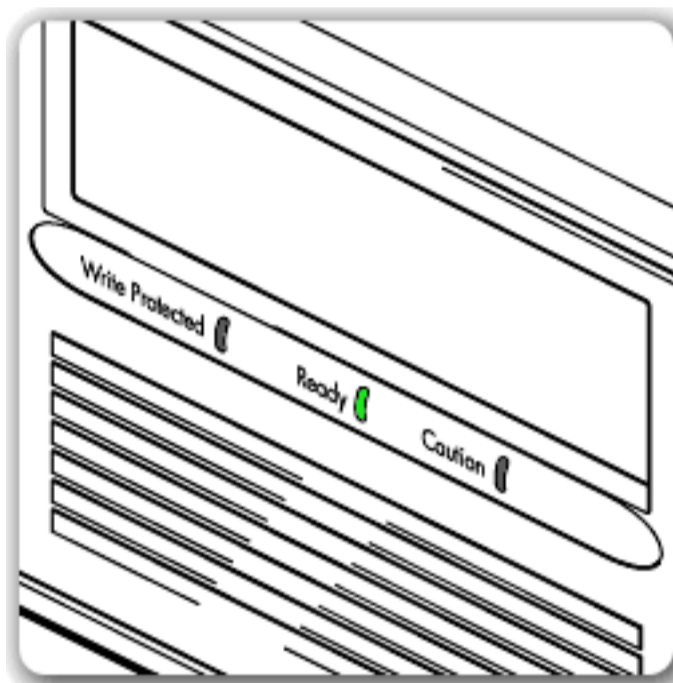


Write Protected (first light)

This LED indicates if a cartridge is write-protected.

On, steady: The DLTtape cartridge is write-protected.

Off: The DLTtape cartridge is write-enabled.



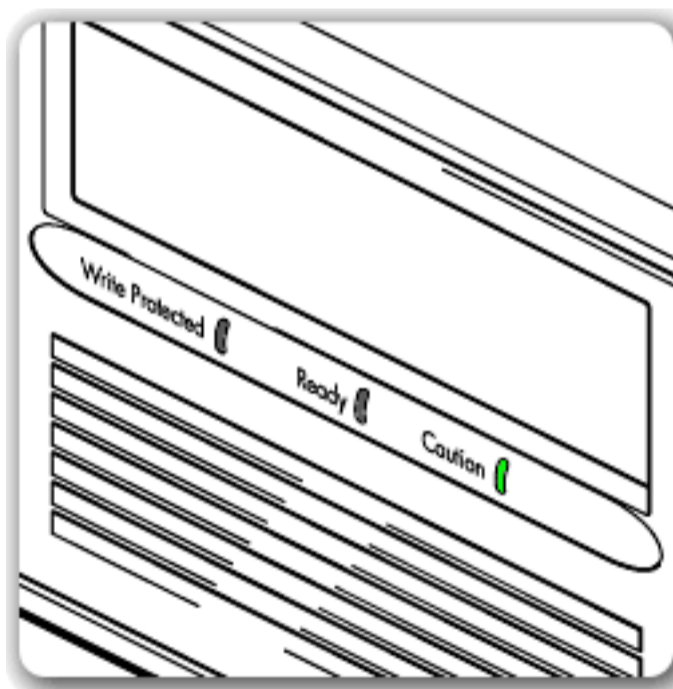
Ready (second light)

This LED indicates when a cartridge is loaded.

On, steady: The DLTtape cartridge is loaded and ready to use.

On, flashing: The tape is in motion.

Off: No cartridge is loaded.



Caution (third light)

This LED indicates when a cleaning tape should be used. See also "[Cleaning](#)".

On, steady: A calibration failure or hard read/write error occurred. Try cleaning the drive with a tape approved for use in the DLT1 drive.

If after cleaning, this indicator is illuminated again when you load a DLTtape cartridge: it is probable that the DLTtape cartridge is causing problems. Try a new DLTtape cartridge. If this condition persists with other cartridges, use [HP Library and Tape Tools](#) to help you diagnose the problem.

Off: Cleaning is complete or not needed.

All three LEDs

This indicates the status of the Power On Self Test (POST).

On, steady: POST is starting.

On, flashing: A POST error has occurred. For more information, see [Troubleshooting](#).

Note: LEDs during firmware update operation. See also [Firmware Updates](#).

- During the firmware update process DO NOT RESET OR POWER CYCLE THE DRIVE.
- When the drive is in firmware update mode, the Write Protected and Ready LEDs flash.
- If a corrupt or incompatible image is downloaded for a firmware update, the Ready and Write Protected LEDs do not flash. The drive resets and leaves the code update cartridge loaded to indicate that the code update was not successful.
- If a valid image is downloaded the Ready and Write Protected LEDs will flash alternately during the update process. The code update cartridge is ejected on successful completion.



dlt1 tape drive user's guide

data protection

→ [contact hp](#)

→ [home page](#)
 → [before you start](#)
 → [operation](#)
 → [the front panel lights](#)
 loading & unloading
 → [cartridge care](#)
 → [cleaning](#)
 → [specifications](#)
 → [media compatibility](#)
 → [diagnostics](#)
 → [troubleshooting](#)
 → [FAQs](#)

→ [SCSI configuration](#)
 → [UNIX configuration](#)

→ [ordering supplies](#)

loading and unloading

contents of this section

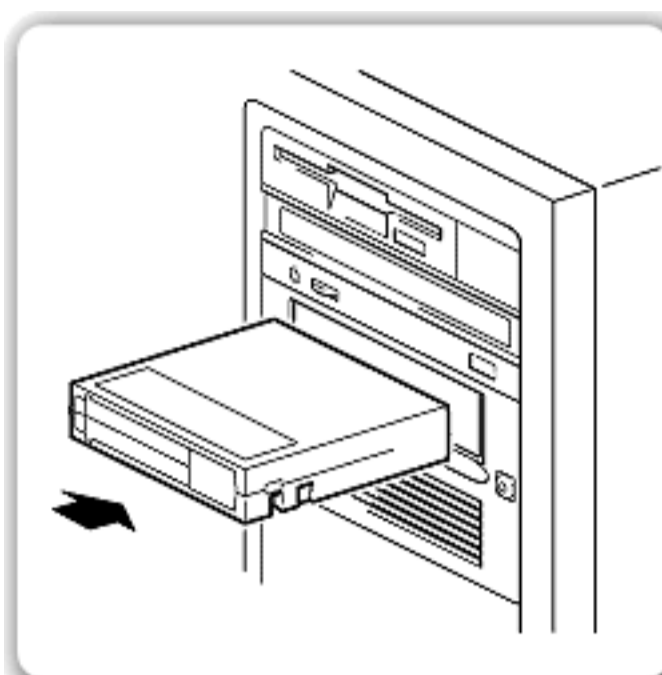
→ [to load a cartridge](#)
 → [to unload a cartridge](#)
 → [to label a cartridge](#)
 → [to write protect a cartridge](#)

related topics

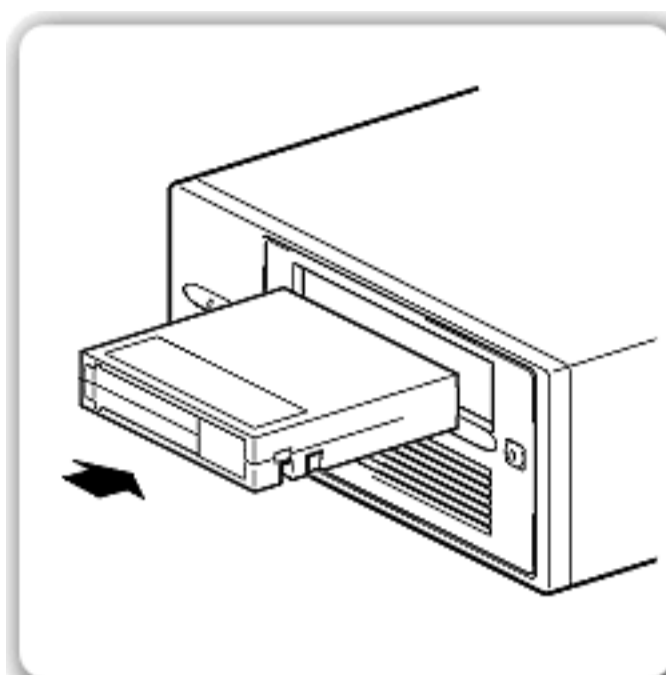
→ [cartridge care](#)

to load a cartridge

Use *only* DLTtape IV cartridges with your drive.



Internal drives



External drives

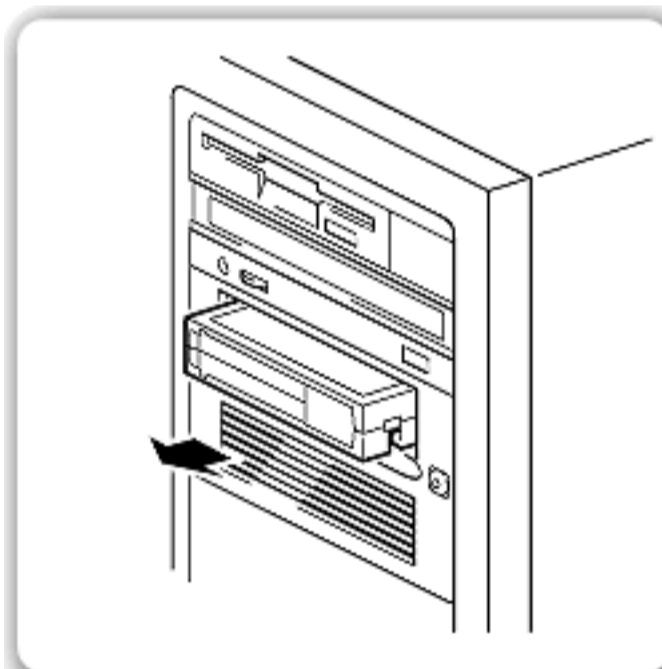
1. Insert the cartridge into the slot in front of the drive, oriented as shown above.
2. Apply gentle pressure on the rear of the cartridge until the drive takes the cartridge and loads it.

The Ready light flashes while the drive performs its load sequence. When the cartridge is loaded, the Ready light is steady.

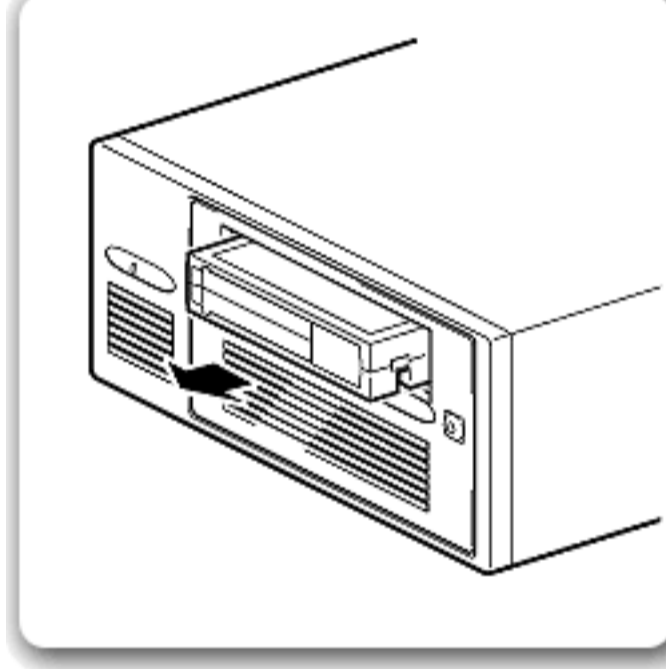
Do not try to force the cartridge if it does not load properly. The drive will eject the cartridge after about 10 seconds so you can load it again.

Note: When you insert a new, unformatted cartridge into your HP Surestore DLT1 tape drive, the loading sequence takes longer because the drive is writing reference tracks on the tape.

to unload a cartridge



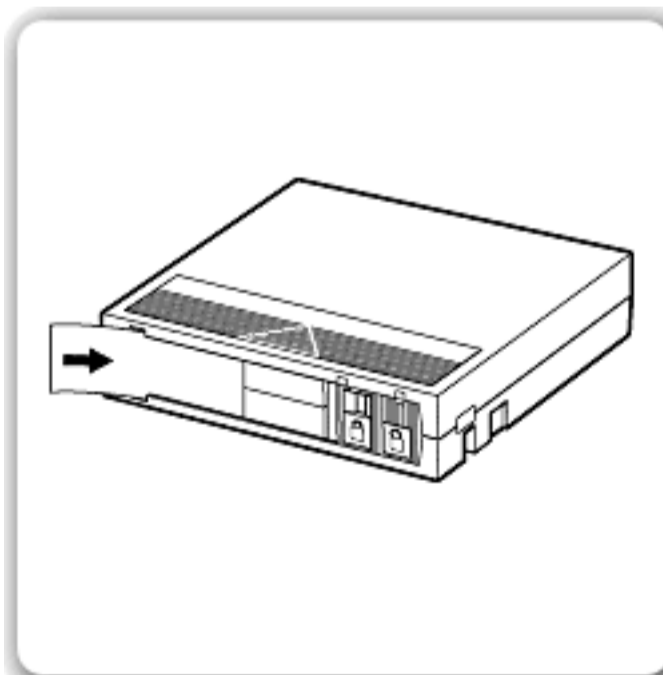
Internal drives



External drives

1. Press the Eject button on the front panel or use your backup software. During the unload sequence the Ready light flashes. The drive completes any task it is currently performing, winds the tape to the beginning, and ejects the cartridge. The eject cycle will take up to two minutes.
2. Remove the cartridge and store it in its plastic case in a cool, dry atmosphere.

to label a cartridge



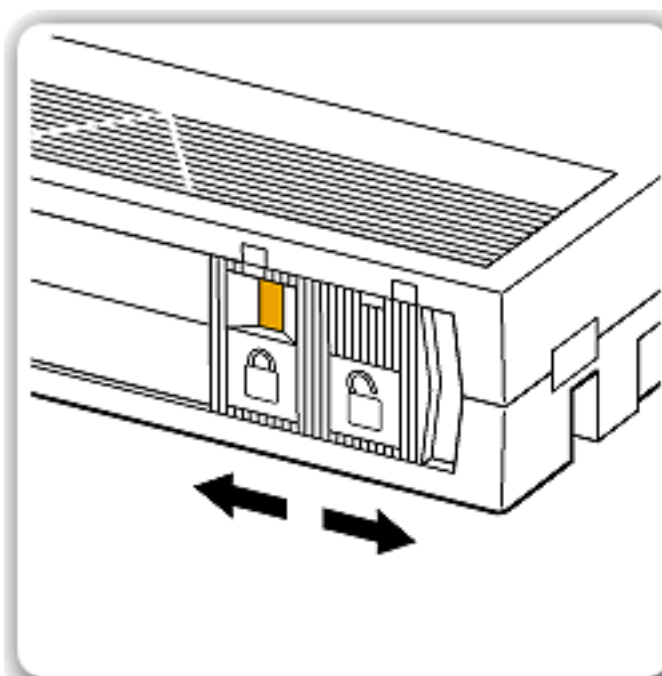
Use *only* DLTtape IV cartridges with your drive. Ensure that only one label is located in the label area of the cartridge. Never use non-standard labels, and never stick anything to the cartridge.

The label area and write-protect switch are on the front of the cartridge, as illustrated.

to write-protect a cartridge

If you want to protect the data on a cartridge from being altered or overwritten, you can write-protect the cartridge. Do this before you insert the cartridge by sliding the write-protect switch on the front of the cartridge.

Caution: Write-protection will not prevent a cartridge being erased by bulk-erasure or degaussing.



To write-protect a cartridge, slide the write-protect switch **to the left**.

Note a small orange rectangle is visible indicating that the cartridge is protected.

To write-enable a cartridge, slide the the write-protect switch **to the right**.



dlt1 tape drive user's guide

data protection

→ [contact hp](#)

→ [home page](#)

→ [before you start](#)

→ [operation](#)

cartridge care

→ [cleaning](#)

→ [specifications](#)

→ [media compatibility](#)

→ [diagnostics](#)

→ [troubleshooting](#)

→ [FAQs](#)

→ [SCSI configuration](#)

→ [UNIX configuration](#)

→ [ordering supplies](#)

cartridge care

contents of this section

→ [choosing cartridges](#)

→ [caring for cartridges](#)

→ [using cartridges](#)

→ [storing cartridges](#)

→ [maximizing tape life](#)

→ [avoiding condensation](#)

related topics

→ [write-protecting cartridges](#)

→ [labeling cartridges](#)

→ [loading and unloading cartridges](#)

→ [ordering cartridges](#)

choosing cartridges

Only rely on the best media to protect your valuable data. Thanks to HP's rigorous testing programs, HP Surestore DLT1 data and cleaning cartridges are the safest investment you can make.

HP DLTape IV cartridges are designed to meet the exacting mechanical, environmental and durability specifications of data storage applications.

Order online at: www.hp.com/go/storagemedia.

Important: You must use *only* DLT1 cleaning cartridges with HP Surestore DLT1 tape drives. Be aware that cleaning cartridges that do not specify DLT1 on the cartridge may be accepted by the drive but will not clean the drive. Use only DLT1 cleaning cartridges.



Your HP Surestore DLT1 tape drive uses *only* DLTape IV cartridges. Your DLT1 tape drive can read but not write DLTape cartridges that use the DLT4000 format.

Make sure all cartridges that you want to use for writing are either unformatted or have been formatted with your DLT1 tape drive before loading them. If you want to reuse cartridges that have been formatted by a drive other than DLT1, use a magnetic bulk eraser to prepare the cartridges for use with your DLT1 tape drive.

caring for cartridges

Under optimum environmental conditions, Hewlett-Packard DLTape IV cartridges are currently specified to 1,000,000 passes over any part of the tape. In operational terms, this can be translated to about 2000 full backup or restore operations. Under severe environmental conditions, particularly where the tape drive is used at very low humidity or if certain areas of the tape are accessed frequently, the number of backup operations should be limited even further.

Caution: Ensure that only one label is located in the label area of the cartridge. Never use non-standard labels and never stick anything to the cartridge.

using cartridges

Only use DLTape IV cartridges in temperatures in the tape drive's operating range from 10C to 40C (50°F to 104°F) and 20 to 80% relative humidity (noncondensing). If you expose cartridges to temperatures outside the operating limits, stabilize them before you use them. To do this, leave the cartridges in the operating environment for 24 hours.

storing cartridges

- Store cartridges at temperatures between 16°C and 32°C (60°F and 90°F) with a relative humidity between 20% and 80%.
- Always keep the cartridges in a dust-free environment.
- Always store cartridges in their plastic cases when not in use.

maximizing tape life

- Do not touch the tape surface.
- Do not attempt to clean the tape path or tape guides inside the cartridge.
- Do not leave cartridge tapes in excessively dry or humid conditions.
- Do not leave cartridges in direct sunlight or near sources of heat 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 locate more than one label onto cartridges; extra labels can cause the cartridges to jam in the tape drive.
- Place identification labels only in the slide-in slot on the front of the cartridge.
- Never use any type of adhesive labels on your DLTape cartridge.

avoiding condensation

Condensation can be a problem for tape drives and cartridges. To minimize the chance of condensation, stay within the specifications for using and storing cartridges above and observe the following guidelines:

1. Position the drive where the temperature is relatively stable -- away from open windows, heat sources and doors.
2. Avoid leaving cartridges in severe temperature conditions, for example, in a car standing in bright sunlight.
3. Avoid transferring data (reading from and writing to cartridges) when the temperature is changing by more than 10°C (18°F) per hour.
4. If you bring a cold tape drive or tape cartridge into a warm room, allow time for it to warm to room temperature before using it. For example, if you have moved the drive from a cold car to a warm room, allow time for the drive to reach room temperature (up to 24 hours if the temperature change is extreme).



data protection

→ [contact hp](#)→ [home page](#)→ [before you start](#)→ [operation](#)→ [cartridge care](#)

cleaning

→ [specifications](#)→ [media compatibility](#)→ [diagnostics](#)→ [troubleshooting](#)→ [media compatibility](#)→ [FAQs](#)→ [SCSI configuration](#)→ [UNIX configuration](#)→ [ordering supplies](#)

dlt1 tape drive user's guide

cleaning

contents of this section

- [cleaning strategy](#)
- [cleaning cartridge](#)
- [cleaning the tape heads on a drive](#)

cleaning strategy

HP Surestore DLT1 drives have been developed to have a minimal cleaning requirement. The **Caution** LED on the tape drive will be on when the drive needs cleaning. However, it is good practice that the drive is cleaned once every two weeks to ensure optimal performance.

IMPORTANT: It is essential to use only DLT1 cleaning cartridges with HP Surestore DLT1 tape drives. Cleaning cartridges from other media manufacturers will not be accepted by the drive. Use of HP cleaning media will ensure your tape drive is fully protected.

cleaning cartridge

You must use *only* DLT1 cleaning cartridges to clean the tape heads. A cleaning cartridge is supplied with each tape drive.

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 be used up to 20 times. The cleaning cartridge includes a label with 20 small boxes printed on it. 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.

Be aware that cleaning cartridges that do not specify DLT1 on the cartridge will be accepted by the drive but will not clean the drive. Use *only* DLT1 cleaning cartridges (see also [Ordering Information](#)).

cleaning the tape heads on a drive

The drive's TapeAlert feature sends a message to your backup application when the tape heads need cleaning and the Caution LED illuminates. To clean the tape heads:

1. Insert a DLT1 cleaning cartridge into the drive. The tape drive automatically loads the cartridge and cleans the heads.

Note: If you insert another type of cleaning cartridge, the Caution LED turns off. Ensure that cleaning is performed only with DLT1 cleaning cartridges.

During the cleaning cycle the Caution LED flashes. At the end of the cleaning cycle, the Caution LED turns off to indicate that you should remove the cleaning cartridge. The cleaning cycle can take several minutes.

2. Remove the cleaning cartridge from the drive.

If the Caution LED is illuminated when you insert a DLTtape cartridge immediately after cleaning, try a new DLTtape cartridge. If this condition persists with other cartridges, use [HP Library and Tape Tools](#) to help you diagnose the problem.



dlt1 tape drive user's guide

data protection

- [contact hp](#)
- [home page](#)
- [before you start](#)
- [operation](#)
- [cartridge care](#)
- [cleaning](#)
- [specifications](#)
 - [dlt1i](#)
 - [dlt1e](#)
- [media compatibility](#)
- [diagnostics](#)
- [troubleshooting](#)
- [FAQs](#)
- [SCSI configuration](#)
- [UNIX configuration](#)
- [ordering supplies](#)

features and specifications

Choose your model from the bulleted list below



Internal Drives

- [HP Surestore DLT1i tape drive](#)



External Drives

- [HP Surestore DLT1e tape drive](#)



dlt1 tape drive user's guide

data protection

[→ contact hp](#)[→ home page](#)[→ before you start](#)[→ operation](#)[→ cartridge care](#)[→ cleaning](#)[→ specifications](#)

dlt1i

[→ dlt1e](#)[→ media compatibility](#)[→ diagnostics](#)[→ troubleshooting](#)[→ FAQs](#)[→ SCSI configuration](#)[→ UNIX configuration](#)[→ ordering supplies](#)

hp surestore dlt1i

contents of this section

[→ features](#)[→ specifications](#)[→ physical specification](#)[→ power requirements](#)[→ performance](#)[→ operating limits](#)[→ non-operating limits](#)[→ safety and electromagnetic compatibility](#)

features



The HP Surestore DLT1 tape drive provides affordable 80GB backup to IT managers with mid-range servers. The 6MB/s compressed transfer rate provides backup in under 4 hours. DLT technology appeals to customers looking for reliable and scalable backup.

Your new tape drive provides the following key features:

- Proven DLT technology
- Up to 80GB (compressed) on a single tape cartridge
- Transfer rate of 6MB/s (compressed)
- Read compatible with DLT4000 data
- Technology scalable to higher capacities and transfer rates
- Compatibility with all key backup software applications
- TapeSense System™ to improve reliability by rejecting damaged media
- Roller design to minimize lateral tape movement
- [TapeAlert](#) support for worry-free backup
- [HP Library & Tape Tools](#) software to verify successful installation and troubleshoot problems
- Ultra wide SCSI-2 interface
- 3-year, next-day, unit exchange

Note: HP Surestore DLT1i does not currently support One-Button Disaster Recovery (OBDR).

specifications

physical specification

dimensions 148.6 mm (5.9") W (with bezel)
86.36 mm (3.4") H (with bezel)
210.6 mm (8.29") D (with bezel)

weight 1.8 kg (3.9 lbs)

power requirements

power consumption +5V @ 1.5A steady state
+12V @ 0.33A steady state
+5V @ 1.75A (max)
+12V @ 1.75A (max)

performance

interface Ultra wide SCSI-2
recording format DLT1
media DLTtape IV
capacity 40 GB (native)
sustained transfer rate native 3 MB/sec
compressed 6 MB/sec (assumes 2:1 compression)
burst transfer rate 40 MB/sec (Ultra wide SCSI-2)
file access time (from BOT) 68 sec typical
135 sec maximum
load to BOT 59 sec (slightly longer for blank tapes)
unload from BOT 17 sec
68 sec typical
rewind time 135 sec maximum
rewind tape speed 4.1 m/sec (160 in/sec)

operating limits

temperature 10°C to 40°C (50°F to 104°F)
humidity 20% to 80% RH (non-condensing)
10%/hr maximum operating humidity rise
maximum wet bulb temperature 25°C
temperature gradient 11°C per hour (across range)
operating altitude -0.15 to 9 km (-500 to 30,000 ft)
vibration 0.25g 5-500 Hz
shock survival 3g 10ms (half sine)

non-operating limits

temperature -40°C to 66°C (-40°F to 151°F)
humidity 10% to 95% RH (non-condensing)
temperature rise 20°C per hour with 5 degree margin
(across range)
humidity rise 10%/hr
non-operating altitude N/A
vibration 1g 10-500 Hz
shock survival 40G 10ms (square wave)
140G 2ms (half sine)

safety and electromagnetic compatibility

- UL 1950, 3rd edition Information Technology Equipment (ITE)
- CSA-C22.2 No. 950-95 Safety of Information Technology Equipment
- FCC Part 15--Radio Frequency Devices, Subpart B--Unintentional Radiators, Class B
- Industry Canada (ICES), Radio Interference Regulation, Digital Apparatus, Class B
- C-TICK, AS/NZS A3548, Radio Frequency Devices Class B
- CISPR Publication 22 (1985), Class B
- EN 55022: 1998, CISPR Publication 22 (1997), CISPR Publication 22 (1993) (U.S.A.), Radiated and Conducted Emissions
- EN55024: 1998, CISPR Publication 24 (1997), IEC61000-4-2: 1995, IEC61000-4-3: 1995, IEC61000-4-5: 1995, IEC61000-4-6: 1996, IEC61000-4-8: 1993, IEC61000-4-11: 1994, Immunities.

CE-Mark comprised of the following requirements:

- EN60950/A11: 1997, IEC60950/A4: 1996, Safety of Information Technology Equipment including Electrical Business Equipment
- EN55082-1/IEC1000-4-2, 1000-4-3, 1000-4-4, Electromagnetic Compatibility for Industrial-Process Measurement and Control Equipment:

Part 2 - Electrostatic Discharge (ESD) Requirements
Part 3 - Radiated Electromagnetic Field Requirements
Part 4 - Electrical Fast Transient/Burst (EFT) Requirements



dlt1 tape drive user's guide

data protection

→ [contact hp](#)

→ [home page](#)
 → [before you start](#)
 → [operation](#)
 → [cartridge care](#)
 → [cleaning](#)
 → [specifications](#)
 → [dlt1](#)
 → [dlt1e](#)
 → [media compatibility](#)
 → [diagnostics](#)
 → [troubleshooting](#)
 → [FAQs](#)

→ [SCSI configuration](#)
 → [UNIX configuration](#)

→ [ordering supplies](#)

hp surestore dlt1e

contents of this section

→ [features](#)
 → [specifications](#)
 → [physical specification](#)
 → [power requirements](#)
 → [performance](#)
 → [operating limits](#)
 → [non-operating limits](#)
 → [safety and electromagnetic compatibility](#)

features



The HP Surestore DLT1 tape drive provides affordable 80GB backup to IT managers with mid-range servers. The 6MB/s compressed transfer rate provides backup in under 4 hours. DLT technology appeals to customers looking for reliable and scalable backup.

Your new tape drive provides the following key features:

- Proven DLT technology
- Up to 80GB (compressed) on a single tape cartridge
- Transfer rate of 6MB/s (compressed)
- Read compatible with DLT4000 data
- Technology scalable to higher capacities and transfer rates
- Compatibility with all key backup software applications
- TapeSense System™ to improve reliability by rejecting damaged media
- Roller design to minimize lateral tape movement
- [TapeAlert](#) support for worry-free backup
- [HP Library & Tape Tools](#) software to verify successful installation and troubleshoot problems
- Ultra wide SCSI-2 interface
- 3-year, next-day, unit exchange

Note: HP Surestore DLT1e does not currently support One-Button Disaster Recovery (OBDR).

specifications

physical specification

dimensions 212.85 mm (8.38") W
 100.08 mm (3.94") H
 273.05 mm (10.75") D

weight 4.08 kg (9 lbs)

power requirements

power 100-254 VAC
 44 W, 0.76A @ 110 VAC
 Auto-ranging. Power connection IEC
 CEE-22

performance

| | |
|-----------------------------|--|
| interface | Ultra wide SCSI-2 |
| recording format | DLT1 |
| media | DLTtape IV |
| capacity | 40 GB (native) |
| transfer rate | native 3 MB/sec compressed 6 MB/sec (assumes 2:1 compression) |
| burst transfer rate | 40 MB/sec (Ultra wide SCSI-2) |
| file access time (from BOT) | 68 sec typical 135 sec maximum |
| load to BOT | 59sec (slightly longer for blank tapes) |
| unload from BOT | 17 sec |
| rewind time | 68 sec typical 135 sec maximum |
| rewind tape speed | 4.1 m/sec (160 in/sec) |

operating limits

| | |
|------------------------------|--|
| temperature | 10°C to 40°C (50°F to 104°F) |
| humidity | 20% to 80% RH (non-condensing) 10%/hr maximum operating humidity rise |
| maximum wet bulb temperature | 25°C |
| temperature gradient | 11°C per hour (across range) |
| operating altitude | -0.15 to 9 km (-500 to 30,000 ft) |
| vibration | 0.25g 5-500 Hz |
| shock survival | 3g 10ms (half sine) |

non-operating limits (storage ranges)

| | |
|------------------------|---|
| temperature | -40°C to 66°C (-40°F to 151°F) |
| humidity | 10% to 95% RH (non-condensing) |
| temperature rise | 20°C per hour with 5 degree margin (across range) |
| humidity rise | 10%/hr |
| non-operating altitude | N/A |
| vibration | 1g 10-500 Hz |
| shock survival | 40G 10ms (square wave) 140G 2ms (half sine) |

safety and electromagnetic compatibility

- UL 1950, 3rd edition Information Technology Equipment (ITE)
- CSA-C22.2 No. 950-95 Safety of Information Technology Equipment
- FCC Rules and Regulations, Part 15--Radio Frequency Devices, Subpart B--Unintentional Radiators, Class B
- Industry Canada (ICES), Radio Interference Regulation, Digital Apparatus, Class B
- C-TICK, AS/NZS A53548, Radio Frequency Devices Class B
- CISPR Publication 22 (1985), Class B
- EN55022: 1998, CISPR Publication 22 (1997), CISPR Publication 22 (1993) (U.S.A.), Radiated and Conducted Emissions
- EN61000-3-2: 1995, +Amendment A1: 1998, +Amendment A2: 1998, IEC 61000-3-2: 1995, +/A1: 1997, +/A2: 1998, Harmonic Current Emissions
- EN61000-3-3: 1995, IEC61000-3-3: 1994, Voltage Fluctuation and Flicker
- EN55024: 1998, CISPR Publication 24 (1997), IEC61000-4-2: 1995, IEC61000-4-3: 1995, IEC61000-4-5: 1995, IEC61000-4-6: 1996, IEC61000-4-8: 1993, IEC61000-4-11: 1994, Immunities

CE-Mark comprised of the following requirements:

- EN60950/A11: 1997, IEC60950/A4: 1996, Safety of Information Technology Equipment including Electrical Business Equipment
- EN55082-1/IEC1000-4-2, 1000-4-3, 1000-4-4, Electromagnetic Compatibility for Industrial-Process Measurement and Control Equipment:

Part 2 - Electrostatic Discharge (ESD) Requirements
 Part 3 - Radiated Electromagnetic Field Requirements
 Part 4 - Electrical Fast Transient/Burst (EFT) Requirements



dlt1 tape drive user's guide

data protection

- [contact hp](#)
- [home page](#)
- [before you start](#)
- [operation](#)
- [cartridge care](#)
- [cleaning](#)
- [specifications](#)
- [media compatibility](#)
- [diagnostics](#)
- [troubleshooting](#)
- [FAQs](#)
- [SCSI configuration](#)
- [UNIX configuration](#)
- [ordering supplies](#)

media compatibility

contents of this section

- [dlt1 compatibility matrix](#)

related topics

- [HP Library & Tape Tools](#)
- [TapeAlert](#)

DLT1 compatibility matrix

| Action | Drive | | | |
|---------------------|-------|---------|---------|---------|
| | DLT1 | DLT4000 | DLT7000 | DLT8000 |
| Read DLT 4000 tape | Yes | Yes | Yes | Yes |
| Write DLT 4000 tape | No | Yes | Yes | Yes |
| Read DLT 8000 tape | No | No | No | Yes |
| Write DLT 8000 tape | No | No | No | Yes |
| Read DLT1 | Yes | No* | No* | No* |
| Write DLT1 | Yes | No | No | No |
| DLT1 cleaning tape | Yes | No# | No# | No# |
| DLT cleaning tape | No** | Yes | Yes | Yes |
| DLTtape IV media | Yes | Yes | Yes | Yes |

* = Cartridge will not be overwritten

** = Cartridge will be ejected

= Cartridge will not physically fit

- HP Surestore DLT1 drive will write to:
 - a new blank DLTtape IV cartridge.
 - a DLTtape IV cartridge previously written in a DLT1 drive.
 - a DLTtape IV that has been bulk erased or degaussed.
- HP Surestore DLT1 will read a cartridge written in the DLT4000 format.



dlt1 tape drive user's guide

troubleshooting

data protection

- [contact hp](#)
- [home page](#)
- [before you start operation](#)
- [cartridge care](#)
- [cleaning](#)
- [specifications](#)
- [media compatibility](#)
- [diagnostics](#)
- [troubleshooting](#)
- [FAQs](#)

- [SCSI configuration](#)
- [UNIX configuration](#)

- [ordering supplies](#)

contents of this section

- [help diagnosing the problem](#)
- [general guidelines](#)
- [troubleshooting](#)
 - [problems with the host computer](#)
 - [computer does not boot up](#)
 - [computer boots, but does not recognize drive](#)
 - [problems with the drive](#)
 - [the tape drive does not power up](#)
 - [all the LEDs on the front panel blink continually](#)
 - [errors for which you cannot find the cause](#)
 - [problems during firmware update](#)
 - [drive does not go into firmware update mode](#)
 - [code update failed](#)
 - [interpreting the LEDs](#)

related topics

- [HP Library & Tape Tools](#)
- [TapeAlert](#)
- [firmware upgrades](#)

help diagnosing the problem

If you experience problems using your tape drive after installation, use [HP Library & Tape Tools](#) to help you diagnose the problem. HP Library & Tape Tools is provided free of charge and is invaluable for solving problems with both the SCSI bus and its attached devices. It will help resolve SCSI ID numbers and also run some tests that may help you isolate problems.

You will also find troubleshooting information on the HP Support web site.

The HP Support web site contains links to:

- www.hp.com/support/dlt1 takes you to HP's Customer Care web site for a wide range of up-to-date information about your product
- www.hp.com/cpsso-support/guide/psd/cscinfo.htm takes you to HP's worldwide call center numbers

general guidelines

If you experience problems when using the tape drive, you need to isolate the cause of the problem. For example, if you have just installed a new SCSI host bus adapter and your system will not start, the cause of the problem is likely to be the adapter.

When installing multiple items of hardware and software, we recommend that you install each in turn and restart the system each time. Similarly if you have already installed multiple devices and software and you experience problems, remove or uninstall each in turn to establish which one is causing the problem.

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.

troubleshooting

The first step in problem-solving is establishing whether the problem lies with the cartridge, the drive, the host computer and its connections, or with the way the system is being operated. If none of the following advice helps you solve the problem, refer to our World Wide Web Customer Care pages on www.hp.com/support/dlt1 or call for assistance.

problems with the host computer

Most modern SCSI host bus adapters locate and display attached devices when the system is booting up. If the device is not detected at this stage, there is probably a problem with the physical hardware: cables, termination, connections, or the HBA itself. Refer to the [SCSI](#) topic for a detailed discussion of SCSI IDs, termination and cabling.

If your drive is found on system boot up but cannot be found in the operating system, this is more likely to be a software problem.

computer does not boot up

| Possible cause | Potential solution |
|---|---|
| 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 Surestore DLT1 drive is 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 Surestore DLT1 tape drive is connected to a dedicated host bus adapter. Do not connect the drive to a disk RAID controller as this is not supported. |
| 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 computer's boot disk during the drive installation process. | Check that the cables to all devices are firmly connected. |

computer boots, but does not recognize the tape drive

| Possible cause | Potential solution |
|---|---|
| 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 is LVDS-compliant and that it does not have any bent pins. Replace, if necessary. (See " Ordering Information ".) |
| The SCSI bus may not be terminated correctly. | 1. If your HP Surestore DLT1 drive is the last or only device on the SCSI bus, make sure the device is properly terminated. 2. If your HP Surestore DLT1 drive is not the last or only device on the SCSI bus, check all SCSI cable connections and make sure the last device on the SCSI bus is terminated. |
| The tape drive's SCSI ID address is not unique. | Identify the SCSI IDs of existing SCSI devices by using HP Library & Tape Tools. Change the drive's SCSI ID. Shut down and turn off the host server or workstation; turn off the desktop drive. Change the drive's SCSI ID. Turn on the host server or workstation and desktop drive. |
| External drives only: the tape drive may have been switched on after the computer was booted up. The computer checks for SCSI devices only at power-on. | Switch on the tape drive, then switch the computer off and then on again. |
| The SCSI adapter may be incorrectly configured. | Check the SCSI host adapter configuration. Refer to the SCSI host adapter manuals for instructions. |
| The SCSI cable may be loose. | Check both ends of the SCSI cable, both for the desktop and internal drives. |
| The SCSI terminator might be loose or missing. | 1. Make sure the terminator is properly seated on the open SCSI connector on the rear panel of the desktop drive or on the last device on the SCSI bus. 2. Make sure an LVD or SE terminator is in place on the end of the SCSI ribbon cable for the internal drive. |
| The SCSI terminator might not be at the end of the SCSI bus or more than two terminators might be present on the SCSI bus. | Make sure the terminators are placed only at each end of the SCSI bus—one at the host adapter and one on the last device on the bus, both internal and external. |
| The SCSI host adapter might be in a defective expansion slot. | Move the SCSI host adapter to a different expansion slot. |
| The SCSI bus might be too long. | Make sure the total length of the SCSI bus does not exceed the ANSI SCSI standard of 3 meters (10 feet) for an SE bus, 12 meters (40 feet) for an LVD SCSI bus with multiple devices, or 25 meters (82 feet) for an LVD SCSI bus with a single device. |

problems with the drive

tape drive does not power up

| Possible cause | Potential solution |
|--|---|
| The power cable is not connected properly. | Check that the cables to the tape drive are firmly connected. Make sure that the power cable is firmly connected. <ul style="list-style-type: none"> • For internal drives, try another power connector. • For external drives, the power on/off switch incorporates a green LED. If this is not on, check the power cable connection and replace the cable if necessary. You can use the power cable from your monitor or another device to check that the connection is working. If the power supply is present and all LEDs remain off, call for assistance . |
| The self-test fails (All three LEDs flashing.) | 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 assistance. |

all the LEDs on the front panel blink continually

| Possible cause | Potential solution |
|---------------------------------------|---|
| An internal drive fault has occurred. | 1. Press and hold the Eject button for 6 seconds to reset the drive. 2. Turn the drive off and then on again. If the drive is a HP Surestore DLT1 internal drive, shut down and turn off the host server or workstation, then turn it back on and allow it to boot. 3. Call technical support if Power-On Self-Test (POST) continues to fail. |

errors for which you cannot find the cause

| Possible cause | Potential solution |
|--|--|
| The AC power source may not be properly grounded. (HP Surestore DLT1e desktop drive only.) | 1. Plug the HP Surestore DLT1e Desktop drive's power cable into a power outlet on the same circuit as the host server or workstation. 2. Plug the HP Surestore DLT1e Desktop Drive's power cable into a different power outlet. |

problems during firmware update

drive does not go into firmware update mode

| Possible cause | Potential solution |
|---|---|
| There is a DLTape cartridge in the drive. | Remove the cartridge from the drive and repeat the update process. |
| The drive and its controller hardware are not communicating properly. | The drive's hardware may be damaged and must be repaired. Refer to our World Wide Web Customer Care pages on www.hp.com/support/dlt1 or call for assistance. |

code update failed

| Possible cause | Potential solution |
|--|--|
| 1. The cartridge is not a valid code update cartridge | Obtain a valid code update cartridge and repeat the update process. |
| 2. The cartridge does not contain a valid code update image file. | |
| The cartridge contains a valid code update image file, but the flash EEPROM programming process fails. | The drive's controller hardware is probably damaged and must be replaced. The drive resets and runs Power-On Self-Test (POST) which fails if the flash EEPROM does not contain a valid code image. If this occurs, you must repair the drive before using it. Refer to our World Wide Web Customer Care pages on www.hp.com/support/dlt1 or call for assistance. |

interpreting the LEDs

The HP Surestore DLT1 tape drive has three LEDs (light emitting diodes) on the front panel which indicate drive status. The Ready switch is illuminated when power is switched on.

The tape drive performs a power on Power-On Self-Test (POST) whenever power is applied or the drive is reset. The test takes several seconds to complete, after which the drive is ready to use. The following takes place during POST:

1. The LEDs turn on all at once and then turn off.
2. If a cartridge is loaded, the Ready LED flashes during initialization and remains illuminated after POST.
3. If there is no cartridge loaded, all LEDs turn off after POST.

Use the following table to interpret the LED sequences and the appropriate action to take.

| Symptom | Action |
|---|---|
| Drive fails to execute power-on self-test. LEDs remain off. | Check power is being supplied to the drive. For external drives, the power on/off switch incorporates a green LED. If this is not on, check the power cable connection and replace the cable if necessary. You can use the power cable from your monitor or another device to check that the connection is working. For internal drives try another power connector. If the power supply is present and all LEDs remain off, contact the HP Customer Care Center . |
| The Caution LED is illuminated. | The drive may need cleaning. Load the DLT1 cleaning cartridge . |



dlt1 tape drive user's guide

data protection

- [contact hp](#)
- [home page](#)
- [before you start](#)
- [operation](#)
- [cartridge care](#)
- [cleaning](#)
- [specifications](#)
- [media compatibility](#)
- [diagnostics](#)
- [troubleshooting](#)
- [FAQs](#)
- [SCSI configuration](#)
- [UNIX configuration](#)
- [ordering supplies](#)

frequently asked questions

For further troubleshooting information, refer also to our Customer Support web site: <http://www.hp.com/support/dlt1>

How often should I clean the tape drive heads?

HP recommends that the drive is cleaned once every two weeks to ensure optimum performance.

Use only DLT1 cleaning cartridges to clean the heads. Refer to [Cleaning](#) for details.

What should I avoid when positioning the tape drive?

For internal drives, the server must provide forced cooling and be capable of drawing 2 cfm of air through the tape drive. Avoid blocking air vents. Ensure that empty bays have the appropriate blanking plates installed so that airflow is maintained.

For external drives, do not place the drive in a dirty environment, for example, on the floor, near a busy walkway, or near a door. Avoid locations subject to sudden temperature changes, such as near an outside door or window.

For specific environmental limits, refer to the [specifications](#) for your tape drive model.

How many times can I use a DLTtape IV cartridge?

The recommended maximum number of passes over any single part of the tape is 1,000,000. In practical terms, this is equivalent to about 2,000 backup operations.

What types of tape cartridges can I use with my drive?

Only rely on the best media to protect your valuable data. Thanks to HP's rigorous testing programs, HP DLTtape IV data and DLT1 cleaning cartridges are the safest investment you can make.

Order online at: www.hp.com/go/storagemedia.

Important: You must use DLT1 cleaning cartridges with HP Surestore DLT1 tape drives.

How do I update the firmware?

You can update the firmware in HP Surestore DLT1 tape drives either by downloading over the SCSI bus or by loading a firmware update tape. See [Firmware Updates](#).

For how long can I archive tapes?

DLTtape IV cartridges will preserve the integrity of stored data for at least 30 years if proper storage conditions are observed. See [Storing Cartridges](#).



DLT1 tape drive user's guide

SCSI configuration

contents of this section

- [summary of SCSI terminology](#)
- [setting up the SCSI bus](#)
 - [SCSI ID numbers](#)
 - [identifying SCSI IDs](#)
 - [setting the SCSI ID](#)
 - [SCSI termination](#)
 - [termination power](#)
 - [plug and play adaptor cards](#)
 - [SCSI cables](#)
 - [cable length](#)
 - [cable quality](#)
- [what is SCSI?](#)
 - [the standards](#)
- [SCSI in hp surestore tape drives](#)
- [using wide and narrow devices together](#)
- [using SE and LVD, ultra and ultra 2 SCSI devices together](#)

summary of SCSI terminology

Note: this section discusses SCSI tape drive devices in general, although specific reference is made to the particular SCSI requirements of HP Surestore DLT1 tape drives where appropriate.

Various terms are used when describing SCSI devices. This section provides a brief summary. See [What is SCSI](#) for a more detailed discussion of the different SCSI specifications.

There are three main factors that affect performance and cable length:

- The speed of the data bus, which may be Fast, Ultra or Ultra 2.
- The width of the data bus, which may be Narrow or Wide.
- The voltage level of the interface, which may be single-ended (SE) or low voltage differential (LVD).

HP Surestore DLT1 drives are Ultra SCSI-2 wide devices designed to operate on a low voltage differential SCSI bus (LVDS) with a burst transfer rate of 40 MB/sec. Using the drive on a single-ended SCSI bus restricts performance. Do not use on the same bus as other single-ended devices as this will switch the LVDS host adapter into single-ended mode and restrict performance.

See [SCSI Cables](#) for more information about cable lengths.

setting up the SCSI bus

Each device on a SCSI bus, including the SCSI host bus adapter (HBA), must be configured with a unique ID (identifier).

Note: HP recommends that a dedicated host bus adapter is used for the tape drive. A suitable adapter is available from HP as an accessory (see [Ordering Information](#)).

SCSI ID numbers

SCSI IDs are numbered as follows:

- For wide SCSI buses, the ID will be a number from 0 through 15, so a typical wide SCSI HBA can accommodate up to fifteen other devices.
- For standard, narrow SCSI buses, the ID will be a number from 0 through 7, so a typical narrow SCSI HBA can accommodate up to seven other devices.

SCSI IDs are usually set on the device itself (sometimes via configuration software), but some newer devices are capable of selecting an unused ID automatically when powered-up (these are known as "SCAM" devices). HP Surestore drives are **not** SCAM compliant.

SCSI ID 7 is reserved for the HBA because it has the highest priority on the bus. On wide buses, the priority runs from 7 (highest) to 0, then 15 down to 8 (lowest).

Narrow: 7 6 5 4 3 2 1 0 **High** ————— **priority** ————— **Low**
Wide: 7 6 5 4 3 2 1 0 15 14 13 12 11 10 9 8

identifying SCSI IDs

If your computer already has devices connected to the SCSI bus, you will need to know their IDs to avoid any conflict with the new tape drive. Here are some methods of finding out the information:

- The fastest and easiest way is to run [HP Library & Tape Tools](#). HP Library & Tape Tools will check your SCSI configuration, including the SCSI controller itself and any devices currently attached to it.
- Most computers display a list of SCSI devices and IDs during the boot-up process. This usually scrolls past very fast. If you press the [Pause] key, you should be able to halt the scrolling and view the list.
- If you have an Adaptec host adapter in the computer, it may have come with a Windows utility called SCSI Interrogator (SHOWSCSI.EXE) which displays information about connected devices.
- If you have Windows NT installed, select SCSI Adapters from the Control Panel, select a device in the Devices tab and click on Properties to view information about the device, including its SCSI ID.
- If you have Novell NetWare installed, use its LIST DEVICES command.

If none of these is available to you, try the following sources of information:

- The details of all installed devices and settings may have been written down and stored with your computer's documentation (for new computers, this is often done by the supplier).
- Your HBA's documentation should tell you which settings it uses.
- Look at each device to find out its ID. This is usually easy with external devices. With internal devices, you will probably need the help of the device's documentation to identify the SCSI ID setting, which is usually set with jumpers.

Setting the SCSI ID

- On internal HP Surestore drives, set the SCSI ID by attaching or removing jumpers at the rear of the drive.
- On external HP Surestore DLT1 drives, the ID is displayed on the rear panel and can be set by using a small screwdriver or a ball-point pen to press the little buttons above and below the number.

In either case, see the [Getting Started Guide](#) for more details. Note that host adapters check SCSI IDs only at power-on, so any changes will not take effect until the host system is power-cycled.

SCSI termination

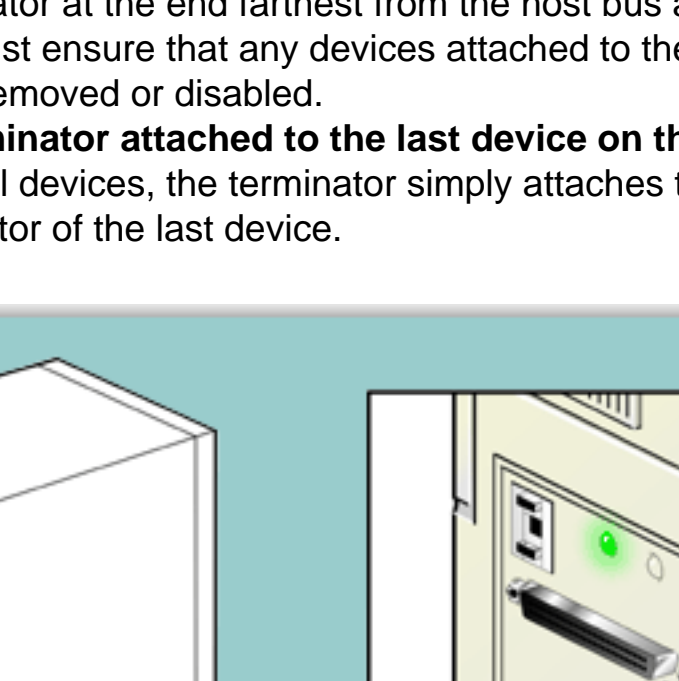
Terminators are essential, as they provide the correct voltages on the SCSI bus and prevent unwanted signal reflections from interfering with data transfers. The rule is:

There must be termination at both physical ends of the bus and only at the ends.

There are two main types of termination, active and passive. Active terminators reduce interference and allow faster data throughput. On devices with high transfer speeds, such as HP Surestore DLT1 drives, active termination is required.

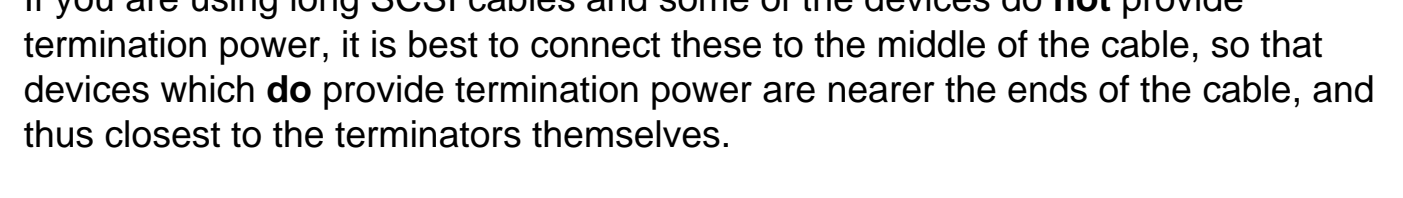
Correct termination can be achieved in four ways:

- **Using the host bus adapter:** Often the HBA forms one end of the SCSI bus and provides termination.



If you have both internal and external devices attached to the same SCSI bus, the HBA will be in the middle of the cable and thus its termination must be disabled. See the host bus adapter's documentation for details of how to do this.

- **Using a terminated SCSI cable:** Usually the internal SCSI cable in a PC-based server has a number of SCSI connectors along its length and a terminator at the end farthest from the host bus adapter. In this case, you must ensure that any devices attached to the cable have termination removed or disabled.
- **Using a terminator attached to the last device on the bus:** For other external devices, the terminator simply attaches to the spare SCSI connector of the last device.



termination power

SCSI terminators require power to function, which is supplied along the SCSI cable from one or more of the connected devices. Most host adapters provide power by default.

If you are using long SCSI cables and some of the devices do **not** provide termination power, it is best to connect these to the middle of the cable, so that devices which **do** provide termination power are nearer the ends of the cable, and thus closest to the terminators themselves.

plug and play adaptor cards

Most plug-and-play adapter cards have an auto-termination feature which, when the adapter is in the middle of the bus, can detect the terminators situated at either end of the SCSI bus and automatically turn off the on-board termination.

SCSI cables

Cables matter in SCSI systems. There are two factors to consider:

cable length

- For LVD SCSI there is a maximum permissible length of 25 meters for a single device. With multiple devices the maximum combined internal/external length is 12 meters.
- For best performance, keep lengths to a minimum, but avoid very short overall lengths (less than 0.5 meters).

cable quality

It is important to use good quality cables. Generally speaking, cable quality affects performance and reliability. This is particularly true for external, shielded cables.

For HP Surestore DLT1 internal drives, you need a SCSI ribbon cable with the correct termination. The drives have a 68-pin wide, high-density SCSI connector. If you are using an HP Surestore DLT1 drive on an internal bus with other peripherals that run at Ultra2 speeds, it is important that a 68-pin LVD-compatible ribbon cable is used.

The cable provided with HP Surestore DLT1 external tape drives will attach to a computer with a wide LVDS SCSI connector (68 pins). If your server or host bus adapter is equipped with a very high density (VHD) wide SCSI connector, you will need to order a 68-pin HD-to-VHD converter or 68-pin HD-to-VHD cable. See [Ordering Information](#).

Look after your SCSI cables. In particular, take care when connecting or disconnecting external to not damage the high-density connectors. Avoid putting excessive twists in external shielded cables, as this can cause premature failure.

what is SCSI?

The Small Computer Systems Interface (SCSI) is popular because it offers a fast and flexible method of connecting a variety of devices to a host computer. The SCSI standards define both the physical connections between the devices (cables and connectors) and the protocols devices use to communicate with each other.

the standards

There have been three general standards:

- **SCSI-1**, which is now obsolete
- **SCSI-2**, which is very common, and still a current standard
- **SCSI-3**, which is an emerging set of linked standards that define much more than the simple bus systems used by the earlier versions. SCSI-3 includes Fibre Channel, Wide SCSI, FireWire (IEEE 1398), Low Voltage Differential (LVD or LVDS), and Fast Serial SCSI. Some of these standards are now being used on PC platforms

Another variant is **ATAPI**, which uses an EIDE physical bus to pass SCSI protocols to connected devices. Technically, this is not part of the SCSI-3 standards, although some operating systems (notably Windows NT) manage ATAPI devices as if they were fully SCSI.

SCSI is a backward-compatible standard, so that SCSI-2 and SCSI-3 devices can almost always be made to work together.

SCSI is a **bus** interface: all the devices are connected to a single cable (some of this may be inside and some outside the host computer's case). The connection to the host itself is known as the Host Bus Adapter (HBA). You can have several HBAs in a single computer, each with its own SCSI bus: this is a common arrangement in high-performance servers. Some host bus adapters (such as the Adaptec 3940W) have more than one SCSI bus available on a single card.

SCSI in hp surestore tape drives

HP Surestore DLT1 drives are Ultra SCSI-2 wide devices designed to operate on a low voltage differential SCSI bus (LVDS) with a burst transfer rate of 40 MB/sec.

using wide and narrow devices together

Narrow SCSI devices can transfer data one byte at a-time (and are sometimes called "8-bit SCSI" devices). They can conform to either the SCSI-2 or SCSI-3 protocols. They have a 50-pin connection to the SCSI bus.

Wide SCSI devices can transfer two bytes of data simultaneously ("16-bit SCSI"). They usually have a single, 68-pin connection to the SCSI bus. (This physical arrangement is part of the SCSI-3 specification.) They may support either SCSI-2 or SCSI-3 protocols.

Wide and narrow devices can simultaneously be connected to the same bus without problem, provided certain rules are followed.

Using HP Surestore DLT1 drives on a narrow bus will restrict performance.

Narrow devices used on a wide bus will not normally affect the performance of any wide devices connected

using SE and LVD, ultra and ultra 2 devices together

SE and LVD define how the signals are transmitted along the cable.

With **single-ended (SE) SCSI**, each signal travels over a single wire and each signal's value is determined by comparing the signal to a paired ground wire. Signal quality tends to decrease over longer cable lengths or at increased signal speed.

With **low voltage differential (LVD) signaling**, signals travel along two wires and the difference in voltage between the wire pairs determines the signal value. This enables faster data rates and longer cabling with less susceptibility to noise than SE signaling and reduced power consumption.

Using HP Surestore DLT1 drives on a single-ended SCSI bus restricts performance. Do not use on the same bus as other single-ended devices as this will switch the LVDS host adapter into single-ended mode and restrict performance to SE speeds and SE cable length.

If you connect only LVD devices, the bus will operate in low voltage differential mode and Ultra2 speeds will be enabled. You can use a combination of Ultra and Ultra2 devices. Each device will operate at its optimum speed.

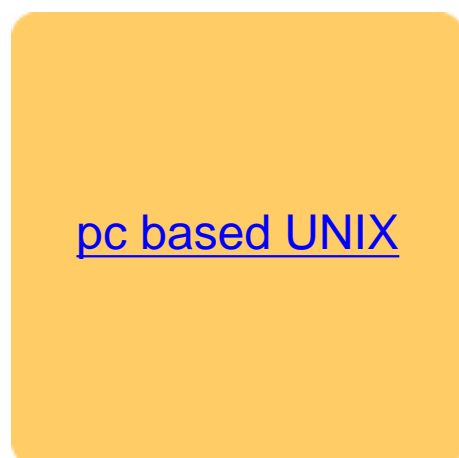
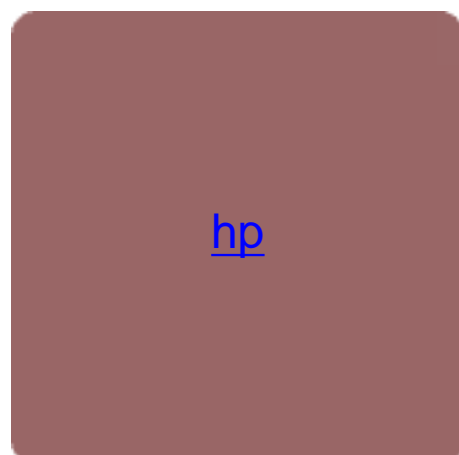


dlt1 UNIX configuration guide

This topic is available in English only.

data protection

- [contact hp](#)
- [home page](#)
- [before you start](#)
- [operation](#)
- [cartridge care](#)
- [cleaning](#)
- [specifications](#)
- [media compatibility](#)
- [diagnostics](#)
- [troubleshooting](#)
- [FAQs](#)
- [SCSI configuration](#)
- [UNIX configuration](#)
 - [hp systems](#)
 - [dec systems](#)
 - [ibm RS/6000 systems](#)
 - [pc based UNIX systems](#)
 - [silicon graphics](#)
 - [sun systems](#)
 - [verify installation](#)
 - [UNIX glossary](#)
- [ordering supplies](#)



This guide provides basic information on configuring HP Surestore DLT1 tape drives with various operating systems. The table below lists the models for which this information is appropriate.

| Model | Type | Capacity | Identifier String for UNIX Configuration* |
|-------------------|-------------|-------------------------------------|---|
| HP Surestore DLT1 | DLT1 drives | 80 GB (assuming 2:1 compression) | BNCHMARKDLT1 |

***Drive Identification in UNIX Configuration:** These strings should be used in UNIX scripts wherever the drive type has to be identified. There are no hardware configuration switches.



dlt1 UNIX configuration guide

data protection

→ [contact hp](#)

→ [home page](#)
 → [before you start](#)
 → [operation](#)
 → [cartridge care](#)
 → [cleaning](#)
 → [specifications](#)
 → [media compatibility](#)
 → [diagnostics](#)
 → [troubleshooting](#)
 → [FAQs](#)

→ [SCSI configuration](#)
 → [UNIX configuration](#)
 [hp systems](#)
 → [dec systems](#)
 → [ibm RS/6000 systems](#)
 → [pc based UNIX systems](#)
 → [silicon graphics systems](#)
 → [sun systems](#)
 → [verify installation](#)
 → [UNIX glossary](#)

→ [ordering supplies](#)

HP-UX systems (series 700 only)

This topic is available in English only.

contents of this section

→ [determining the SCSI ID](#)
 → [creating the device files](#)

related topics

→ [verifying installation](#)
 → [glossary](#)

determining the SCSI id

Before you configure your system to support your new HP Surestore DLT1 drive, you need to determine what SCSI ID to use. The SCSI ID must be unique for each device attached to the SCSI bus. To list the existing devices, use the following command:

```
% /sbin/ioscan -f
```

The output of this should look similar to the following example:

| Class | I | H/W Path | Driver | S/W State | H/W Type | Description |
|----------|---|-----------|-------------|-----------|-----------|----------------------|
| bc | 0 | | root | CLAIMED | BUS_NEXUS | |
| graphics | 0 | 1 | graph3 | CLAIMED | INTERFACE | Graphics |
| ba | 0 | 2> | bus_adapter | CLAIMED | BUS_NEXUS | Core I/O Adapter |
| ext_bus | 0 | 2/0/1 | c700 | CLAIMED | INTERFACE | Built-in SCSI |
| target | 2 | 2/0/1.4 | tgt | CLAIMED | DEVICE | |
| disk | 0 | 2/0/1.4.0 | sdisk | CLAIMED | DEVICE | TOSHIBA CD-ROM XM-34 |
| target | 3 | 2/0/1.6 | tgt | CLAIMED | DEVICE | |
| disk | 1 | 2/0/1.6.0 | sdisk | CLAIMED | DEVICE | HP C2490A |
| lan | 0 | 2/0/2 | lan2 | CLAIMED | INTERFACE | Built-in LAN |
| : | : | : | : | : | : | : |

After you have installed the new tape drive, you can check that it has been attached successfully. From a shell window (hpterm/xterm), execute `ioscan` to display the list of attached devices.

For an HP Surestore DLT1, execute the following:

```
% /sbin/ioscan -f | grep "BNCHMARK"
```

The new lines should look similar to the following, where the 4 in the I field represents the instance of the SCSI tape driver, not the SCSI ID:

| Class | I | H/W Path | Driver | S/W State | H/W Type | Description |
|-------|---|-----------|--------|-----------|----------|-----------------|
| tape | 4 | 2/0/1.5.0 | stape | CLAIMED | DEVICE | HP-----BNCHMARK |

creating the device files

Once you have verified the tape drive connection, you will need to create the appropriate device files for the drive. Normally, you would have rebooted your system after attaching the tape drive, and this process runs `insf`. However, if you have *not* rebooted your system since attaching the drive, you should run `insf` as follows before running `mksf` to create the device files:

```
% /sbin/insf -C tape
```

Create the device files for the devices using the `mksf` command as follows:

```
% /sbin/mksf -d stape -I <instance> [-n] [-u] /dev/rmt/X<name>
```

where:

| Argument | Description |
|---------------|---|
| -d stape | Specifies the SCSI tape driver |
| -I <instance> | Specifies the tape drive's hardware address via the instance of the SCSI tape driver. The first instance is 0, the second 1, and so on. |
| [-n] | Specifies no rewind; absence of this parameter indicates rewind mode |
| [-u] | Specifies Berkeley mode; absence of this parameter indicates AT&T mode. Berkeley and AT&T modes differ in their read-only close behavior: <ul style="list-style-type: none"> • In Berkeley mode, the tape position will remain unchanged by a device close operation. • In AT&T mode, a device close operation will cause the tape to be repositioned just after the next tape filemark (the start of the next file). |

In most cases, Berkeley mode should be used.

/dev/rmt/X<name> Specifies the path of the device file, where:

| | |
|--------|--|
| X | Specifies the tape device identifier. Use the next available identifier. You can examine the contents of <code>/dev/rmt</code> using the <code>ls</code> command to determine which identifiers have already been used. |
| <name> | Specifies the short name (in HP-UX 9.x-style) of the device file: <ul style="list-style-type: none"> mnb No rewind, compression disabled, Berkeley-mode device hnb No rewind, compression enabled, Berkeley-mode device mnb No rewind, compression disabled, Berkeley-mode device hnb No rewind, compression enabled, Berkeley-mode device |

See the man page (`man 1m mksf`) for other options of the `mksf` command. The `stape` section covers the SCSI tape driver options. The man page `man 7 mt` describes the long filenames used in HP-UX 10.x.

example:

To create a device file with the following characteristics:

- A hardware address specified by instance 5 (`-I 5`)
- No rewind (`-n`)
- Berkeley mode tape positioning on close (`-u`)
- A filename of `4mnb`, where 4 is the tape device identifier (`/dev/rmt/4mnb`)

You would execute the following:

```
% /sbin/mksf -d stape -I 5 -n -u /dev/rmt/4mnb
```

You can check that the appropriate device file was created using the `lssf` command as follows:

```
% /sbin/lssf /dev/rmt/4mnb
```

This should produce the following output to show that the device file now exists:

```
stape card instance 0 SCSI target 6 SCSI LUN 0 berkeley no
rewind
BEST density at address 2/0/1.6.0 /dev/rmt/4mnb
```

Once the device files have been created, you should confirm that your new tape drive is working properly. See [Verifying Installation](#).



data protection

→ [contact hp](#)

→ [home page](#)
 → [before you start](#)
 → [operation](#)
 → [cartridge care](#)
 → [cleaning](#)
 → [specifications](#)
 → [media compatibility](#)
 → [diagnostics](#)
 → [troubleshooting](#)
 → [FAQs](#)

→ [SCSI configuration](#)
 → [UNIX configuration](#)
 → [hp systems](#)
 [dec systems](#)
 [ibm RS/6000](#)
 → [systems](#)
 [pc based UNIX](#)
 [systems](#)
 → [silicon graphics](#)
 → [sun systems](#)
 → [verify installation](#)
 → [UNIX glossary](#)

→ [ordering supplies](#)

dlt1 UNIX configuration guide

DEC systems, Digital UNIX 4.x

This topic is available in English only.

contents of this section

→ [configuring for Digital UNIX 4.x](#)

related topics

→ [verifying installation](#)
 → [glossary](#)

configuring for Digital UNIX 4.x

- 1 Add the following entry to your `/etc/ddd.dbase` file:


```
SCSIDEVICE
Type = tape
Name = "BNCHMARK" "DLT1"
```
- 2 Set the following parameters in the file:


```
PARAMETERS:
MaxTransferSize = 0xffffffff
ReadyTimeSeconds = 0x2d
InquiryLength = 0x20
DENSITY:
DensityNumber = 0
OneFileMarkOnClose = yes
DensityCode = 0x00
Blocking = 0
CompressionCode = 0x0
Buffered = 0x1
DENSITY:
DensityNumber = 1
OneFileMarkOnClose = yes
DensityCode = 0x00
Blocking = 0
CompressionCode = 0x1
Buffered = 0x1
```
- 3 Rebuild the kernel by running `/sbin/ddd_config_c`, then reboot the system with the tape drive attached. The device files for the DLT1 drive will be generated in `/dev/rmt` when you reboot.
- 4 The names of the device files can be interpreted as follows:


```
[n]rmtX D
```

 where:

Code Meaning

- n No rewind
- X Instance number assigned to the drive by the operating system (0 is the first, 1 is the second, and so on)
- h Compression on (high density)
- l Compression off (low density)

For example, `/dev/rmt/nrmt0h` is a device file for the first device, which is a high-density, no-rewind device.

Once the device files have been created, you should confirm that your new tape drive is working properly. See [Verifying Installation](#).



dlt1 UNIX configuration guide

data protection

→ [contact hp](#)

→ [home page](#)
 → [before you start](#)
 → [operation](#)
 → [cartridge care](#)
 → [cleaning](#)
 → [specifications](#)
 → [media compatibility](#)
 → [diagnostics](#)
 → [troubleshooting](#)
 → [FAQs](#)

→ [SCSI configuration](#)
 → [UNIX configuration](#)
 → [hp systems](#)
 → [dec systems](#)
 → [ibm RS/6000 systems](#)
 → [pc based UNIX systems](#)
 → [silicon graphics](#)
 → [sun systems](#)
 → [verify installation](#)
 → [UNIX glossary](#)

→ [ordering supplies](#)

IBM RS/600 systems, AIX

This topic is available in English only.

contents of this section

→ [determining the SCSI ID](#)
 → [configuring the device files](#)
 → [device file names under AIX](#)

related topics

→ [verifying installation](#)
 → [glossary](#)

determining the SCSI id

Before you configure your system to support your new HP Surestore DLT1 drive, you need to determine what SCSI ID to use. The SCSI ID must be unique for each device attached to the SCSI bus. To list the existing devices, use the following command:

```
% lsdev -C |grep SCSI
```

This will produce output that looks similar to:

```
scsi0 Available 00-00-0S Standard SCSI I/O Controller
hdisk0 Available 00-00-0S-0 1.0 GB SCSI Disk Drive
rmt1 Defined 00-00-0S-2,0 Other SCSI Tape Drive
```

The SCSI ID is in the series 00-00-0S-X,0 where X is the SCSI ID. Review the list of existing SCSI IDs and choose an available ID to assign to your new tape drive.

configuring the device files

To install the HP Surestore DLT1 drive on an IBM workstation running AIX, you will need to create the appropriate device files for the drive.

NOTE: Do *not* choose the `smit` option of "4mm2gb" as the Tape Device Type. This is reserved for Connor drives. If you use it with HP drives, you will get the error "Device to be configured does not match the physical device at the specified connection location".

To change to variable block mode, use the following procedure:

- 1 If you are using a *graphics terminal* running X-Windows, then at a Windows terminal, type: `smit tape`
 If you are using a *non-graphics terminal*, at the command line type:

```
% smit -C tape
```
- 2 If no device has been configured at this address before, select "add a tape drive" to set up the address. From the pop-up window, select "ost" or "Other SCSI tape drive" as the tape drive you wish to change and choose connection addresses as appropriate.
- 3 Select from the window: "change/show characteristics of a tape drive"
- 4 From the pop-up window, select "ost" or "Other SCSI tape drive" as the tape drive you wish to change. Do *not* choose "4mm2gb".
- 5 Change the block size field to 0, and click on the "DO" button or press [Enter] to apply the change.

HP DLT1 drives will work with `tar`, `cpio`, `backup`, `restore` and `dd`. For systems other than the 43P, the drive is also boot-capable, provided a boot tape is generated using `mkszfile` and `mksysb`.

Once the device files have been created, you should confirm that your new tape drive is working properly. See [Verifying Installation](#).

device file names under AIX

Use device filenames as listed below for the combination of Rewind on Close, Retension on Open, and Compression that you want:

| Filename | Rewind on Close | Retension on Open | Compression |
|----------------------|-----------------|-------------------|-------------|
| /dev/rmt <i>n</i> | Yes | No | enabled |
| /dev/rmt <i>n</i> .1 | No | No | enabled |
| /dev/rmt <i>n</i> .2 | Yes | Yes | enabled |
| /dev/rmt <i>n</i> .3 | No | Yes | enabled |
| /dev/rmt <i>n</i> .4 | Yes | No | disabled |
| /dev/rmt <i>n</i> .5 | No | No | disabled |
| /dev/rmt <i>n</i> .6 | Yes | Yes | disabled |
| /dev/rmt <i>n</i> .7 | No | Yes | disabled |

The *n* in the filename is the instance number assigned to the drive by the operating system, where 0 is the first device, 1 is the second and so on.

Rewind on Close Normally, the drive repositions the tape to BOT (Beginning of Tape) when the device file is closed. Using the no rewind option is useful when creating and reading tapes that contain multiple files.

Retension on Open Retensioning consists of winding to EOT (End of Tape) and then rewinding to BOT, in order to reduce errors. If this option is selected, the tape is positioned at BOT as part of the open process. DLT1 drives do not require retensioning, so you should not use device fields that send retensioning commands.

Compression Compression can be disabled or enabled.



invent

dlt1 UNIX configuration guide

data protection

[→ contact hp](#)

→ [home page](#)
 → [before you start](#)
 → [operation](#)
 → [cartridge care](#)
 → [cleaning](#)
 → [specifications](#)
 → [media compatibility](#)
 → [diagnostics](#)
 → [troubleshooting](#)
 → [FAQs](#)

→ [SCSI configuration](#)
 → [UNIX configuration](#)
 → [hp systems](#)
 → [dec systems](#)
 → [ibm RS/6000](#)
 → [systems](#)
 → [pc based UNIX](#)
 → [systems](#)
 → [silicon graphics](#)
 → [sun systems](#)
 → [verify installation](#)
 → [UNIX glossary](#)

→ [ordering supplies](#)

PC-based UNIX, SCO and Linux

This topic is available in English only.

contents of this section

→ [determining the SCSI ID \(Linux\)](#)
 → [configuring for an SCO system](#)
 → [configuring for a Linux system](#)

related topics

→ [verifying installation](#)
 → [glossary](#)

determining the SCSI id (Linux)

Look at the output of `dmesg` to find out what SCSI channel number is used for each connection.

To find out the SCSI IDs in use on each channel:

```
run cat /proc/scsi/scsi
```

This will produce output similar to the following for each device:

```
Attached devices:
Host: SCSI0 Channel:00 Id:00 Lun:00
Vendor: HP Model -----
Type: Direct-Access ANSI SCSI Revision 02
```

Look at the Id information to establish which Ids are in use.

configuring for an SCO system

To install the appropriate driver and device files on a SCO system, perform the following steps:

- 1 Run `'mkdev tape'` as root.
- 2 Select 'Configure SCSI tape drive'.
- 3 Select 'Install tape drive'.
- 4 Select the appropriate SCSI adapter.
- 5 Select the appropriate SCSI bus.
- 6 Select the Target ID to match the SCSI ID set on the back of the drive.
- 7 Select the LUN to be 0.
- 8 Enter 'y' to update the SCSI configuration.
- 9 Enter the following details:

```
Vendor identification string:          BNCHMARKDLT1
```

```
SCSI version to which the drive conforms: 2
```

```
Response Data Format (SCSI-2):        2
```

```
Generic device:                        1
```

This procedure will automatically make the drive the default device, even if another device is already configured.

You may want to edit `/etc/conf/pack.c/stp/space.c` to change the filemark handling on close. By default, it writes only one filemark for a write filemark `ioctl()`. See the comments in the `space.c` file.

- 10 Enter 'q' to leave unchanged the boot string that is displayed when the system is rebooted.
- 11 Enter 'q' to return to the Main Menu.
- 12 Enter 'q' to quit.
- 13 You are now prompted to rebuild the kernel and the kernel environment (which includes the device files). Perform both steps by answering 'y' when prompted, and select the new kernel to be booted by default. You can now use one of the following files, as appropriate, for backup operations:

```
/dev/nrStpX if you require a no-rewind device
```

```
/dev/rStpX if you require a rewind device
```

where `x` is the instance number as assigned to the drive by the operating system (0 is the first device, 1 is the second, and so on).

controlling compression with SCO

Because SCO does not have any compression/no-compression device files, you must use `'tape setcomp'` to control the compression status of the drive as follows:

| Command | Compression | Decompression |
|--------------------------------|-------------|---------------|
| <code>tape -a 0 setcomp</code> | disabled | disabled |
| <code>tape -a 1 setcomp</code> | enabled | disabled |
| <code>tape -a 2 setcomp</code> | disabled | enabled |
| <code>tape -a 3 setcomp</code> | enabled | enabled |

If you have multiple drives, you must specify the appropriate device files in the command. For example:

```
% tape -a 0 setcomp /dev/nrStp2
```

Use `'tape getcomp'` to tell you the current status of the drive.

NOTE: Do *not* use the SCO `'mt'` utility. This is obsolete, and does not perform the same function as `'mt'` on other platforms. Use `'tape'` to achieve the same result.

improving performance through block size on SCO

In order to improve performance, specify larger blocking factors for `cpio` and `tar`. Use the `'b'` option of `tar` with an argument of 20 or use the `'B'` option of `cpio`. For example:

```
% tar cvbf 20 /dev/rStpY ./*
```

or

```
% find / -print | cpio -ocB > /dev/rStpY
```

or, if you have a version of SCO UNIX earlier than 5.x:

```
% find / -print | cpio -ocB > /dev/rStpY
```

In each case, `Y` is the instance number as assigned to the drive by the operating system (0 is the first device, 1 is the second, and so on).

Alternatively, you can use the `tape` command as follows:

```
% tape -a 32768 setblk <device file>
```

This explicitly sets the block size used for the drive when you are using built-in applications such as `cpio` and `tar`. The `<device file>` is either `/dev/nrStpY` or `/dev/rStpY` as described above.

configuring for Linux systems

No changes are needed to support DLT1 on Linux platforms, however you should ensure that you have the relevant drivers loaded.

To see the device drivers loaded currently, execute an `lsmod` command, this will give output like:

```
Module Size Used by
sgm 4376 1
ide-scsi 7200 0
lockd 30792 1
sunrpc 53316 1
st 24656 0
ncr53c8xx 52096 1
aic7xxx 136184 2
```

The lines of interest here are:

```
st          This is the tape driver. Its presence in the output of the lsmod
            command shows that the tape driver is loaded.
ncr53c8xx  This is a SCSI chipset driver for the LSI Logic family of HBAs
            (amongst others).
aic7xxx    This is a SCSI chipset driver for the Adaptec 7xxx chipset family (such
            as Adaptec 2940UW).
```

In order to communicate with a tape device, the operating system needs to have drivers for the tape and the underlying transport mechanism (the host bus adaptor) loaded. Ensure that both are available as either loadable modules (for example, usable with `insmod` and visible with `lsmod`) or are statically built into your kernel.

In order to determine if the drive has been detected by the tape driver at module load time, execute:

```
dmesg | grep "st"
```

This should find a number of lines. One should look like:

```
Detected SCSI tape st0 at scsi1, channel 0, id 5, lun 0
```

To load the tape driver module if it is not loaded as above, execute:

```
insmod st
```

to load it. This should happen naturally if your system is rebooted after attaching the drive.

In order to enable large transfers under Linux (>64 KB per write), edit the file `/usr/src/linux/drivers/scsi/st_options.h` and change the definition of `ST_BUFFER_BLOCKS`.

If you want requests to space to end of data to be faster, you should also enable `ST_FAST_MTEOM` in the same file. After changing this file, rebuild the modules and install the new binary. At the very least, this requires:

```
make modules
make modules_install
```

from the `/usr/src/linux` directory. See your kernel documentation.



dlt1 UNIX configuration guide

data protection

→ [contact hp](#)

→ [home page](#)
 → [before you start](#)
 → [operation](#)
 → [cartridge care](#)
 → [cleaning](#)
 → [specifications](#)
 → [media compatibility](#)
 → [diagnostics](#)
 → [troubleshooting](#)
 → [FAQs](#)

→ [SCSI configuration](#)
 → [UNIX configuration](#)
 → [hp systems](#)
 → [dec systems](#)
 → [ibm RS/6000 systems](#)
 → [pc based UNIX systems](#)
 → [silicon graphics](#)
 → [sun systems](#)
 → [verify installation](#)
 → [UNIX glossary](#)

→ [ordering supplies](#)

Silicon Graphics systems, IRIX

This topic is available in English only.

contents of this section

→ [determining the SCSI ID](#)
 → [configuring the device files](#)
 → [MTCAN and constants values](#)

related topics

→ [verifying installation](#)
 → [glossary](#)

determining the SCSI id

Before you configure your system to support your new HP Surestore DLT1 drive, you need to determine what SCSI ID to use. The SCSI ID must be unique for each device attached to the SCSI bus. To list the existing devices, use the following command:

```
% hinvt -v | grep SCSI
```

This will produce output similar to the following:

```
Integral SCSI controller 0: Version WD33C93B, revision D
Disk drive: unit 1 in SCSI controller 0
```

In this, "unit X" indicates the SCSI ID. Review the list of existing SCSI IDs and choose an available ID to assign to your new tape drive.

configuring the device files

To install the HP Surestore DLT1 drive on a Silicon Graphics system running IRIX, you will need to modify the kernel configuration file.

• If you want `tar` to default to short block transfers, change the `512*512` in your `tpsc` or `scsi` HP entry to `128*512` (128-kilobyte blocks) or, better still, `64*512` (64-kilobyte blocks).

1 Select the name of the kernel configuration file for your version of IRIX from the list below and open it with a text editor:

• For IRIX 6.2 and later: `/var/sysgen/master.d/scsi`

2 Find the following entry in the kernel configuration file and copy it to a new location in the file where you can edit it as appropriate for your tape drive:

For IRIX 6.2:

```
{DECDLT, TPDLT, 8, 4, "BNCHMARK", "DLT1", 0, 0, {0},
MTCAN_BSF|MTCAN_BSR|MTCAN_APPEND|
MTCAN_PREV|MTCAN_SYNC|MTCAN_SPEOD|MTCAN_CHKRDY|MTCAN_VAR|
MTCAN_SETSZ|MTCAN_SILI|MTCAN_SEEK|MTCAN_COMPRESS,
/*minimum delay to I/O is 4 minutes, because when a retry
is *performed, the drive retries a number of times, and
then
*rewinds to BOT, repositions, and tries again.*/
40, 4*60, 20*60, 5*60, 512, 64*512, 0, (u_char*)0 },
```

For IRIX 6.4/6.5:

```
{ DATDLT, TPDLT, 8, 4, "BNCHMARK", "DLT1", 0, 0, {0},
MTCAN_BSF|MTCAN_BSR|MTCAN_APPEND|
MTCAN_PREV|MTCAN_SYNC|MTCAN_SPEOD|MTCAN_CHKRDY|MTCAN_VAR|
MTCAN_SETSZ|MTCAN_SILI|MTCAN_SEEK|MTCAN_COMPRESS,
/* minimum delay on i/o is 4 minutes, because when a
retry is
* performed, the drive retries a number of times, and
then
* rewinds to BOT, repositions, and tries again. */
40, 4*60, 4*60, 5*60, 3*3600, 512, 512*512,
tpsc_default_dens_count, tpsc_default_hwg_dens_names,
tpsc_default_alias_dens_names,
{0}, 0, 0, 0,
0, (u_char *)0 },
```

For an explanation of the MTCAN values and constants, see "[MTCAN and Constants Values](#)".

3 Recompile the kernel by running `autoconfig` and then reboot the system. When you reboot, the device files for the DLT1 drive will be created automatically.

The following device files will be created in `/dev/rmt`:

```
tps0d3          tps0d3cnrv     tps0d3nrns     tps0d3s
tps0d3c         tps0d3cns     tps0d3nrnsv    tps0d3sv
tps0d3cnr       tps0d3cnsv    tps0d3nrns     tps0d3v
tps0d3cnrns     tps0d3cs      tps0d3nrsv     tps0d3stat
tps0d3cnrnsv    tps0d3csv     tps0d3nrsv
tps0d3cnrs      tps0d3cv      tps0d3ns
tps0d3cnrsv     tps0d3nr      tps0d3nsv
```

These device file names can be interpreted as follows:

| Device Name | Function |
|-------------|---|
| c | Compression |
| nr | No rewind on close |
| v | Device supports variable block sizes |
| ns | Device does not byte-swap |
| s | Device does byte-swap |
| stat | Allows the device to be used when one of the other device files specifying the same physical device is already opened |

For example, the device file `tps0d3` indicates a device on controller card 0 at SCSI ID 3, and the device file `tps0d3nrsv` indicates a device on controller card 0 at SCSI ID 3 that does not rewind on close and supports variable block sizes.

Once the device files have been created, you should confirm that your new tape drive is working properly. See [Verifying Installation](#).

MTCAN and constants values

The MTCAN values have the following functions:

| MTCAN value | Capability Enabled |
|-------------|--|
| APPEND | Append to existing tape data |
| BSF | Backspace file |
| BSR | Backspace record |
| CHKRDY | Determine if a tape cartridge is present |
| CHTYPEANY | Change density and/or fixed to variable at points other than beginning of tape |
| COMPRESS | Compression |
| PREV | Prevent media removal |
| SEEK | Seek to a particular block |
| SETSZ | Fixed block size can be set |
| SILI | Suppress illegal length indicators |
| SPEOD | Space to EOD (end of data) |
| SYNC | Synchronous mode SCSI |
| VAR | Variable block sizes |

The constants have the following functions:

| Constant | Description |
|-------------------|---|
| 40 | Transfer time-out in "inverse ticks" |
| 4*60 | Minimum time-out in seconds for any command |
| 4*60 | Space command time-out in seconds |
| 5*60 | Time-out in seconds for long operations (such as rewinds) |
| 512 | Default block size in bytes for fixed block size mode |
| 64*512 or 512*512 | Recommended blocking factor in bytes for the upper limit of read/write commands |



dlt1 UNIX configuration guide

data protection

→ [contact hp](#)

→ [home page](#)
 → [before you start](#)
 → [operation](#)
 → [cartridge care](#)
 → [cleaning](#)
 → [specifications](#)
 → [media compatibility](#)
 → [diagnostics](#)
 → [troubleshooting](#)
 → [FAQs](#)

→ [SCSI configuration](#)
 → [UNIX configuration](#)
 → [hp systems](#)
 → [dec systems](#)
 → [ibm RS/6000 systems](#)
 → [pc based UNIX systems](#)
 → [silicon graphics sun systems](#)
 → [verify installation](#)
 → [UNIX glossary](#)

→ [ordering supplies](#)

Sun systems, Solaris 2 (SunOS 5.x)

This topic is available in English only.

contents of this section

→ [determining the SCSI ID](#)
 → [configuring the device files](#)
 → [hp-data values](#)

related topics

→ [verifying installation](#)
 → [glossary](#)

determining the SCSI id

Before you configure your system to support your new HP SureStore DLT1 drive, you need to determine what SCSI ID to use. The SCSI ID must be unique for each device attached to the SCSI bus.

- 1 Check for existing SCSI controllers using the following command:

```
% modinfo | grep "SCSI Host"
```

This will produce output similar to the following:

```
18 501a4000 c3b8 61 1 esp (ESP SCSI Host Bus Adapter Drive)
21 501c8000 9e70 6 1 fas (FAS SCSI Host Bus Adapter Drive)
```

This indicates that there are two SCSI controllers on the system, an ESP-based adapter and a FAS-based adapter. For the adapter to which the new tape drive is attached, you will need to determine what SCSI IDs are already used.

- 2 Determine the SCSI IDs of the existing devices attached to the SCSI controller:

For all adapters:

```
% dmesg | egrep ".*xxx.*target" | sort | uniq
```

where xxx = the type of adapter (esp, glm, fas or isp), as appropriate.

For example, for an ESP-based adapter:

```
% dmesg | egrep ".*esp.*target" | sort | uniq
```

This produces a list similar to:

```
sd0 at esp0: target 0 lun 0 sd6 at esp0: target 6 lun 0
```

This indicates that SCSI IDs 0 and 6 are used for existing devices. SCSI ID 7 is generally used for the adapter itself. In this situation, you would use a SCSI ID from 1 to 5 for the new tape drive.

configuring the device files

Only if necessary, make the following file modifications to enhance performance:

- 1 In the file `/kernel/drv/st.conf`, after these lines:

```
#####
# Copyright (c) 1992, by Sun Microsystems, Inc.
#ident "@(#)st.conf 1.6 93/05/03 SMI"
```

add the following:

```
tape-config-list =
    "BNCHMARKDLT1", "HP DLT1", "DLT1",
    DLT1 = 1, 0x36, 0, 0xd639, 4, 0x00, 0x00, 0x86, 0x87, 3;

    name="st" class="scsi"
        target=X lun=0;
```

where *X* is the SCSI target address of the device you have attached.

- 2 If you are replacing an existing tape device on the same SCSI ID, remove the contents of the `/dev/rmt` directory as follows:

```
% cd /dev/rmt
% rm *
```

- 3 Do a reconfigure boot:

```
% cd /
% touch /reconfigure
% sync;halt
```

- 4 When the system is down, reboot:

```
% boot -r
```

Make sure you include the `-r` switch, so that the device directory is reconfigured using the new data.

- 5 You should now be able to use the drive:

- Use `/dev/rmt/Xcb` if you require a compression rewind device file, where *X* is the relevant device address.
- Use `/dev/rmt/Xcbr` when you require a compression non-rewind device.

Once the device files have been created, you should confirm that your new tape drive is working properly. See [Verifying Installation](#).

hp-data values

The values for `DLT1` and `name`, which provide normal DLT mode, have the following meanings:

| Value | Meaning |
|-----------|--|
| 1 | This value should be 1. |
| 0x36 | Value for a DLT drive in <code>/usr/include/sys/mtio.h</code> . |
| 0 or 1024 | Default block size. For variable block size, use 0 instead of 1024 (except with Solaris 2.3, where you should not use 0). |
| 0xd639 | A value is derived from constants provided in <code>/usr/include/sys/scsi/targets/stdef.h</code> . The value determines which operations the driver can perform with the attached device by using a unique value for each feature and then adding them together to form <code>0xd639</code> . The features are as follows: <ul style="list-style-type: none"> 0x001 Device supports variable length records. 0x008 Device can backspace over files (as in the <code>'mt bsf'</code> option). 0x010 Device supports backspace record (as in <code>'mt bsr'</code>). 0x020 Device requires a long time-out period for erase functions. 0x0200 Device knows when end of data has been reached. 0x0400 Device driver is unloadable. 0x1000 Time-outs five times longer than normal. 0x4000 Driver buffers write requests and pre-acknowledges success to application. 0x8000 Variable record size not limited to 64 KB. |
| 0x00 | Default density setting. Creates a device file with compression disabled. |
| 0x86 | Density code specifying 40GB capacity (no compression). |
| 0x87 | The density code for data compression enabled by default (80GB). |
| target=X | <i>X</i> specifies the SCSI ID (target) of the device. |
| lun=0 | Specifies the LUN for the device. |



dlt1 UNIX configuration guide

data protection

→ [contact hp](#)

- [home page](#)
- [before you start](#)
- [operation](#)
- [cartridge care](#)
- [cleaning](#)
- [specifications](#)
- [media compatibility](#)
- [diagnostics](#)
- [troubleshooting](#)
- [FAQs](#)

- [SCSI configuration](#)
- [UNIX configuration](#)
 - [hp systems](#)
 - [dec systems](#)
 - [ibm RS/6000 systems](#)
 - [pc based UNIX systems](#)
 - [silicon graphics](#)
 - [sun systems](#)
 - [verify installation](#)
 - [UNIX glossary](#)

→ [ordering supplies](#)

verify the installation

This topic is available in English only.

contents of this section

- [overview](#)
- [verifying the installation](#)
 - [example](#)
 - [system-specific arguments](#)
 - [glossary](#)

overview

As part of the installation process, you will have installed the appropriate device driver for your UNIX system and created device files to communicate with the tape drive. This section describes how you can verify that the installation has been performed correctly.

In outline, the procedure is as follows:

- 1 Write test data to a tape.
- 2 Read the test data from the tape.
- 3 Compare the data read from the tape with the original data on disk.

verifying the installation

- 1 Test the SCSI connection to the tape drive by doing a rewind operation:
 - a If there is a tape cartridge already in the drive, remove it.
 - b Insert a tape cartridge.
 - c Rewind the tape using the command line:
 % mt -t <archive name> rewind
 or for SCO UNIX:
 % tape -a /dev/rStpX rewind
 If you do not see the Ready light flash as the tape rewinds, the hardware installation may be faulty. Check the troubleshooting section of the User's Guide for help in identifying the problem.

- 2 Write a sample file to tape, using 'tar':
 % cd /
 % tar cvf <archive name> <file>

The options to tar have the following meanings:

- c Create a new archive (backup file) on the device.
- v Operate in verbose mode.
- f Specify the archive name explicitly.

The arguments follow the cvf options in the command line. Their values depend on the operating system; suggested values are given in "System-Specific Arguments". The arguments are as follows:

- <archive name> The name of the archive name to be created.
Example: /dev/rmt/0m
- <file> The name of the file to archive, prefixed with './'.
Example: ./stand/vmunix

NOTE Make sure you prefix the file name with './' when you back it up to tape. If you do not, the restore operation in step 3 will overwrite the original copy on disk.

- 3 Read the file back from tape:
 % cd /tmp
 % tar xvf <archive name>
 The 'x' option to tar here means "extract from the archive".
 Use the same value for the <archive name> argument as in step 2.
- 4 Compare the original with this retrieved file:
 % cmp <original file> /tmp/<retrieved file>
 This step compares the retrieved file and the original file byte by byte. If they are the same, there should be no output, and this verifies that the installation is correct. The arguments are as follows:

- <original file> The name of the original file, prefixed with './'.
Example: /stand/vmunix
- <retrieved file> The name of the file retrieved from the archive.
Example: stand/vmunix

example

Suppose you are verifying the installation of an HP DLT1 tape drive on an HP-UX 10.X system. The procedure would be as follows. See "System-Specific Arguments" below for the choice of <archive name> and <file> arguments:

- 1 Change directory to root:
 % cd /
- 2 Back up /stand/vmunix to tape:
 % tar cvf /dev/rmt/0m ./stand/vmunix
 Note the prefix of './' to the filename.
- 3 Change to the temporary directory:
 % cd /tmp
- 4 Extract the file from the tape:
 % tar xvf /dev/rmt/0m
- 5 Compare the original with the restored version:
 % cmp /stand/vmunix /tmp/stand/vmunix
 Note that the original filename is *not* prefixed with './'.

system-specific arguments

The following table lists suggested values for the arguments <archive name> and <file> in the verification procedure described above. If any of the suggested files are symbolic links on your system, choose another file appropriate for your system.

| System | File Name | Description | Archive Name | Notes |
|---------------------------|--------------|--------------|---|--|
| DEC OSF | vmunix | OSF kernel | /dev/rmt/Ym | Y is the instance of the drive |
| HP-UX 10.x | stand/vmunix | HP-UX kernel | /dev/rmt/Ym | Y is the instance of the drive |
| IBM AIX | unix | AIX kernel | /dev/rmt Y.1 /dev/rmt Y.1 | Y is the device ID reported back as available when you ran 'smitt -C tape' to create the device files. |
| SCO | unix | SCO kernel | /dev/rmt Y.1 | Use the device file created during the running of 'mkdev tape', where Y is the instance of the tape drive. |
| Silicon Graphics IRIX | unix | IRIX kernel | /dev/rmt/tpsCdX | C is the SCSI card X is the SCSI ID of the drive |
| SUN Solaris 2 (SunOS 5.x) | bin/csh | C shell | Determine the archive name as described below*. | |
| Linux | bin/sh | Bourne shell | /dev/stp | |

*For SUN Solaris 2, determine the archive name by typing:

```
% ls -l /dev/rmt/*m | grep "st@X"
```

where X is the SCSI ID. Identify the line for the tape drive. For example, if the drive was at SCSI ID 2, look for the line containing "st@2,0". This might be as follows (but on a single line):

```
lrwxrwxrwx 1 root root 63 Mar 1 00:00 /dev/rmt/0m  
.././devices/sbus@1f,0/espdma@e,8400000/esp@e,8800000/st@2,0:m
```

Here you could use /dev/rmt/0m (shown underlined above) as the archive name.



data protection

→ [contact hp](#)

- [home page](#)
- [before you start](#)
- [operation](#)
- [cartridge care](#)
- [cleaning](#)
- [specifications](#)
- [media compatibility](#)
- [diagnostics](#)
- [troubleshooting](#)
- [FAQs](#)

- [SCSI configuration](#)
- [UNIX configuration](#)
 - [hp systems](#)
 - [dec systems](#)
 - [ibm RS/6000 systems](#)
 - [pc based UNIX systems](#)
 - [silicon graphics](#)
 - [sun systems](#)
 - [verify installation](#)
 - [UNIX glossary](#)

→ [ordering supplies](#)

dlt1 UNIX configuration guide

glossary

This topic is available in English only.

AT&T mode

Berkeley and AT&T functional modes differ in "read only" close functionality. In AT&T mode, a device close operation will cause the tape to be repositioned just after next tape filemark (the start of the next file).

Berkeley mode

Berkeley and AT&T functional modes differ in "read only" close functionality. In Berkeley mode the tape position will remain unchanged by a device close operation.

Compression

A procedure in which data is transformed by the removal of redundant information to reduce the number of bits required to represent the data. This is done by substituting short codewords for strings of bytes.

Filemark

A mark written by the host to the tape, which can be searched for, often using the drive's fast-search capability. It does not necessarily separate files. It is up to the host to assign a meaning to the mark.

Immediate mode

A mode of responding to SCSI commands where the drive or other peripheral does not wait until the command has finished before returning status information back to the host. When writing filemarks, Immediate mode can significantly improve the performance of systems which do not set the Immediate bit when sending a SCSI WRITE FILEMARKS command. On the other hand, data is not flushed to tape in response to a filemark command.

Infinite flush

By default, the buffer in the drive is flushed every 5 seconds. Infinite flush avoids frequent starting and stopping of the mechanism when using a very slow application. It also avoids losing capacity through the flushing of partly written groups. On the other hand, infinite flush means that data can remain in the buffer for very long periods of time, and could be lost in the event of a power failure.

LUN

Logical Unit Number. A unique number by which a device is identified on the SCSI bus. A tape drive has a fixed LUN of 0. In an autoloader, the changer mechanism is LUN1.



data protection

→ [contact hp](#)

→ [home page](#)
 → [before you start](#)
 → [operation](#)
 → [cartridge care](#)
 → [cleaning](#)
 → [specifications](#)
 → [media compatibility](#)
 → [diagnostics](#)
 → [troubleshooting](#)
 → [FAQs](#)

→ [SCSI configuration](#)
 → [UNIX configuration](#)

[ordering supplies](#)

dlt1 tape drive user's guide

ordering supplies

contents of this section

→ [cables](#)
 → [adapters](#)
 → [rail kits](#)
 → [media](#)

SCSI cables

| Item | Description | Part Number |
|----------------|---|-------------|
| 1.0 m internal | 2 connector, 68-way, terminated, LVD/SE Ultra2 quality conductor | C7491A |
| 0.9 m external | 68-pin high density to 68-pin high density, LVD/SE Ultra2 quality conductor | C5741A |
| 1.5 m external | 68-pin high density to 68-pin high density, LVD/SE Ultra2 quality conductor | C5742A |
| 2.5 m external | 68-pin high density to 68-pin high density, LVD/SE Ultra2 quality conductor | C5743A |
| 1.5 m external | 68-pin very high-density (VHD) to 68-pin high-density LVD/SE Ultra2 quality conductor | C7482A |
| terminator | external SCSI terminator (LVD/SE multimode) | C5738A |

adapters

| Item | Description | Part Number |
|---------------------------|--|-------------|
| High-End Tape Connect Kit | Ultra2 host bus adapter kit for internal and external drives | C7474A |

rail kits

| Item | Description | Part Number |
|----------|---|-------------|
| rail kit | for Compaq servers | C7469A |
| rail kit | for HP Netserver | C7391-60002 |
| rail kit | for Dell PowerEdge servers 2300, 4100, 4200, and 6100 | C5732A |

media

| Item | Description | Part Number |
|--------------------|---------------|-------------|
| data cartridge | HP DLTtape IV | C5141F |
| cleaning cartridge | HP DLT1 | C7998A |

hp surestore dlt1

getting started guide

internal tape drive



DLT1



Internal drives - overview

For further details, see:

Before you start

Check system prerequisites. (Always connect to a wide, Ultra SCSI-2 Low Voltage Differential (LVD) or Single-Ended (SE) SCSI bus.) Visit the HP Surestore DLT1 web page: [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1). For example, you can use HP Library & Tape Tools to help you install your drive. **page 3**

Step 1: Check the drive's SCSI ID

Check the tape drive's SCSI ID. If necessary, change it from the default of 5 by resetting the jumpers on the back of the drive. **page 7**

Step 2: Prepare the mounting bay

Switch off the computer and attached devices, remove all power cables, and remove the computer's outer casing. Remove the blanking plate(s) from a spare, full-height 5-¼ inch bay. **page 9**

Step 3: Attach mounting hardware

If your computer requires special rails to install the tape drive, mount them on the drive now. In the box, you will find a mounting tray for HP NetServer L-series. **page 11**

Step 4: Install the drive

Install the drive. To make it easier to fit the cables, do not secure the drive with screws yet. **page 13**

Step 5: Attach power and SCSI cables

Attach a spare power cable from the computer's internal power supply. Attach a SCSI cable to the drive and to the computer's SCSI host adapter (which should be LVD or SE). **page 15**

Step 6: Secure the drive

Secure the drive into place with screws. Replace the computer's outer casing. **page 17**

Your tape drive

Find out what the LEDs on your tape drive indicate and make sure you are using the correct type of cartridge. **page 19**

Use the correct media

Find out how to use and care for DLTtape IV cartridges and how to use DLT1 cleaning cartridges. **page 21**

Operating the tape drive

Power on the system and check the tape drive is operational. Carry out a trial backup and restore. **page 23**

HP Library & Tape Tools

Find out more about the free diagnostic and troubleshooting tool supplied with your tape drive. **page 25**

Register your tape drive

Register your tape drive to ensure you receive up-to-date information about HP's products, services and support. **page 26**

Troubleshooting

If you experience problems during installation, check this section first. For more detailed troubleshooting information visit the web site: [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1). **page 27**

Copyright © 2000 by Hewlett-Packard Limited.

October 2000

The information contained in this document is subject to change without notice.

This document contains proprietary information which is protected by copyright. All rights are reserved. No part of this document may be photocopied, reproduced or translated to another language without the prior written consent of Hewlett-Packard Limited.

Hewlett-Packard shall not be liable for errors contained herein or for incidental or consequential damages (including lost profits) in connection with the furnishing, performance, or use of this material whether based on warranty, contract, or other legal theory.

Windows is a U.S. registered trademark of Microsoft Corp.

UNIX is a registered trademark of X/Open Company in the U.S. and other countries.

Product Details

Write your tape drive details here so you can find them easily if you need them.

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

Before you start

To install and use your new tape drive, you will need the following:

- A wide, Ultra SCSI-2 LVD or SE SCSI bus
- LVDS compliant SCSI ribbon cable with termination (normally supplied with the host bus adapter)
- Available 5¼-inch, full-height mounting bay (or two adjacent half-height bays)
- Mounting hardware, if required
- Backup software that supports the HP Surestore DLT1 tape drive

SCSI host bus adapter

You need a properly installed and configured SCSI host bus adapter or a built-in SCSI controller on your computer's motherboard (SCSI-2 or SCSI-3 compliant). Connectivity information can be found on our World Wide Web site: [//www.hp.com/go/connect](http://www.hp.com/go/connect). Check the server documentation for the specification of any built-in SCSI channels. Do not connect to a RAID controller channel; these are for disk drives only.

If you are installing on a Windows 98, Windows NT 4, Windows 2000 or Novell NetWare system, you can use HP Library & Tape Tools to check your computer's SCSI configuration, see page 23.

HP Surestore DLT1 drives are Ultra SCSI-2 wide SCSI devices designed to operate on an LVD-SCSI bus with a burst transfer rate of 40 MB/sec. Using the drive on a single-ended SCSI bus restricts performance. Do not use on the same bus as other single-ended devices as this will switch the LVDS host adapter into single-ended mode and restrict performance. HP recommends that a dedicated host bus adapter is used for the tape drive. A suitable adapter is available from HP as an accessory. For ordering information, SCSI specifications, and information on how to configure your SCSI bus, refer to the online *User's Guide* on: [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1).

SCSI ribbon cable

You need an Ultra SCSI-2 wide SCSI ribbon cable with the correct termination.

HP Surestore DLT1 drives have a 68-pin wide, high-density SCSI connector. If you are using an HP Surestore DLT1 drive on an internal bus with other peripherals that run at Ultra SCSI-2 speeds, it is important that a 68-pin LVD-compatible ribbon cable is used.

Mounting bay

You need one industry standard, 5¼-inch, full-height bay in which to install the HP Surestore DLT1 tape drive.

Mounting hardware

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

Some servers require a special mounting tray or rails to fix the drive into the empty bay. The drive comes with mounting hardware for HP NetServer L-series. (Not all HP servers require rails. Some have a built-in mounting tray.) Some Compaq servers require rails which may be obtained separately by ordering: HP accessory C7469A.

Rails for Dell servers may also be ordered separately. Different models of server require different rail kits. For more details, refer to the HP support web site: [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1)

Other computers 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 computer manufacturer before you can install the tape drive.*

Backup software

You need a backup application that supports the HP Surestore DLT1 drive. A TapeWare CD-ROM containing backup software by Yosemite Technologies is supplied with your tape drive.

As a general rule, native backup applications (such as NTBackup and tar) do not provide the data streaming rate required to support the full performance of your HP Surestore DLT1 tape drive. We recommend using a backup application that can provide the required data streaming rate as well as other useful features, such as TapeAlert. Computer Associates, HP, Veritas and Legato all provide suitable products that have been tested with HP Surestore drives. For the latest list of backup applications that support HP Surestore drives, please consult our World Wide Web site (www.hp.com/go/connect).

Applications usually recognize tape drives by their manufacturers' internal identifiers rather than their model numbers, so check the table below for the appropriate reference for your model.

| Drive Model | Internal Identifier |
|-------------------|---------------------|
| HP Surestore DLT1 | BNCHMARKDLT1 |

Using the HP Surestore DLT1 World Wide Web Site

The HP Surestore DLT1 web site: [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1) contains drivers, useful utilities, and information to help you install and use your tape drive.

HP product registration

To register your new tape drive electronically via the web, use the “Product Registration” link.

Drivers

For detailed information about drivers, refer to the “Drivers” link. There is a separate link for each operating system. The tape drive must be installed before installing the driver.

User documentation

For more information about using your HP Surestore DLT1 tape drive, refer to the online *User’s Guide*. 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 updates and, if necessary, generate comprehensive troubleshooting information for support calls. For further details see page 27.

TapeAlert plug-ins

TapeAlert is a tape drive status monitoring and messaging utility that makes it easy to detect problems that could have an impact on backup quality. From the use of worn-out tapes to defects in the drive hardware, TapeAlert provides easy-to-understand warnings of errors as they arise, and suggests a course of action to remedy the problem.

To take advantage of TapeAlert, you need a TapeAlert-compatible tape drive, such as the HP Surestore DLT1 drive, and TapeAlert-compatible backup software. The HP Surestore DLT1 web site contains plug-ins for leading network management consoles, such as TapeAlert for OpenView, to monitor your tape drive across the network.

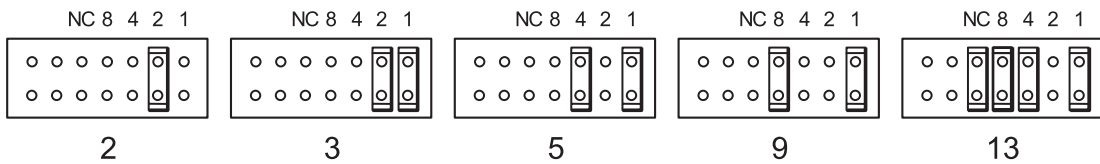
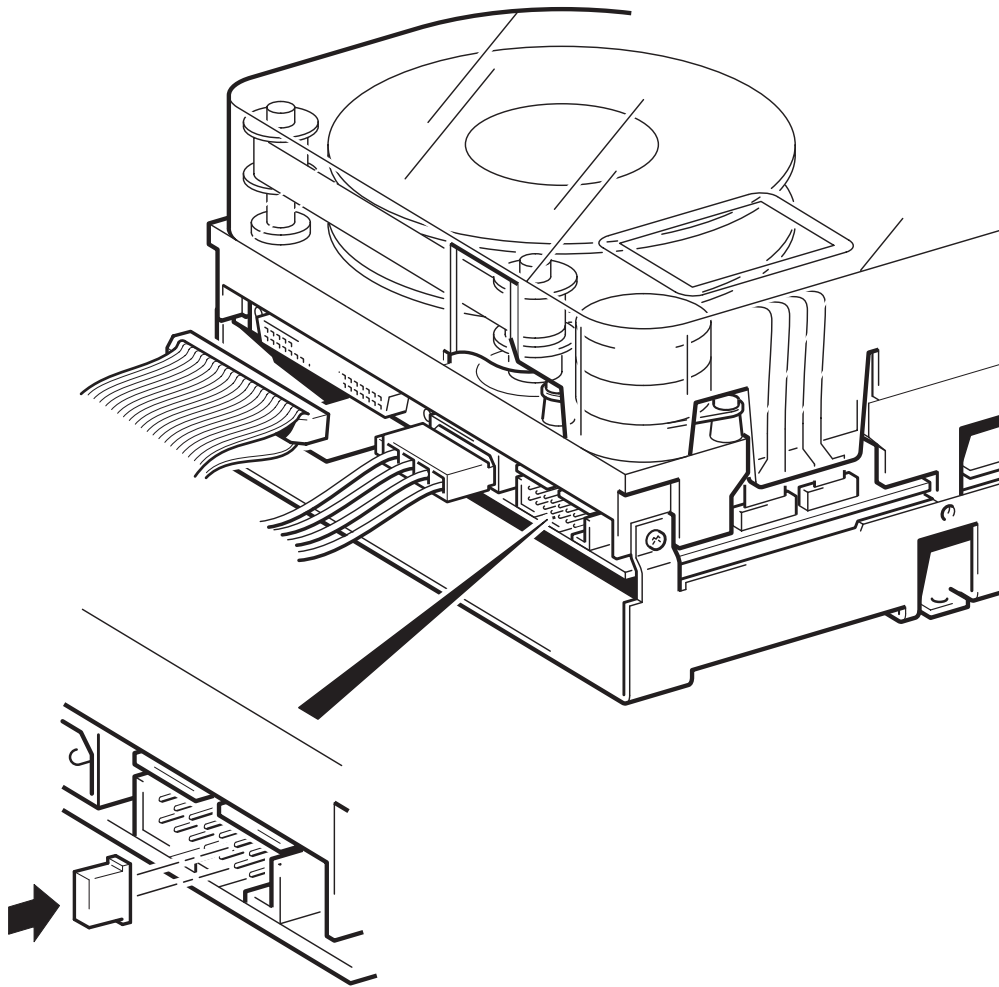


Figure 1: checking the drive's SCSI ID

Step 1: Check the drive's SCSI ID

Note Your HP Surestore DLT1 drive is shipped with a default SCSI ID of 5, but it can be assigned any *unused* ID between 0 and 15. Do not use SCSI ID 7, which is usually reserved for the SCSI controller, or SCSI ID 0, which is typically assigned to the boot disk. We do not recommend installing the drive onto a narrow SCSI bus, as this will restrict performance. (See "SCSI host bus adapter" on page 3.)

- 1** Determine whether you need to change the SCSI ID from the default of 5.

If you are installing on a Windows 98, Windows NT 4, Windows 2000 or NetWare system, you can install HP Library & Tape Tools from the web site: [//www.hp.com/support/tapetools](http://www.hp.com/support/tapetools) and run the "Install Check" to check your computer's current SCSI configuration (see page 23).

If you are installing on a UNIX® system, check the online *User's Guide* on our World Wide Web site [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1), for instructions on how to determine the SCSI IDs of existing devices.

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 computer (such as the back plate) before you remove the tape drive from its bag.

- 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. Use your fingers to move the jumpers to the pattern corresponding to the ID you want, see figure 1.

Spare jumpers will either be on the pin array itself (but only attached to a single pin) or in the accessories box.

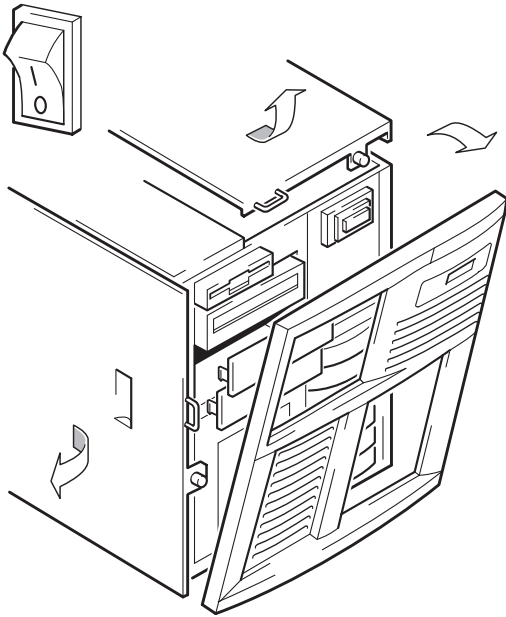


Figure 2a: preparing mounting bay in a typical HP server

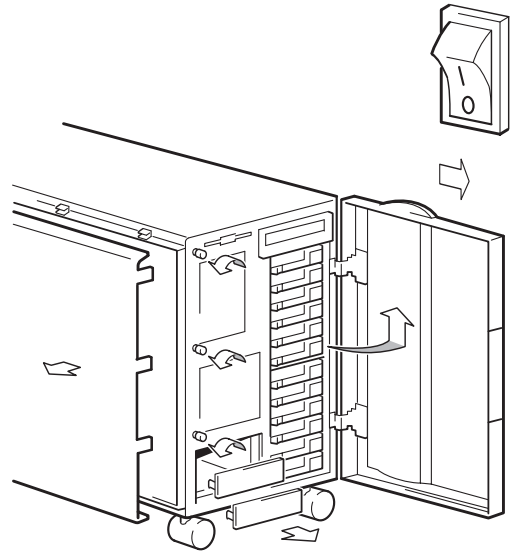


Figure 2b: preparing mounting bay in a typical Compaq server

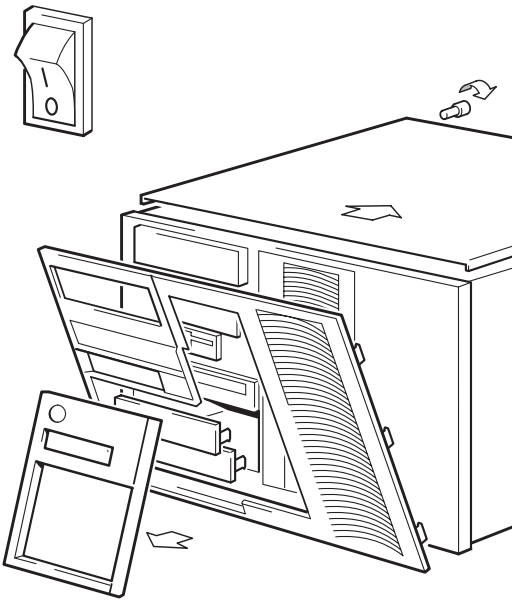


Figure 2c: preparing mounting bay in a typical IBM server

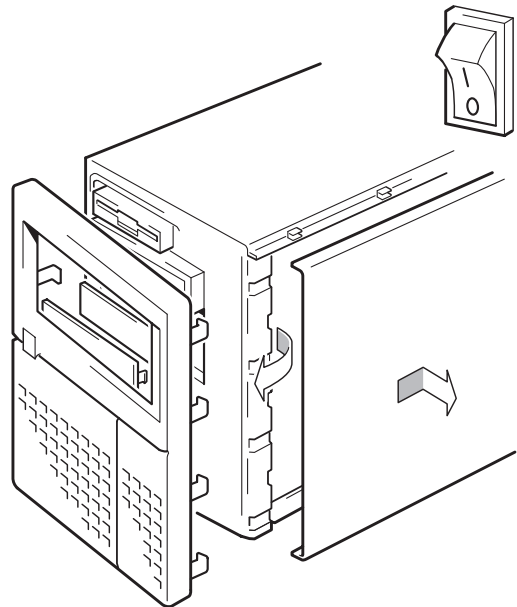


Figure 2d: preparing mounting bay in a typical Dell server

Step 2: Prepare the mounting bay

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

Static electricity can damage electronic components. Always wear an antistatic wriststrap if one is available. If not, after you have disconnected power from the computer 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 screwdriver
 - Flat-bladed screwdriver (if your computer uses slotted screws)
 - Torx screwdriver (if your computer uses torx screws)
 - Your computer manuals (for reference during installation)
- 2** Perform a normal system shutdown and turn off the computer and any connected peripherals.
- 3** Remove the computer's cover (as shown in figures 2a to 2d) and front panel (as detailed in your computer's documentation).

As you work inside the computer, 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 front filler panel from a full-height, 5¼-inch bay of your computer, as described in your computer's documentation. Keep any screws for use in step 6 on page 17.

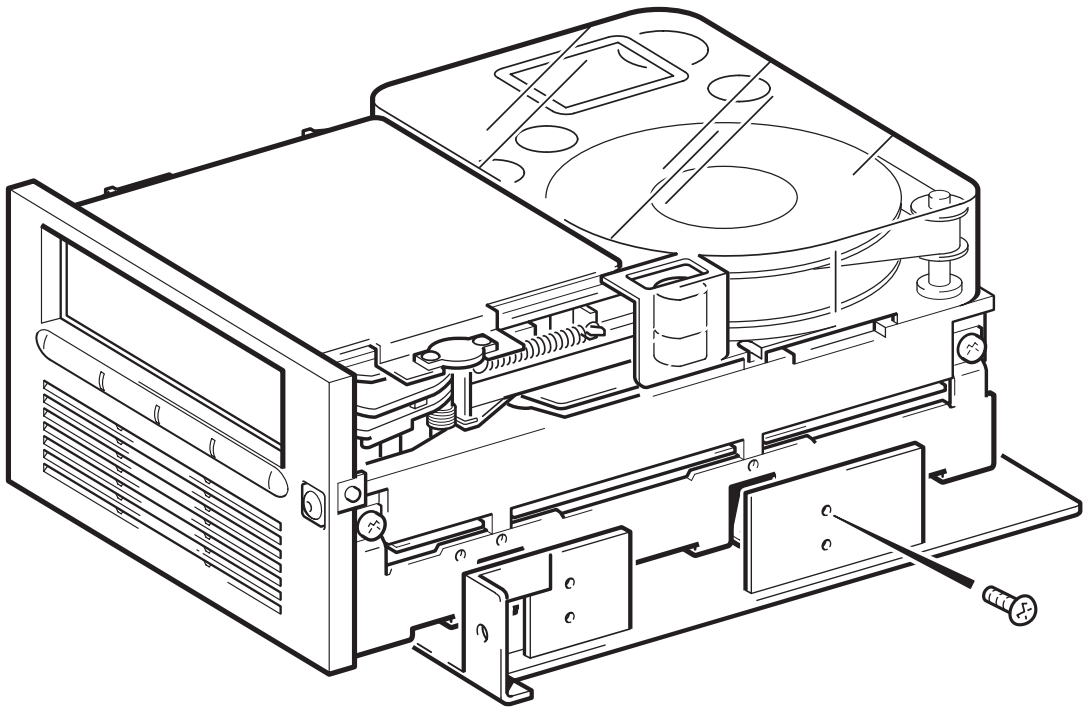


Figure 3: attaching tray for NetServer L-Series servers

Step 3: Attach mounting hardware

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

If your computer does not require special mounting hardware, proceed to step 1 on page 13 now.

- 1** Attach the appropriate rails:
 - If you are installing in an HP NetServer L-series, place the tape drive in the mounting tray supplied, as shown in figure 3.
 - Some IBM servers have snap-on mounting rails attached to the filler panel. These can be removed and attached to the tape drive with screws. Mounting hardware may be required for some other servers such as DELL and Compaq servers. For more details, refer to the HP support web site: [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1)
 - If your computer uses other mounting hardware, attach it to the tape drive as directed in your computer documentation.
- 2** Secure the tape drive in the mounting tray using the four screws supplied with your drive.

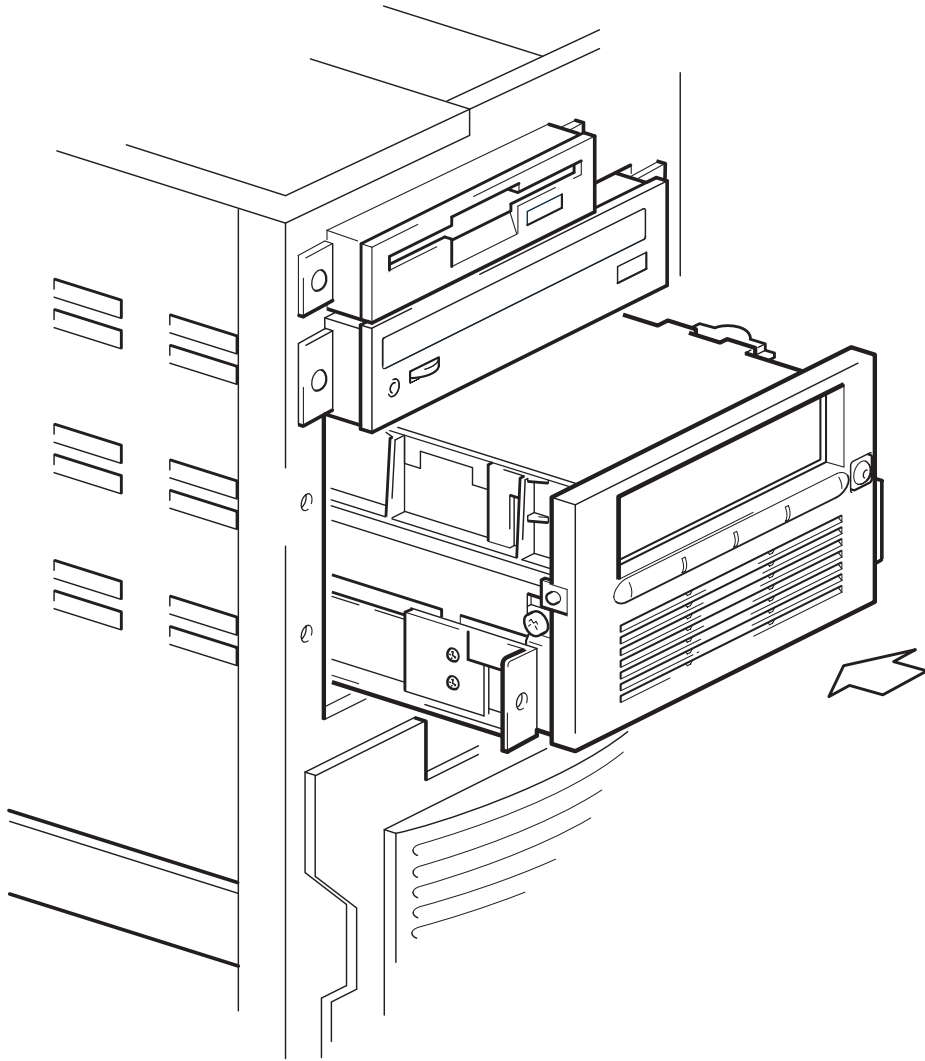


Figure 4: installing the drive

Step 4: Install the drive

Note Write the model name, product number, serial number, and SCSI ID of your drive somewhere safe for future reference. The model name is on the front of the drive and the product and serial numbers are on a label on the top of the 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 4.

If your computer 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 with screws at this point because you may have to move the drive to get the cables into place.

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

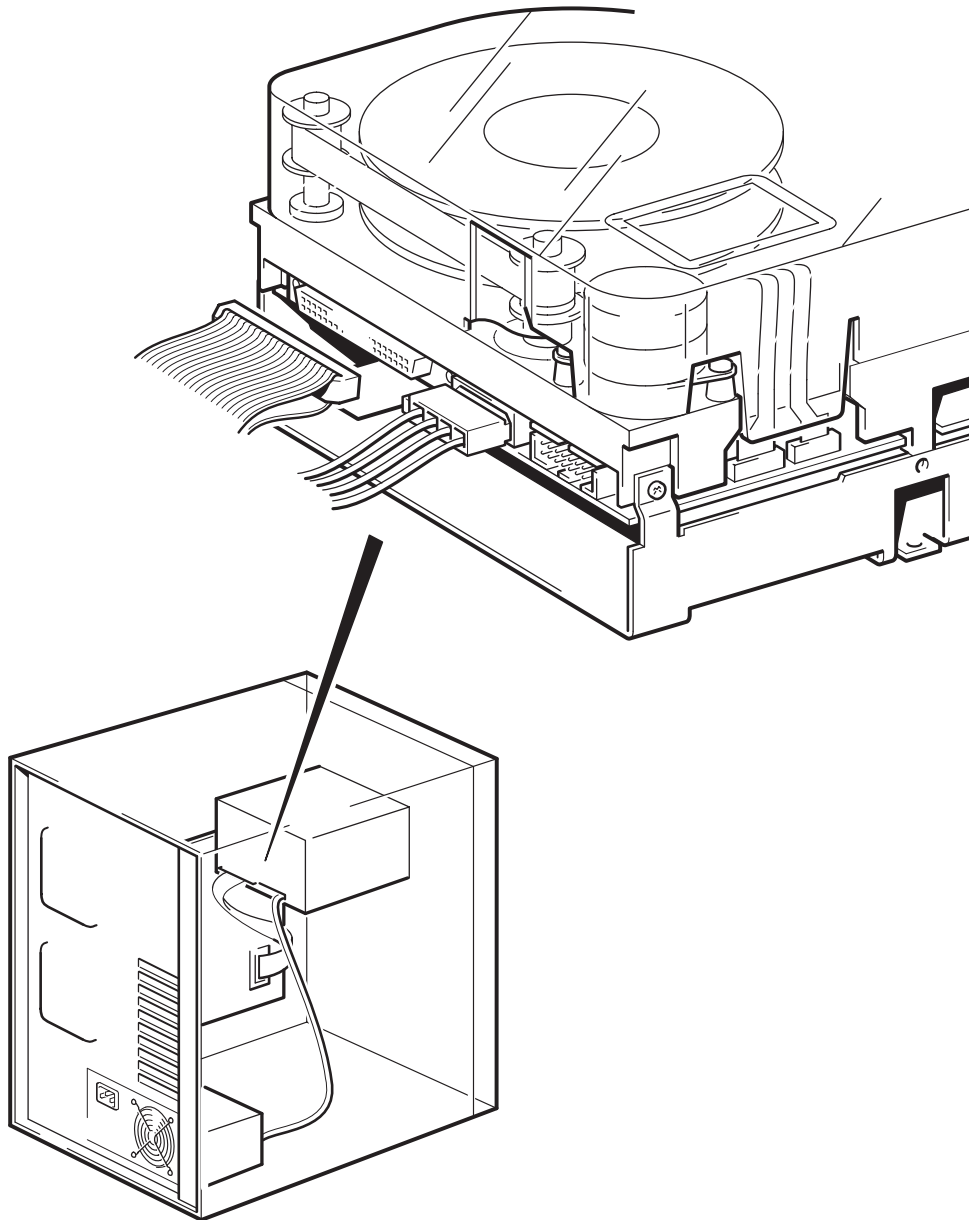


Figure 5: attaching SCSI and power cables to internal drive

Step 5: Attach power and SCSI cables

- 1** Attach a spare power cable from the computer's internal power supply to the power connector, as shown in figure 5.
- 2** Attach a spare SCSI cable on the computer's SCSI ribbon cable to the SCSI connector, as shown in figure 5.

Note If the drive is the last or only device on the SCSI chain, it must be terminated.

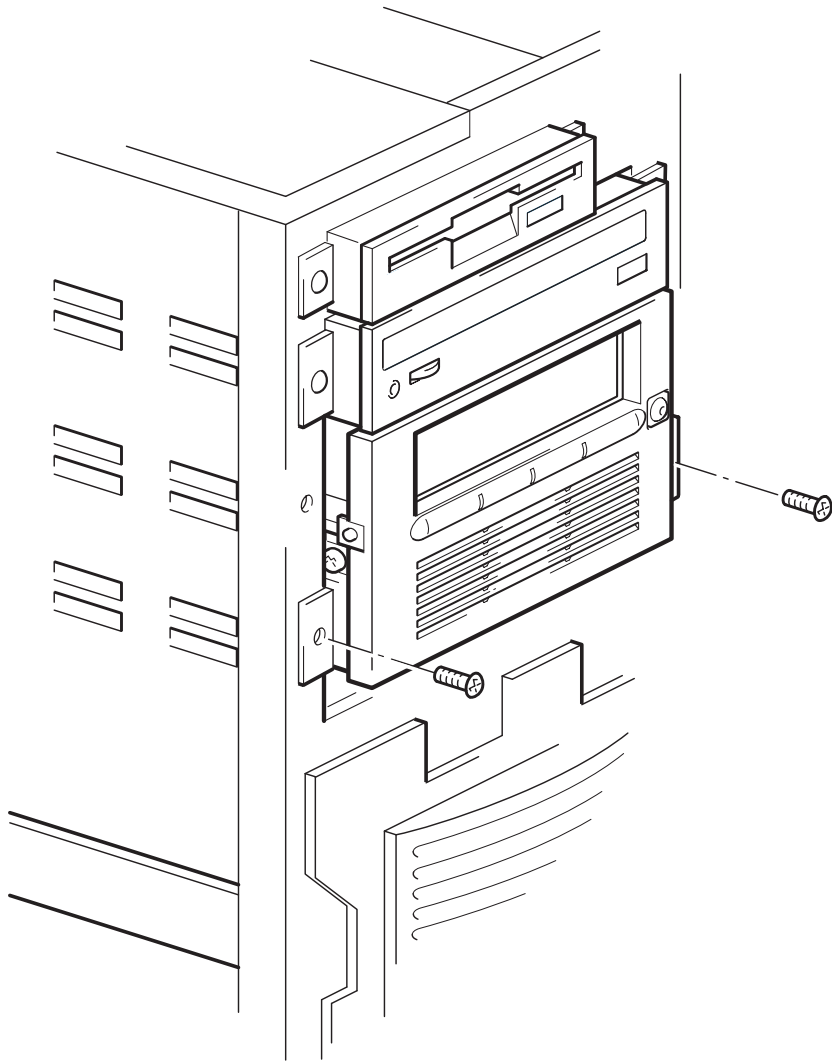


Figure 6: securing the drive (side mounting screws shown)

Step 6: Secure the drive

- 1 Secure the tape drive into place with screws.

If you used mounting hardware that screws to the front of the computer, use the screws you removed in step 2 to fix the drive in place.

If your computer does not require mounting hardware, check that the holes in the chassis are aligned with the holes in the sides of the drive and use the four screws provided with the rail kit to secure the drive, as shown in figure 6.

- 2 Replace the cover on the computer.

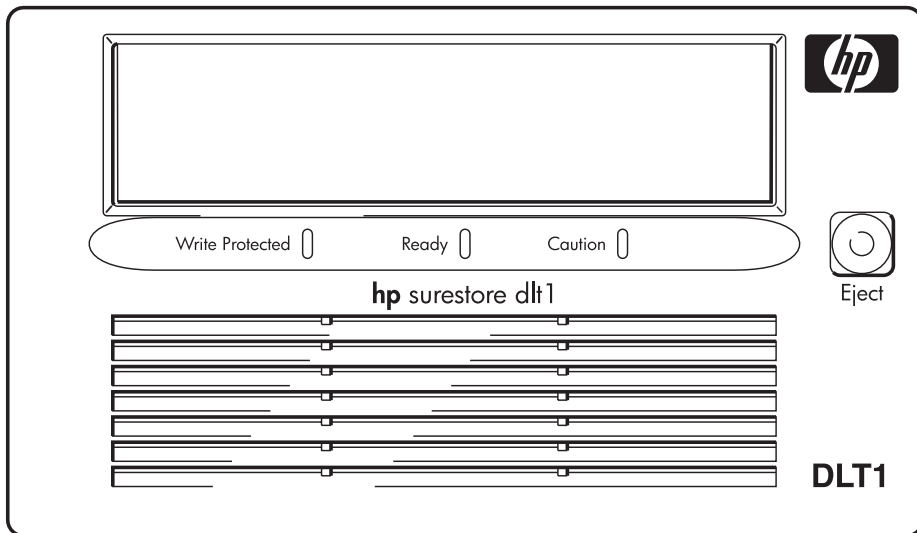


Figure 7: tape drive controls and indicators

Your tape drive

There are three LEDs and an eject button on the front panel of your tape drive, as shown in figure 7. For more information about using the eject button, see “To unload a cartridge” on page 23.

Front panel LEDs

There are three LEDs as illustrated in figure 7.

Write Protected

- On: the DLTtape cartridge is write-protected.
- Off: the DLTtape cartridge is write-enabled.

Ready

- On: the DLTtape cartridge is loaded and ready to use.
- Off: no cartridge is loaded.
- Flashing: tape is in motion.

Caution

- On: A calibration failure or hard read/write error occurred. Try cleaning the drive with a tape approved for use in the DLT1 drive.
- If after cleaning, this indicator is illuminated again when you load a DLTtape cartridge: it is probably that the DLTtape cartridge is causing problems. Try a new DLTtape cartridge. If this condition persists with other cartridges, you can use HP Library and Tape Tools (downloadable from the web site: [//www.hp.com/support/tapetools](http://www.hp.com/support/tapetools)) to help you diagnose the problem. If the condition still continues, contact Technical Support.
- Off: Cleaning is complete or not needed.

All three LEDs

- On: Power-On Self-Test (POST) is starting.
- Flashing: A POST error has occurred. For more information, see “Troubleshooting” on page 27.

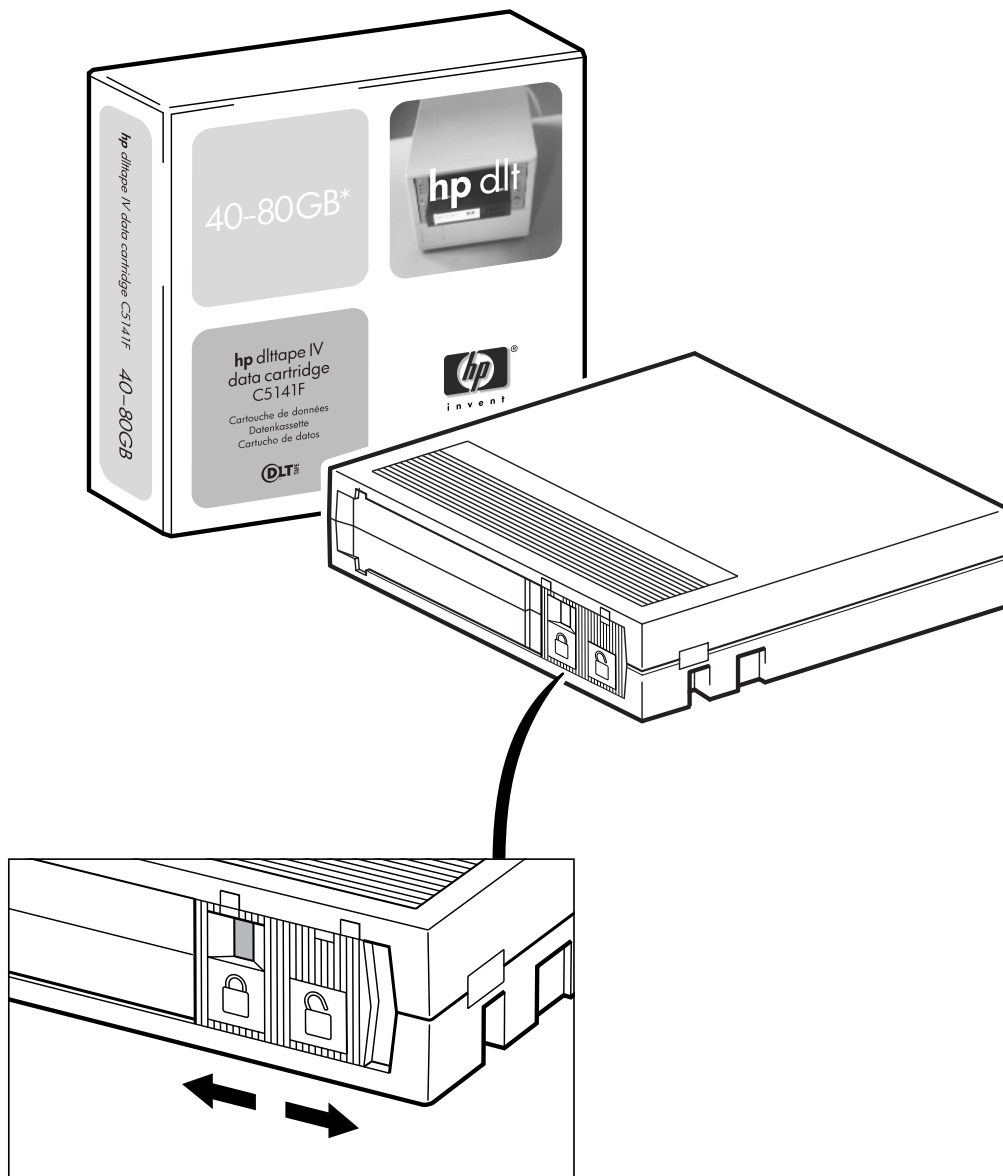


Figure 8: write protecting cartridges

Use the correct media

HP Surestore DLT1 drives use only DLTtape IV cartridges. Your HP Surestore DLT1 tape drive can read but not write DLTtape IV cartridges that use the DLT 4000 format.

Note Your HP Surestore DLT1 tape drive automatically ejects any other cartridge types and any cartridges whose format it cannot read. If you want to reuse cartridges that have been formatted with a drive other than DLT1, use a magnetic bulk eraser to prepare the cartridges for use with your HP Surestore DLT1 tape drive.

Only rely on the best media to protect your valuable data. Thanks to HP's rigorous testing programs, HP Surestore DLT1 data and cleaning cartridges are the safest investment you can make. Order online at: [//www.hp.com/go/storagemedia](http://www.hp.com/go/storagemedia). If you do not have internet access, please contact your local HP Customer Contact Center.

Write-protecting cartridges

If you want to protect the data on a cartridge from being altered or overwritten, you can write-protect the cartridge. To write-protect a cartridge, slide the switch **to the left** to write-protect the cartridge. Note a small orange rectangle is visible, indicating that the cartridge is write-protected. To write-enable a cartridge, slide the switch **to the right** to allow your HP Surestore DLT1 tape drive to write data to the cartridge. Figure 8 illustrates the location of the write-protect switch.

Cleaning cartridges

When the Caution LED is on, your HP Surestore DLT1 tape drive's read/write head may need to be cleaned. It is good practise to clean the drive once every two weeks. Each cleaning cartridge can be used up to 20 times. 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.

Caution You must use *only* DLT1 cleaning cartridges with HP Surestore DLT1 tape drives. Be aware that cleaning cartridges that do not specify DLT1 on the cartridge may be accepted by the drive but will not clean the drive.

A cleaning cartridge is supplied with each tape drive. Insert the cleaning cartridge and the drive will carry out its cleaning cycle. When the cleaning cartridge has cleaned the read/write head, the Caution LED turns off to indicate that you should remove the cleaning cartridge.

Looking after cartridges

- Do not touch the tape media.
- Do not attempt to clean the tape path or tape guides inside the cartridge.
- Do not leave cartridge tapes 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.
- Place identification labels only in the slide-in slot on the front of the cartridge.
- Store the cartridges in their storage cases in a dust-free environment in which temperatures are always between 16°C and 32°C (60°F to 90°F).

Figure 9a: loading a cartridge

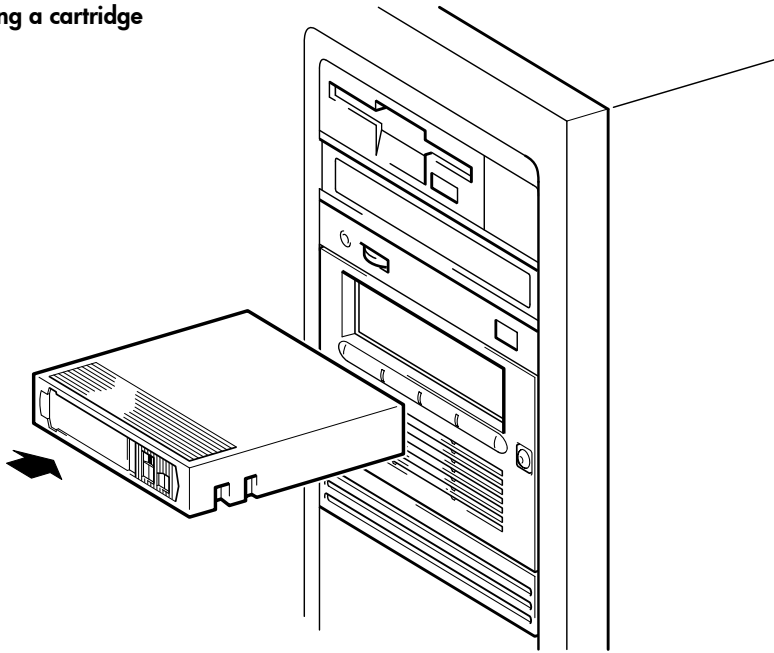
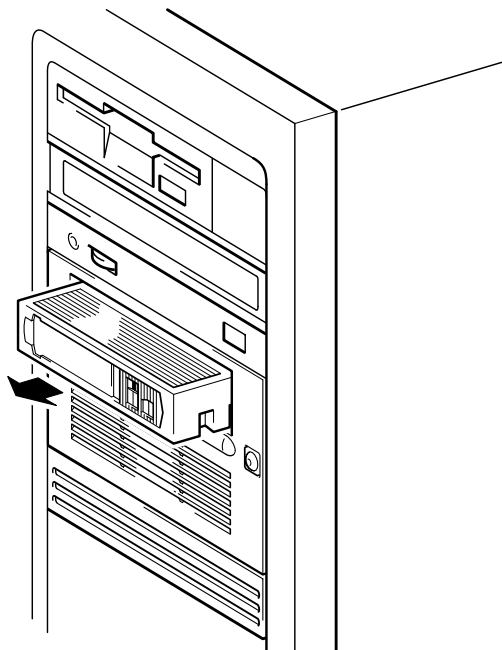


Figure 9b: unloading a cartridge



Operating the tape drive

Check operation

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

- 1 Switch on the drive and the computer. Every time you turn on the tape drive it runs a POST which takes several seconds to complete. At the end of POST, all LEDs turn off. Read more about the self-test and front panel lights in "Troubleshooting" on page 27.

- 2 Verify that the tape drive installation was successful.

For Windows and NetWare systems, use HP Library & Tape Tools as described on page 25.

For UNIX systems, refer to the configuration instructions in the online *User's Guide* on the web site: [/www.hp.com/support/dlt1](http://www.hp.com/support/dlt1) which includes a verification procedure.

Note If you encounter a problem during this verification procedure, turn to "Troubleshooting" on page 27 for help in diagnosing and fixing the problem.

- 3 You are now ready to install backup software, as required (see page 4), and carry out a backup and restore test to check that the drive can write data to tape. Use a blank cartridge.

To load a cartridge

- 1 Insert the cartridge into the slot in front of the drive, oriented as shown in Figure 9a. Apply gentle pressure until the drive takes the cartridge and loads it. (The label and write-protect switch are on the rear face of the cartridge.)
- 2 The Ready LED flashes while the drive performs its load sequence. When the cartridge is loaded, the Ready LED is steadily illuminated.

To unload a cartridge

Note Remove the cartridge from your HP Surestore DLT1 tape drive **before turning off** the desktop drive. **Leaving a cartridge in the drive when power is off can result in cartridge and drive damage.**

- 1 Press the Eject button on the front panel or use your backup software to eject the cartridge (see Figure 9b). The Ready LED flashes while the drive rewinds the tape.
- 2 The drive completes any task it is currently performing, winds the tape to the beginning, and ejects the cartridge. The sequence can take up to two minutes.

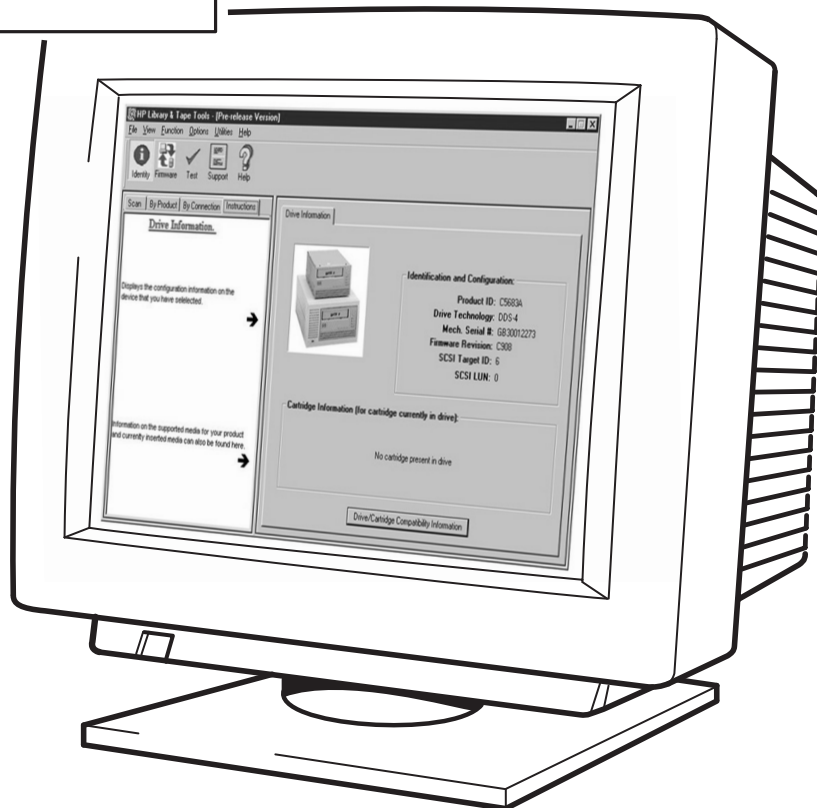
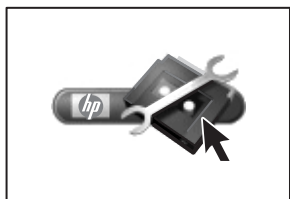


Figure 10: using HP Library & Tape Tools

HP Library & Tape Tools

HP Library & Tape Tools software provides a number of utilities for getting information about your tape drive and troubleshooting problems. It includes the following functions:

- Installation help and advice to help you install your product and operate it correctly
- Discovery to find out what devices are attached to your SCSI bus
- Identity to find out detailed information about individual devices, for example the firmware version
- Tests to check that your drive is operating correctly
- Firmware Update to help you find update files for your tape drive and allow you to perform the update
- Support Ticket to generate detailed troubleshooting information for support calls (if you are connected to the Internet, you will be able to email this information directly to your Support Center)
- Comprehensive Help that is context sensitive, if you need additional information for the screen currently displayed

HP Library & Tape Tools does not work on all operating systems. For the latest compatibility information, updates, and the latest versions of this software, refer to our World Wide Web site: [//www.hp.com/support/tapetools](http://www.hp.com/support/tapetools).

Installing HP Library & Tape Tools

You can install HP Library & Tape Tools from the web site: [//www.hp.com/support/tapetools](http://www.hp.com/support/tapetools). Installation is simply a question of selecting the required option and following the instructions on the screen.

Using HP Library & Tape Tools

HP Library & Tape Tools checks for the presence of a SCSI controller and its driver software and identifies the SCSI IDs of existing SCSI devices. You can then select the required device from the device list and run one of the diagnostic utilities for that device by selecting the appropriate icon: Identity, Firmware, Test or Support.

For ease of use, comprehensive online help is built into the software.

Register your tape drive

Once you have installed and tested your HP Surestore DLT1 tape drive, please take a few minutes to register your product. This will give you the opportunity to receive up-to-date information about our products, services and support.

Please register via the web (www.hp.com/go/tapereg) or by using the Customer Care card in the box.

To ensure your registration is complete, there are a number of questions on the Customer Care card and 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.

If you have Internet access, register electronically

- 1** Select the Product Registration web link on: [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1). This links you to HP's Product Registration web site.
- 2** Complete the registration form. Mandatory questions are shown in red text.
- 3** Click on the Submit button to forward your registration immediately to HP.

If you do not have internet access

- 1** Complete the Customer Care card supplied with the drive. Mandatory questions are shown in black, bold text.
- 2** Mail or fax the completed form to HP.

Troubleshooting

The first step in problem-solving is establishing whether the problem lies with the cartridge, the drive, the host computer and its connections, or with the way the system is being operated. If none of the following advice helps you solve the problem, refer to our World Wide Web Customer Care pages on: [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1) or call for assistance.

None of the drive's LEDs illuminate

| Possible reason | Recommended action |
|-----------------------------------|--------------------------------|
| The drive is not receiving power. | Check the drive's power cable. |

All of the LEDs on the front panel blink continually

| Possible reason | Recommended action |
|---------------------------------------|--|
| An internal drive fault has occurred. | <ol style="list-style-type: none">1. Press and hold the Eject button for 6 seconds to reset the drive.2. Shut down and turn off the host server or workstation, then turn it back on and allow it to boot.3. Call technical support if POST continues to fail. |

The host server or workstation does not recognize the HP Surestore DLT1 tape drive

| Possible reason | Recommended action |
|--|--|
| The drive's SCSI ID might not be unique. | Identify the SCSI IDs of existing SCSI devices by using HP Library & Tape Tools. Change the drive's SCSI ID. Shut down and turn off the host server or workstation. Change the drive's SCSI ID. Turn on the host server or workstation. Ensure that all devices on the SCSI bus are SE or LVD. |
| The SCSI host adapter might be incorrectly configured. | Check the SCSI host adapter configuration. Refer to the SCSI host adapter manuals for instructions. |
| The SCSI cable might be loose. | Check both ends of the SCSI cable. |
| The SCSI terminator might be loose or missing. | Make sure an LVD/SE terminator is in place on the end of the SCSI ribbon cable. |
| The SCSI bus might be improperly terminated. | If your HP Surestore DLT1 drive is not the last or only device on the SCSI bus, check all SCSI cable connections and make sure an LVD/SE terminator is in place on the end of the SCSI ribbon cable. |
| The SCSI terminator might not be at the end of the SCSI bus or more than two terminators might be present on the SCSI bus. | Make sure the terminators are placed only at each end of the SCSI bus—one at the host adapter and one on the end of the SCSI ribbon cable. |

| | |
|---|--|
| The SCSI host adapter might be in a defective expansion slot. | Move the SCSI host adapter to a different expansion slot. |
| The SCSI bus might be too long | Make sure the total length of the SCSI bus does not exceed the ANSI SCSI standard of 3 meters (10 feet) for an SE bus, 12 meters (40 feet) for an LVD SCSI bus with multiple devices, or 25 meters (82 feet) for an LVD SCSI bus with a single device. |

There are fatal or non-fatal errors for which you cannot find the cause

| Possible reason | Recommended action |
|--|--|
| The SCSI bus might be improperly terminated. | <ol style="list-style-type: none"> 1. If your HP Surestore DLT1 drive is the last or only device on the SCSI bus, make sure the drive is properly terminated. Make sure only the last device is terminated. 2. If your HP Surestore DLT1 drive is not the last or only device on the SCSI bus, check all SCSI cable connections and make sure the last device on the SCSI bus is terminated. |

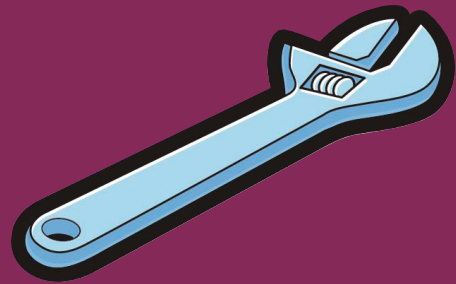
Other sources of information

If you experience problems using your tape drive after installation, use HP Library & Tape Tools to help you diagnose the problem (see page 25).

You will also find troubleshooting information on the HP support web site: [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1) that takes you to HP's Customer Care web site for a wide range of up-to-date information about your product.



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



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

hp surestore dlt1

getting started guide

external tape drive



DLT1



External drives - overview

For further details, see:

Before you start

Check system prerequisites. (Always connect to a wide, Ultra SCSI-2 Low-Voltage Differential (LVD) or Single-Ended (SE) SCSI bus.) Visit the HP Surestore DLT1 web page: [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1). For example, you can use HP Library & Tape Tools to help you install your drive.

page 3

Step 1: Check the drive's SCSI ID

Check the tape drive's SCSI ID on the SCSI ID switch on the rear panel of drive. If necessary, change it from the default of 5 by pressing the + or - buttons above and below the SCSI ID number. Use a ball-point pen or similar pointed object. To prevent particle contamination, do not use a pencil.

page 7

Step 2: Connect the SCSI cable

Power off the computer. Attach one end of the SCSI cable (supplied with the drive) to the computer's external SCSI connector and connect the other end to the SCSI connector on the rear of the tape drive.

page 9

Step 3: Connect the power cable

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

page 11

Your tape drive

Find out what the LEDs on your tape drive indicate and make sure you are using the correct type of cartridge.

page 13

Use the correct media

Find out how to use and care for DLTape IV cartridges and how to use DLT1 cleaning cartridges.

page 15

Operating the tape drive

Power on the drive, then the computer. Check operation and carry out a trial backup and restore.

page 17

HP Library & Tape Tools

Find out more about the free diagnostic and troubleshooting tool supplied with your tape drive.

page 19

Register your tape drive

Register your tape drive to ensure you receive up-to-date information about HP's products, services and support.

page 20

Troubleshooting

If you experience problems during installation, check this section first. For more detailed troubleshooting information visit the web site: [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1).

page 21

October 2000

The information contained in this document is subject to change without notice.

This document contains proprietary information which is protected by copyright. All rights are reserved. No part of this document may be photocopied, reproduced or translated to another language without the prior written consent of Hewlett-Packard Limited.

Hewlett-Packard shall not be liable for errors contained herein or for incidental or consequential damages (including lost profits) in connection with the furnishing, performance, or use of this material whether based on warranty, contract, or other legal theory.

Windows is a U.S. registered trademark of Microsoft Corp.

UNIX is a registered trademark of X/Open Company in the U.S. and other countries.

Product Details

Write your tape drive details here so you can find them easily if you need them.

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

Before you start

To install and use your new tape drive, you will need the following:

- A wide, Ultra SCSI-2 LVD or SE-SCSI bus
- LVDS compliant SCSI cable (supplied with the tape drive)
- Backup software that supports the HP Surestore DLT1 tape drive

SCSI host bus adapter

You need a properly installed and configured SCSI host bus adapter or a built-in SCSI controller on your computer's motherboard (SCSI-2 or SCSI-3 compliant). Check the server documentation for the specification of any built-in SCSI channels. Do not connect to a RAID controller channel; these are for disk drives only.

If you are installing on a Windows 98, Windows NT 4, Windows 2000 or Novell NetWare system, you can use HP Library & Tape Tools to check your computer's SCSI configuration, see page 19.

HP Surestore DLT1 drives are Ultra SCSI-2 wide SCSI devices designed to operate on an LVD-SCSI bus with a burst transfer rate of 40 MB/sec. Using the drive on a single-ended SCSI bus restricts performance. Do not use on the same bus as other single-ended devices as this will switch the LVDS host adapter into single-ended mode and restrict performance. HP recommends that a dedicated host bus adapter is used for the tape drive. A suitable adapter is available from HP as an accessory. For ordering information, SCSI specifications, and information on how to configure your SCSI bus, refer to the online *User's Guide* on: [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1).

SCSI cable

You need a SCSI cable that connects to your computer's external connector. For optimum performance, always use the cable supplied with the tape drive. The cable provided with HP Surestore DLT1 tape drives will attach to a computer with a wide LVDS-SCSI connector (68 pins) or a SE-SCSI connector. If your server or host bus adapter is equipped with a very high density (VHD) wide SCSI connector, you will need to order a VHD-to-HD cable. For ordering information refer to: [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1).

Backup software

You need a backup application that supports the HP Surestore DLT1 drive. A TapeWare CD-ROM containing backup software by Yosemite Technologies is supplied with your tape drive.

As a general rule, native backup applications (such as NTBackup and tar) do not provide the data streaming rate required to support the full performance of your HP Surestore DLT1 tape drive. We recommend using a backup application that can provide the required data streaming rate as well as other useful features, such as TapeAlert. Computer Associates, HP, Veritas and Legato all provide suitable products that have been tested with HP Surestore drives. For the latest list of backup applications that support HP Surestore DLT1, please consult our World Wide Web site (www.hp.com/go/connect).

Applications usually recognize tape drives by their manufacturers' internal identifiers rather than their model numbers, so check the table below for the appropriate reference for your model.

| Drive Model | Internal Identifier |
|-------------------|---------------------|
| HP Surestore DLT1 | BNCHMARKDLT1 |

Using the HP Surestore DLT1 World Wide Web Site

The HP Surestore DLT1 web site: [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1) contains drivers, useful utilities, and information to help you install and use your tape drive.

HP product registration

To register your new tape drive electronically via the web, use the “Product Registration” link.

Drivers

For detailed information about drivers, refer to the “Drivers” link. There is a separate link for each operating system. The tape drive must be installed before installing the driver.

User documentation

For more information about using your HP Surestore DLT1 tape drive, refer to the online *User’s Guide*. 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 updates and, if necessary, generate comprehensive troubleshooting information for support calls. For further details see page 19.

TapeAlert plug-ins

TapeAlert is a tape drive status monitoring and messaging utility that makes it easy to detect problems that could have an impact on backup quality. From the use of worn-out tapes to defects in the drive hardware, TapeAlert provides easy-to-understand warnings of errors as they arise, and suggests a course of action to remedy the problem.

To take advantage of TapeAlert, you need a TapeAlert-compatible tape drive, such as the HP Surestore DLT1 drive, and TapeAlert-compatible backup software. The HP Surestore DLT1 web site contains plug-ins for leading network management consoles, such as TapeAlert for OpenView, to monitor your tape drive across the network.

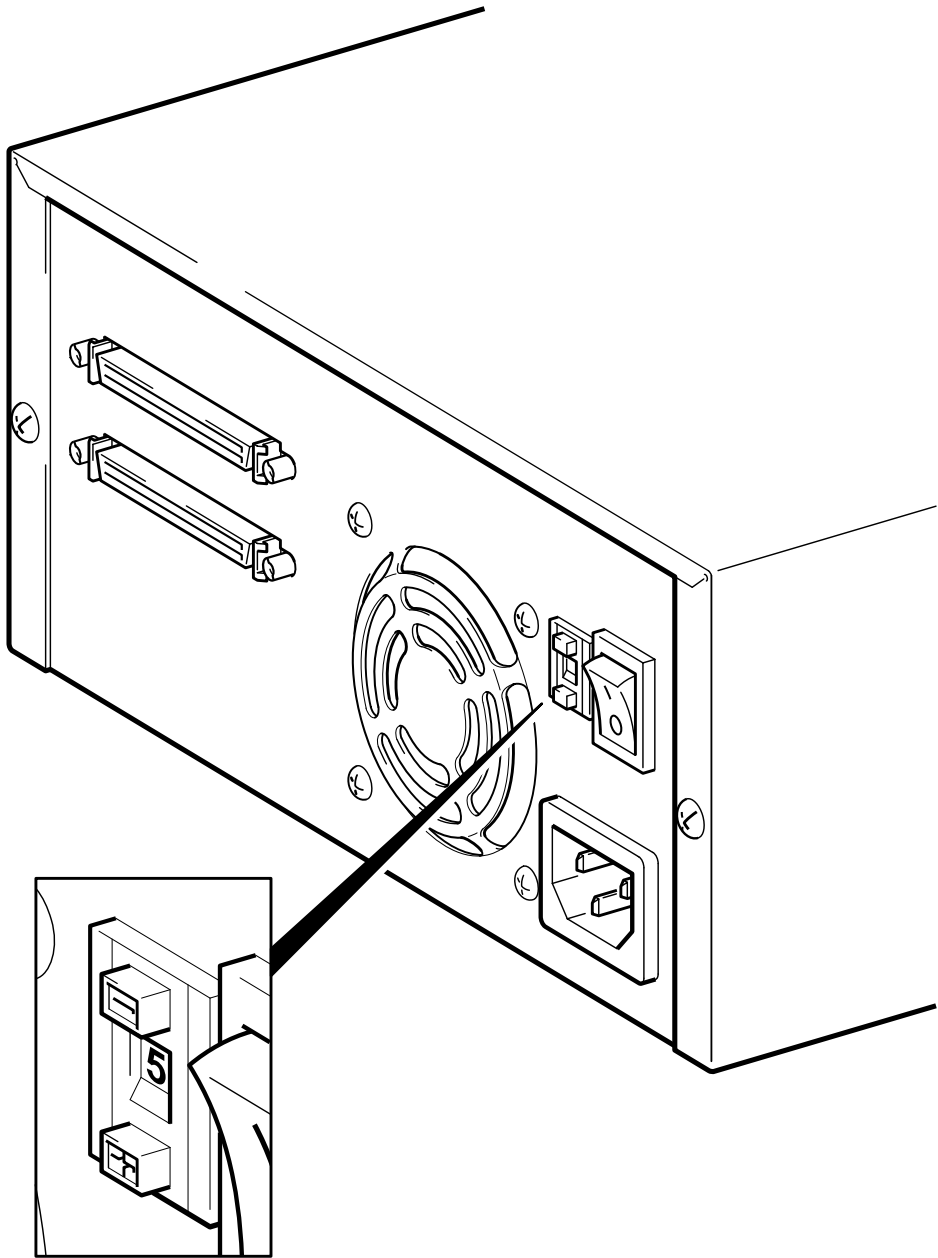


Figure 1: checking the SCSI ID

Step 1: Check the drive's SCSI ID

Note Your HP Surestore DLT1 drive is shipped with a default SCSI ID of 5, but it can be assigned any *unused* ID between 0 and 15. Do not use SCSI ID 7, which is reserved for the SCSI controller, or SCSI ID 0, which is typically assigned to the boot disk. We do not recommend installing the drive onto a narrow SCSI bus, as this will restrict performance. (See "SCSI host bus adapter" on page 3.)

- 1** Determine whether you need to change the SCSI ID from the default of 5.

If you are installing on a Windows 98, Windows NT 4, Windows 2000 or NetWare system, you can install HP Library & Tape Tools from the web site: [//www.hp.com/support/tapetools](http://www.hp.com/support/tapetools) and run the "Install Check" to check your computer's current SCSI configuration (see page 19).

If you are installing on a UNIX® system, check the online *User's Guide* on our World Wide Web site [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1), for instructions on how to determine the SCSI IDs of existing devices.

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

Use a small screwdriver or a ball-point pen to press the SCSI ID selector buttons on the rear panel (see figure 1) until the required value is displayed. Do not use a pencil because small bits of lead could contaminate the drive.

Note The computer and the tape drive SCSI IDs are only checked at power-on. To change the SCSI ID after installation, power down both the computer and the tape drive, change the drive's SCSI ID, power up the tape drive, and then power up the computer.

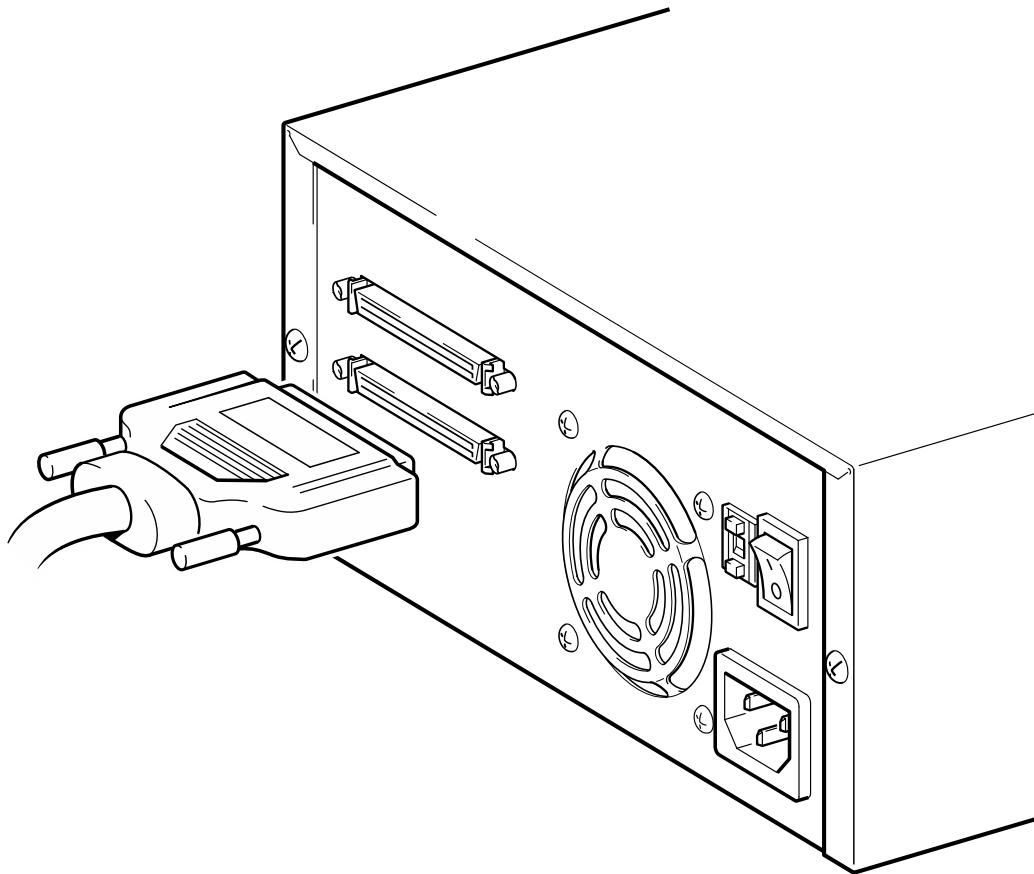


Figure 2: connecting the SCSI cable

Step 2: Connect the SCSI cable

Caution To avoid damaging the computer or tape drive, ensure that both are powered off while you attach the SCSI cable.

For optimum performance, we recommend that your HP Surestore DLT1 drive is installed on a dedicated SCSI bus.

- 1** Perform a normal system shutdown and turn off the computer and any connected peripherals.

A 68-pin wide LVDS SCSI cable is provided. Do **not** connect the cable to a VHD SCSI port.

If your computer's SCSI connector does not match the cable supplied with your drive, you will need to order the appropriate cable or adapter. See "SCSI cable" on page 2 for more details about SCSI cabling. For ordering information, refer to our web site: [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1).

- 2** Attach one end of the SCSI cable to the connector on the SCSI host adapter and secure it by tightening the screws, as shown on figure 2.
- 3** Attach the other end of the SCSI cable to one of the connectors on the rear panel of the tape drive and secure it by tightening the screws.

Note If your HP Surestore DLT1 drive is the only SCSI device (other than the SCSI host adapter) or if it is the last device on the selected computer's bus, it must be terminated. If your HP Surestore DLT1 drive is at the end of the SCSI cable, it is the last device on the SCSI bus.

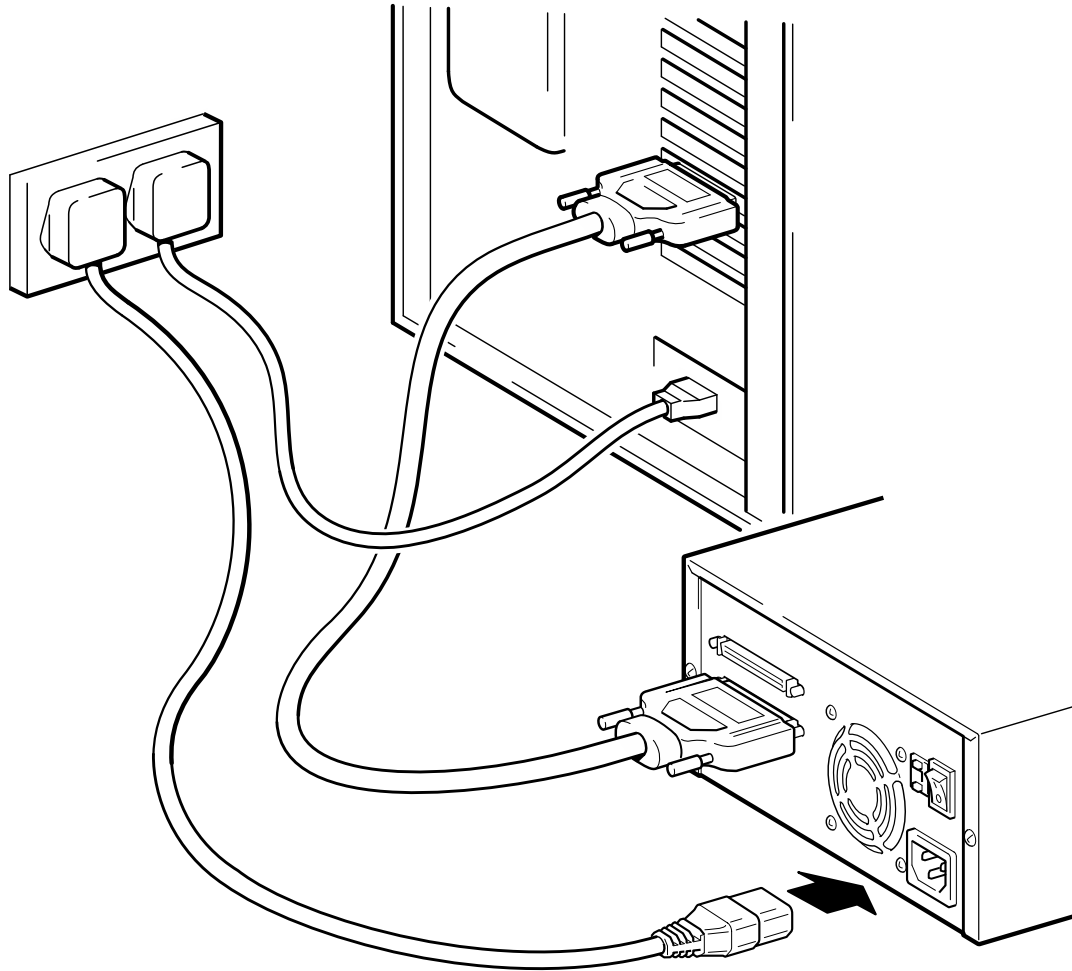


Figure 3: connecting the power cable

Step 3: Connect the power cable

An external HP Surestore DLT1 drive will operate using any voltage in the range 100–240 volts (50–60 Hz). No adjustment is needed. To connect your drive to the power supply, proceed as follows:

- 1** Plug the power cable securely into the socket on the rear panel of the drive. (See figure 3.)
- 2** Plug the other end of the power cable into the power outlet.

Write the model name, product number, serial number, and SCSI ID of your drive at the back of this guide for future reference. 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.

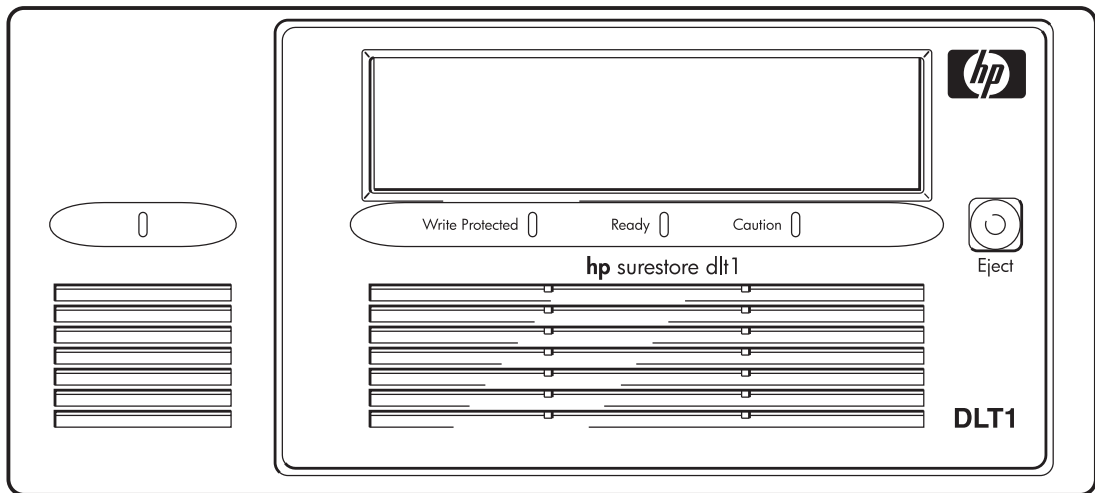


Figure 4: tape drive front panel

Your tape drive

There are three LEDs and an eject button on the front panel of your tape drive. For more information about using the eject button, see "To unload a cartridge" on page 17.

Front panel LEDs

There are three LEDs as illustrated in figure 4.

Write Protected

- On: the DLTtape cartridge is write-protected.
- Off: the DLTtape cartridge is write-enabled.

Ready

- On: the DLTtape cartridge is loaded and ready to use.
- Off: no cartridge is loaded.
- Flashing: tape is in motion.

Caution

- On: A calibration failure or hard read/write error occurred. Try cleaning the drive with a tape approved for use in the HP Surestore DLT1 drive.
- If after cleaning, this indicator is illuminated again when you load a DLTtape cartridge: it is probable that the DLTtape cartridge is causing problems. Try a new DLTtape cartridge. If this condition persists with other clean cartridges, you can use HP Library and Tape Tools (downloadable from the web site: [//www.hp.com/support/tapetools](http://www.hp.com/support/tapetools)) to help you diagnose the problem. If the condition still continues, contact Technical Support.
- Off: Cleaning is complete or not needed.

All three LEDs

- On: Power-On Self-Test (POST) is starting.
- Flashing: A POST error has occurred. For more information, see "Troubleshooting" on page 21.

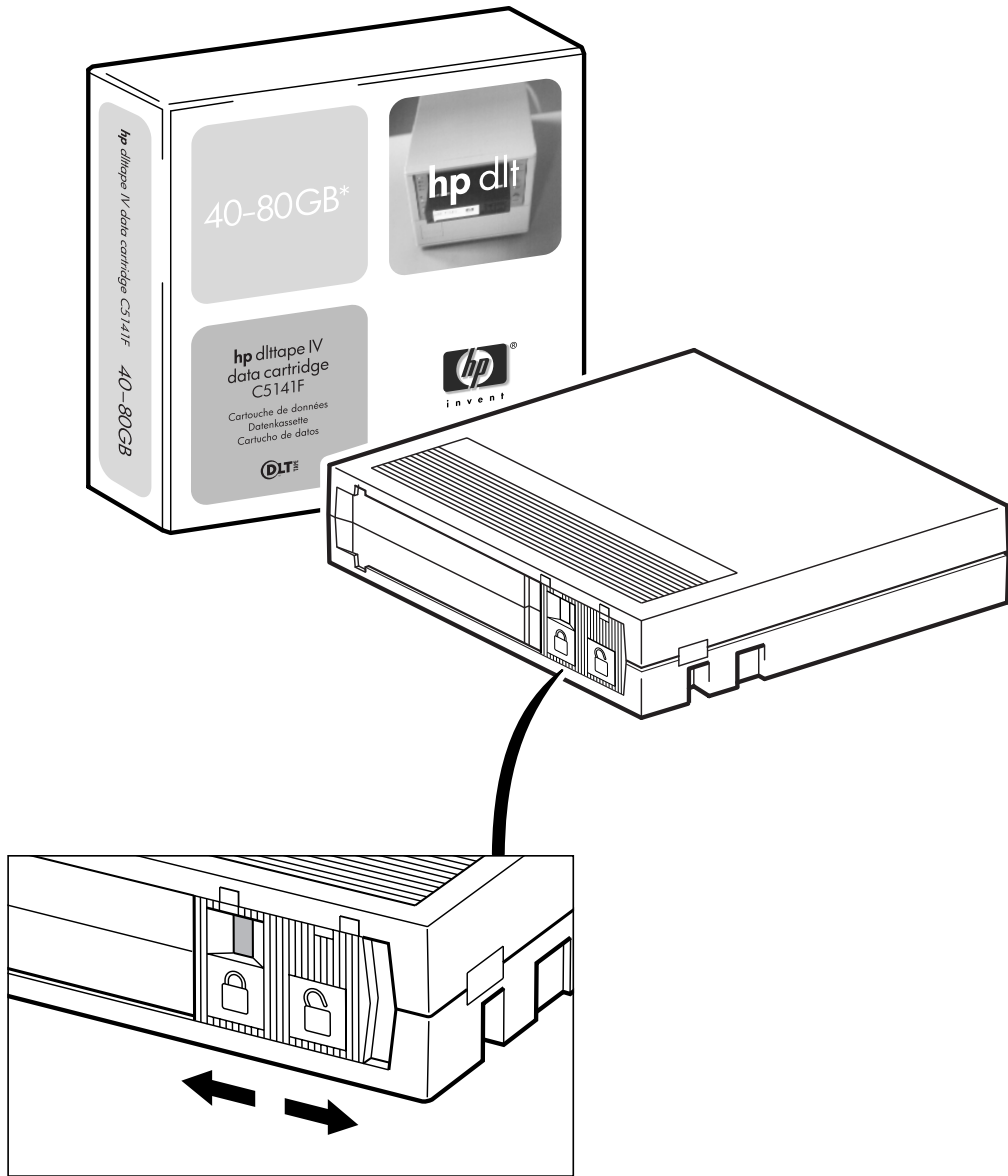


Figure 5: write-protecting cartridges

Use the correct media

HP Surestore DLT1 drives use only DLTtape IV cartridges. Your HP Surestore DLT1 tape drive can read but not write DLTtape IV cartridges that use the DLT4000 format.

Note Your HP Surestore DLT1 tape drive automatically ejects any other cartridge types and any cartridges whose format it cannot read. If you want to reuse cartridges that have been formatted with a drive other than DLT1, use a magnetic bulk eraser to prepare the cartridges for use with your HP Surestore DLT1 tape drive.

Only rely on the best media to protect your valuable data. Thanks to HP's rigorous testing programs, HP Surestore DLT1 data and cleaning cartridges are the safest investment you can make. Order online at: [//www.hp.com/go/storagemedia](http://www.hp.com/go/storagemedia). If you do not have internet access, please contact your local HP Customer Contact Center.

Write-protecting cartridges

If you want to protect the data on a cartridge from being altered or overwritten, you can write-protect the cartridge. To write-protect a cartridge, slide the switch **to the left** to write-protect the cartridge. Note a small orange rectangle is visible, indicating that the cartridge is write-protected. To write-enable a cartridge, slide the switch **to the right** to allow your HP Surestore DLT1 tape drive to write data to the cartridge. Figure 5 illustrates the location of the write-protect switch.

Cleaning cartridges

When the Caution LED is on, your HP Surestore DLT1 tape drive's read/write head may need to be cleaned. It is good practise to clean the drive once every two weeks. Each cleaning cartridge can be used up to 20 times. 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.

Caution You must use *only* DLT1 cleaning cartridges with HP Surestore DLT1 tape drives. Be aware that cleaning cartridges that do not specify DLT1 on the cartridge may be accepted by the drive but will not clean the drive.

A cleaning cartridge is supplied with each tape drive. Insert the cleaning cartridge and the drive will carry out its cleaning cycle. When the cleaning cartridge has cleaned the read/write head, the Caution LED turns off to indicate that you should remove the cleaning cartridge.

Looking after cartridges

- Do not touch the tape media.
- Do not attempt to clean the tape path or tape guides inside the cartridge.
- Do not leave cartridge tapes 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.
- Place identification labels only in the slide-in slot on the front of the cartridge.
- Store the cartridges in their storage cases in a dust-free environment in which temperatures are always between 16°C and 32°C (60°F to 90°F).

Figure 6a: loading a DLTtape cartridge

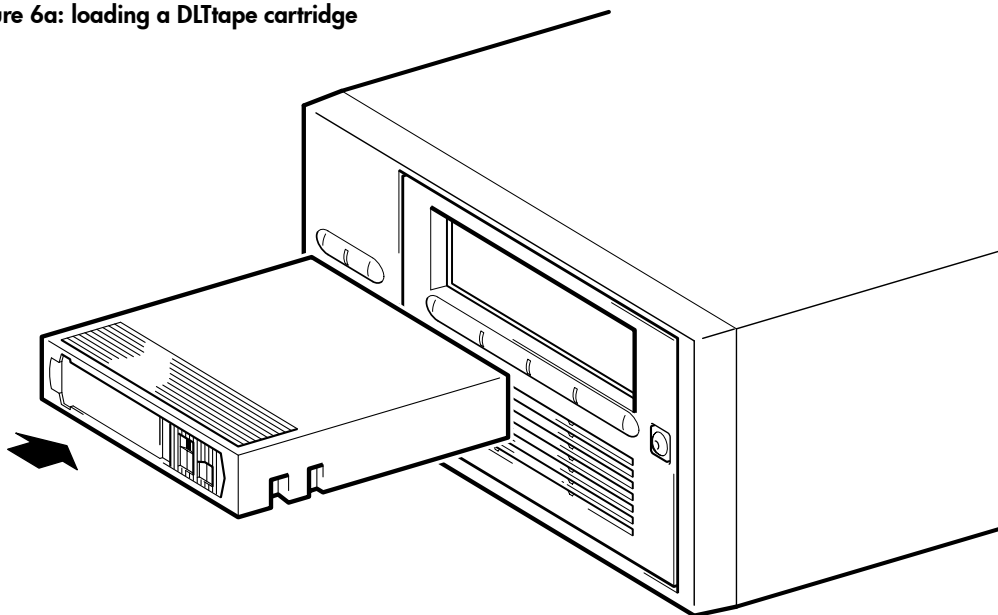
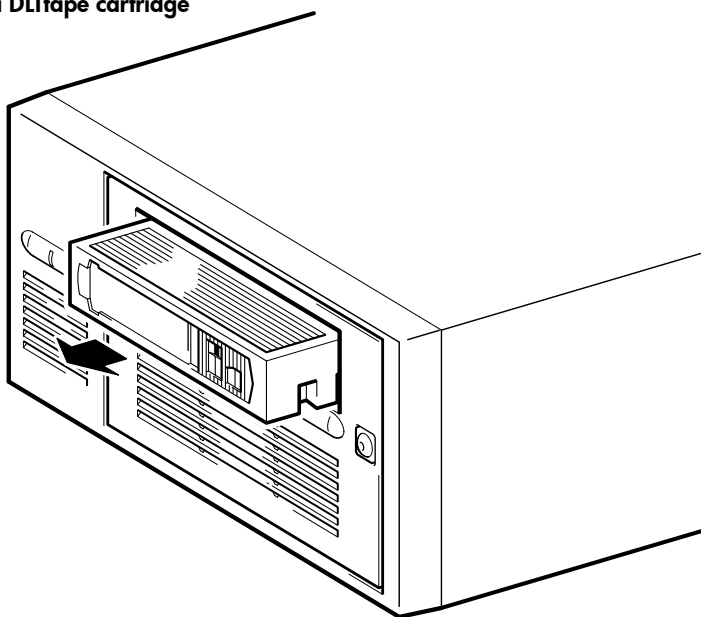


Figure 6b: unloading a DLTtape cartridge



Operating the tape drive

Check operation

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

- 1 Switch on the drive and the computer. Every time you turn on the tape drive it runs a POST which takes several seconds to complete. At the end of POST, all LEDs turn off. Read more about the self-test and front panel lights in "Troubleshooting" on page 21.

- 2 Verify that the tape drive installation was successful.

For Windows and NetWare systems, use HP Library & Tape Tools as described on page 19.

For UNIX systems, refer to the configuration instructions in the online *User's Guide* on the web site: [/www.hp.com/support/dlt1](http://www.hp.com/support/dlt1) which includes a verification procedure.

Note If you encounter a problem during this verification procedure, turn to "Troubleshooting" on page 21 for help in diagnosing and fixing the problem.

- 3 You are now ready to install backup software, as required (see page 4), and carry out a backup and restore test to check that the drive can write data to tape. Use a blank cartridge.

To load a cartridge

- 1 Insert the cartridge into the slot in front of the drive, oriented as shown in Figure 6a. Apply gentle pressure until the drive takes the cartridge and loads it. (The label and write-protect switch are on the rear face of the cartridge.)
- 2 The Ready LED flashes while the drive performs its load sequence. When the cartridge is loaded, the Ready LED is steadily illuminated.

To unload a cartridge

Note Remove the cartridge from your HP Surestore DLT1 tape drive **before turning off** the desktop drive. **Leaving a cartridge in the drive when power is off can result in cartridge and drive damage.**

- 1 Press the Eject button on the front panel or use your backup software to eject the cartridge (see Figure 6b). The Ready LED flashes while the drive rewinds the tape.
- 2 The drive completes any task it is currently performing, winds the tape to the beginning, and ejects the cartridge. The sequence can take up to two minutes.

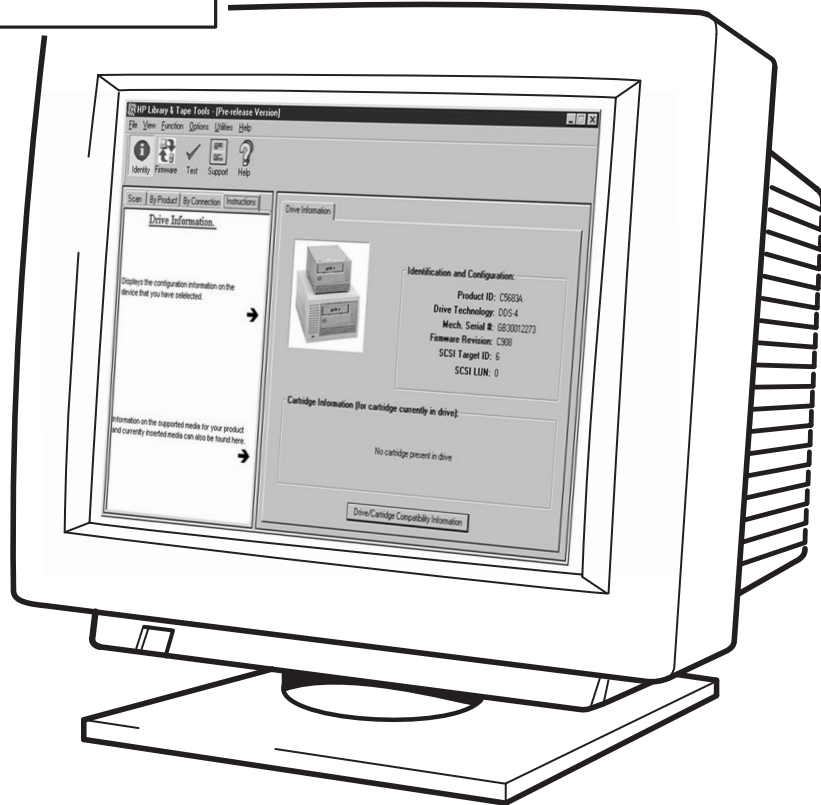
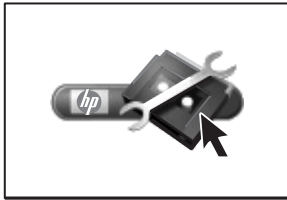


Figure 7: using HP Library & Tape Tools

HP Library & Tape Tools

HP Library & Tape Tools software provides a number of utilities for getting information about your tape drive and troubleshooting problems. It includes the following functions:

- Installation help and advice to help you install your product and operate it correctly
- Discovery to find out what devices are attached to your SCSI bus
- Identity to find out detailed information about individual devices, for example the firmware version
- Tests to check that your drive is operating correctly
- Firmware Update to help you find update files for your tape drive and allow you to perform the update
- Support Ticket to generate detailed troubleshooting information for support calls (if you are connected to the Internet, you will be able to email this information directly to your Support Center)
- Comprehensive Help that is context sensitive, if you need additional information for the screen currently displayed

HP Library & Tape Tools does not work on all operating systems. For the latest compatibility information, updates and the latest versions of this software, refer to our World Wide Web site: [//www.hp.com/support/tapetools](http://www.hp.com/support/tapetools).

Installing HP Library & Tape Tools

You can install HP Library & Tape Tools from the web site: [//www.hp.com/support/tapetools](http://www.hp.com/support/tapetools). Installation is simply a question of selecting the required option and following the instructions on the screen.

Using HP Library & Tape Tools

HP Library & Tape Tools checks for the presence of a SCSI controller and its driver software and identifies the SCSI IDs of existing SCSI devices. You can then select the required device from the device list and run one of the diagnostic utilities for that device by selecting the appropriate icon: Identity, Firmware, Test or Support.

For ease of use, comprehensive online help is built into the software.

Register your tape drive

Once you have installed and tested your HP Surestore DLT1 tape drive, please take a few minutes to register your product. This will give you the opportunity to receive up-to-date information about our products, services and support.

Please register via the web (www.hp.com/go/tapereg) or by using the Customer Care card in the box.

To ensure your registration is complete, there are a number of questions on the Customer Care card and 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.

If you have internet access, register electronically

- 1** Select the Product Registration web link on: [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1). This links you to HP's Product Registration web site.
- 2** Complete the registration form. Mandatory questions are shown in red text.
- 3** Click on the Submit button to forward your registration immediately to HP.

If you do not have internet access

- 1** Complete the Customer Care card supplied with the drive. Mandatory questions are shown in black, bold text.
- 2** Post or fax the completed form to HP.

Troubleshooting

The first step in problem-solving is establishing whether the problem lies with the cartridge, the drive, the host computer and its connections, or with the way the system is being operated. If none of the following advice helps you solve the problem, refer to our World Wide Web Customer Care pages on: [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1) or call for assistance.

None of the drive's LEDs illuminate

| Possible reason | Recommended action |
|-----------------------------------|--|
| The drive is not receiving power. | Check the drive's power cable and power connections. Plug the power cable into a different power outlet. |

All of the LEDs on the front panel blink continually

| Possible reason | Recommended action |
|---------------------------------------|--|
| An internal drive fault has occurred. | <ol style="list-style-type: none">1. Press and hold the Eject button for 6 seconds to reset the drive.2. Turn the drive off and then on again.3. Call technical support if POST continues to fail. |

The host server or workstation does not recognize the HP Surestore DLT1 tape drive

| Possible reason | Recommended action |
|--|--|
| The drive's SCSI ID might not be unique. | Identify the SCSI IDs of existing SCSI devices by using HP Library & Tape Tools. Change the drive's SCSI ID. Shut down and turn off the host server or workstation; turn off the desktop drive. Change the drive's SCSI ID. Turn on the host server or workstation and desktop drive. Ensure that all devices on the SCSI bus are SE or LVD. |
| The SCSI host adapter might be incorrectly configured. | Check the SCSI host adapter configuration. Refer to the SCSI host adapter manuals for instructions. |
| The SCSI cable might be loose. | Check both ends of the SCSI cable. |
| The SCSI terminator might be loose or missing. | Make sure the terminator is properly seated on the open SCSI connector on the rear panel of the desktop drive or on the last device on the SCSI bus. |

| | |
|--|---|
| The SCSI bus might be improperly terminated. | <ol style="list-style-type: none"> 1. If your HP Surestore DLT1 drive is the last or only device on the SCSI bus, make sure the device is properly terminated. 2. If your HP Surestore DLT1 drive is not the last or only device on the SCSI bus, check all SCSI cable connections and make sure the last device on the SCSI bus is terminated. |
| The SCSI terminator might not be at the end of the SCSI bus or more than two terminators might be present on the SCSI bus. | Make sure the terminators are placed only at each end of the SCSI bus—one at the host adapter and one on the last device on the bus, both internal and external. |
| The SCSI host adapter might be in a defective expansion slot. | Move the SCSI host adapter to a different expansion slot. |
| The SCSI bus might be too long | Make sure the total length of the SCSI bus does not exceed the ANSI SCSI standard of 3 meters (10 feet) for an SE bus, 12 meters (40 feet) for an LVD SCSI bus with multiple devices, or 25 meters (82 feet) for an LVD SCSI bus with a single device. |

There are fatal or non-fatal errors for which you cannot find the cause

| Possible reason | Recommended action |
|---|--|
| The SCSI bus might be improperly terminated. | <ol style="list-style-type: none"> 1. If your HP Surestore DLT1 drive is the last or only device on the SCSI bus, make sure the drive is properly terminated. Make sure only the last device is terminated. 2. If your HP Surestore DLT1 drive is not the last or only device on the SCSI bus, check all SCSI cable connections and make sure the last device on the SCSI bus is terminated. |
| The AC power source may not be properly grounded (HP Surestore DLT1e desktop drive only.) | <ol style="list-style-type: none"> 1. Plug the HP Surestore DLT1e Desktop Drive's power cable into a power outlet on the same circuit as the host server or workstation. 2. Plug the HP Surestore DLT1e Desktop Drive's power cable into a different power outlet. |

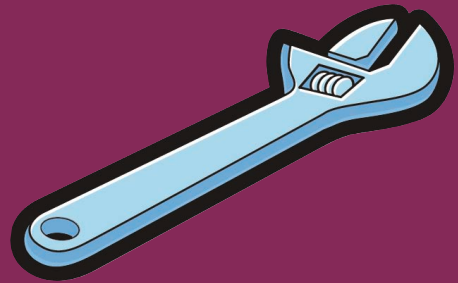
Other sources of information

If you experience problems using your tape drive after installation, use HP Library & Tape Tools to help you diagnose the problem (see page 19).

You will also find troubleshooting information on the HP support web site: [//www.hp.com/support/dlt1](http://www.hp.com/support/dlt1) that takes you to HP's Customer Care web site for a wide range of up-to-date information about your product.



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



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

Free Manuals Download Website

<http://myh66.com>

<http://usermanuals.us>

<http://www.somanuals.com>

<http://www.4manuals.cc>

<http://www.manual-lib.com>

<http://www.404manual.com>

<http://www.luxmanual.com>

<http://aubethermostatmanual.com>

Golf course search by state

<http://golfingnear.com>

Email search by domain

<http://emailbydomain.com>

Auto manuals search

<http://auto.somanuals.com>

TV manuals search

<http://tv.somanuals.com>