

Sun™ StorEdge™ D1000 Storage Guide

Software Instructions for Hot-Plugging Hard Disk Drives



THE NETWORK IS THE COMPUTER™

Sun Microsystems Computer Company

A Sun Microsystems, Inc. Business
2550 Garcia Avenue
Mountain View, CA 94043 USA
415 960-1300 fax 415 969-9131

Part No.: 805-4013-10
Revision A, February 1998

Copyright 1998 Sun Microsystems, Inc. 2550 Garcia Avenue, Mountain View, California 94043-1100 U.S.A. All rights reserved.

This product or document is protected by copyright and distributed under licenses restricting its use, copying, distribution, and decompilation. No part of this product or document may be reproduced in any form by any means without prior written authorization of Sun and its licensors, if any. Third-party software, including font technology, is copyrighted and licensed from Sun suppliers.

Parts of the product may be derived from Berkeley BSD systems, licensed from the University of California. UNIX is a registered trademark in the U.S. and other countries, exclusively licensed through X/Open Company, Ltd.

Sun, Sun Microsystems, the Sun logo, AnswerBook, SunDocs, Solstice DiskSuite, StorEdge, and Solaris are trademarks, registered trademarks, or service marks of Sun Microsystems, Inc. in the U.S. and other countries. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. in the U.S. and other countries. Products bearing SPARC trademarks are based upon an architecture developed by Sun Microsystems, Inc.

The OPEN LOOK and Sun™ Graphical User Interface was developed by Sun Microsystems, Inc. for its users and licensees. Sun acknowledges the pioneering efforts of Xerox in researching and developing the concept of visual or graphical user interfaces for the computer industry. Sun holds a non-exclusive license from Xerox to the Xerox Graphical User Interface, which license also covers Sun's licensees who implement OPEN LOOK GUIs and otherwise comply with Sun's written license agreements.

RESTRICTED RIGHTS: Use, duplication, or disclosure by the U.S. Government is subject to restrictions of FAR 52.227-14(g)(2)(6/87) and FAR 52.227-19(6/87), or DFAR 252.227-7015(b)(6/95) and DFAR 227.7202-3(a).

DOCUMENTATION IS PROVIDED "AS IS" AND ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT, ARE DISCLAIMED, EXCEPT TO THE EXTENT THAT SUCH DISCLAIMERS ARE HELD TO BE LEGALLY INVALID.

Copyright 1998 Sun Microsystems, Inc., 2550 Garcia Avenue, Mountain View, Californie 94043-1100 Etatis-Unis. Tous droits réservés.

Ce produit ou document est protégé par un copyright et distribué avec des licences qui en restreignent l'utilisation, la copie, la distribution, et la décompilation. Aucune partie de ce produit ou document ne peut être reproduite sous aucune forme, par quelque moyen que ce soit, sans l'autorisation préalable et écrite de Sun et de ses bailleurs de licence, s'il y en a. Le logiciel détenu par des tiers, et qui comprend la technologie relative aux polices de caractères, est protégé par un copyright et licencié par des fournisseurs de Sun.

Des parties de ce produit pourront être dérivées des systèmes Berkeley BSD licenciés par l'Université de Californie. UNIX est une marque déposée aux Etats-Unis et dans d'autres pays et licenciée exclusivement par X/Open Company, Ltd.

Sun, Sun Microsystems, le logo Sun, AnswerBook, SunDocs, Solstice DiskSuite, StorEdge, et Solaris sont des marques de fabrique ou des marques déposées, ou marques de service, de Sun Microsystems, Inc. aux Etats-Unis et dans d'autres pays. Toutes les marques SPARC sont utilisées sous licence et sont des marques de fabrique ou des marques déposées de SPARC International, Inc. aux Etats-Unis et dans d'autres pays. Les produits portant les marques SPARC sont basés sur une architecture développée par Sun Microsystems, Inc.

L'interface d'utilisation graphique OPEN LOOK et Sun™ a été développée par Sun Microsystems, Inc. pour ses utilisateurs et licenciés. Sun reconnaît les efforts de pionniers de Xerox pour la recherche et le développement du concept des interfaces d'utilisation visuelle ou graphique pour l'industrie de l'informatique. Sun détient une licence non exclusive de Xerox sur l'interface d'utilisation graphique Xerox, cette licence couvrant également les licenciés de Sun qui mettent en place l'interface d'utilisation graphique OPEN LOOK et qui en outre se conforment aux licences écrites de Sun.

CETTE PUBLICATION EST FOURNIE "EN L'ETAT" ET AUCUNE GARANTIE, EXPRESSE OU IMPLICITE, N'EST ACCORDEE, Y COMPRIS DES GARANTIES CONCERNANT LA VALEUR MARCHANDE, L'APTITUDE DE LA PUBLICATION A REpondre A UNE UTILISATION PARTICULIERE, OU LE FAIT QU'ELLE NE SOIT PAS CONTREFAISANTE DE PRODUIT DE TIERS. CE DENI DE GARANTIE NE S'APPLIQUERAIT PAS, DANS LA MESURE OU IL SERAIT TENU JURIDIQUEMENT NUL ET NON AVENU.



Contents

- 1. Hot-Plug Disk Replacement for the Sun StorEdge™ D1000 1**
 - 1.1 Overview 1
- 2. Adding a Disk Drive to a SPARCstorage RSM Tray 3**
 - 2.1 Selecting a Slot for the New Disk Drive 3
 - 2.2 Adding the Disk Drive 4
 - 2.3 Configuring the Solaris Environment 5
 - 2.3.1 UDWIS/S Host Adapter System 5
 - 2.4 Configuring the New Disk Drive Within Your Application 6
 - 2.5 Configuring the New Disk Drive for a Unix File System (UFS) 6
 - 2.6 Adding the New Device to a Sun StorEdge D1000 Volume Manager (VxVM) Disk Group 7
- 3. Replacing a Faulty Disk in a Sun StorEdge D1000 Tray 9**
 - 3.1 Prepare Spare Drives 10
 - 3.2 Identifying the Faulty Disk Drive 10
 - 3.3 Device Naming Convention in the Solaris Environment 11
 - 3.3.1 UDWIS/S Host Adapter System 11
 - 3.4 Replacing the Disk Drive Within Your Application 11
 - 3.5 UNIX File System (UFS) 11
 - 3.5.1 Preparing to Replace the Disk Drive 12

3.5.2	Removing the Disk Drive	13
3.5.3	Installing the New Disk Drive	14
3.5.4	Restoring the UFS File System	14
3.6	Solstice Enterprise Volume Manager	16
3.6.1	Preparing to Replace the Disk Drive	16
3.6.2	Removing the Disk Drive	17
3.6.3	Installing the New Disk Drive	17
3.6.4	Recreating a VxVM Configuration on the New Drive	18

Hot-Plug Disk Replacement for the Sun StorEdge™ D1000

The Sun StorEdge D1000 is a customer-serviceable disk tray with removable disk modules; hot-pluggable, redundant, load-sharing power supplies; and a hot-pluggable redundant fan module. When coupled with high-availability software solutions (such as SPARCstorage Volume Manager), the disk modules are hot-pluggable.



Caution – As with other high-RAS products, drives should not be pulled out randomly. The Sun StorEdge D1000 design provides support to replace failed drives in redundant (mirrored or RAID) configurations. If the drive is active, you must stop that activity before removing the drive. This can be done without bringing down the operating system or powering down the Sun StorEdge D1000 unit. The Sun StorEdge D1000 hardware fully supports hot-plugging, but there are software considerations that must be taken into account. Follow the procedures in this installation supplement when removing, replacing, and adding drives.

While there is no Solaris™ system software that provides hot-plug functionality to shield the operating system from the physical removal and replacement of a disk drive, there are several scenarios where a disk drive may be safely removed or added to the enclosure as long as the software framework managing the disk drives in the enclosure is taken into account.

1.1 Overview

Hot-plug reconfiguration or hot-plug operations cannot be performed on an active disk drive. All disk access activity must be stopped prior to a disk drive being removed or replaced.

In general, hot-plug reconfiguration operations involve three stages:

1. Preparing for hot-plug reconfiguration
2. Adding, replacing, or removing a disk drive
3. Reconfiguring the operating environment.

Three specific cases exist where the hot-plug feature is useful.

- Adding a disk drive to a system to increase storage capacity:
Chapter 2 “ ”
- Replacing a faulty disk drive while the system is running:
Chapter 3 “ ”

When you intend to replace a faulty drive, prepare replacement disks ahead of time to simplify replacement later.

Each replacement disk should be formatted, labeled, and partitioned the same as the disks to be replaced, and have file systems or other application specific preparation performed.

- Removing a drive from a system that no longer needs it:
Chapter 4 “ ”

Adding a Disk Drive to a SPARCstorage RSM Tray

This chapter contains information on how to configure your system when you add a disk drive while the power is on and the operating system is running.

The way in which you add a disk drive depends on the application you are using. Each application requires that you decide where to install the new disk drive, add the drive, and then reconfigure the operating environment. Each application is different.

In all cases, you must select a slot, physically install the disk drive, and configure the Solaris environment to recognize the drive. Then you must configure your application to accept the new disk drive.



Caution – These procedures should be performed only by a qualified system administrator. Performing hot-plug operations on an active disk drive may result in data loss and/or data corruption.

2.1 Selecting a Slot for the New Disk Drive

Select any available slot in the Sun StorEdge D1000 tray for the new disk drive. For reference when you configure the software environment, make a note of which slot you chose. See FIGURE 2-1.

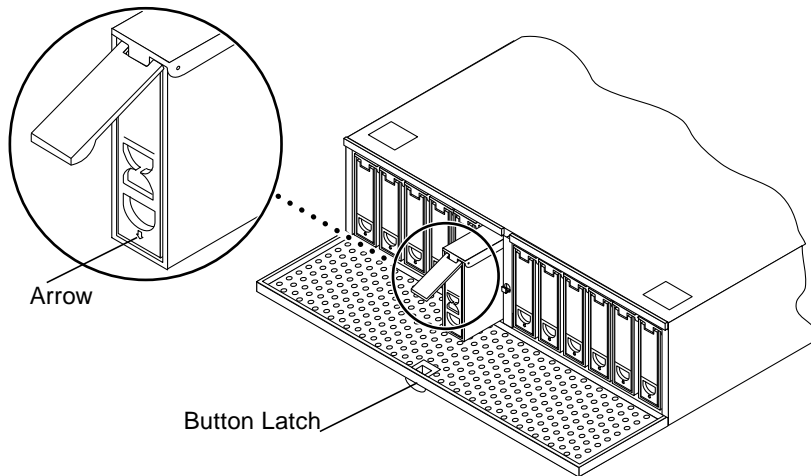


FIGURE 2-1 Adding or Replacing a Disk Drive

2.2 Adding the Disk Drive

- 1. Unlock and open the door at the front of the chassis.**
Push down the button latch at the center of the door (FIGURE 2-1).
- 2. Hold the locking handle on the disk drive open.**
Push down in the direction of the arrow to release the latch (FIGURE 2-1).
- 3. Slide the replacement disk drive into the vacant slot.**
- 4. Gently push the drive until the locking handle engages.**
- 5. Close the locking handle completely, using gentle downward pressure.**

Note – When the drive is firmly installed, it will begin to spin up automatically.

Refer to Chapter 2, “Product Overview” in the *Sun StorEdge A1000 and D1000 Installation, Operations, and Service Manual* for drive ID assignment details.

2.3 Configuring the Solaris Environment

A new device entry needs to be created for the drive in the `/devices` and `/dev/dsk` and `/dev/rdisk` hierarchy. The new drive is assigned a name associated with the slot in the Sun StorEdge D1000 tray into which the drive was installed.

2.3.1 UDWIS/S Host Adapter System

The naming convention for disks attached to a UDWIS/S host adapter is `cwt x dysz`, where:

- `w` corresponds to the SBus controller in your system
- `x` corresponds to the Sun StorEdge D1000 disk slot
- `y` is the logical unit for the disk drive (always 0)
- `z` is the slice (or partition) on the disk.

For example, if the Sun StorEdge D1000 tray is connected to a UDWIS host adapter corresponding to controller `c2` and a drive was added to slot 4 on a Sun StorEdge D1000 tray, the new drive appears as

`/dev/dsk/c2t4d0s[0-7]` and `/dev/rdisk/c2t4d0s[0-7]`.

1. Use the `drvconfig` and `disks` commands to add the new device:

```
# drvconfig
# disks
```

2. Verify that the new disk has been created, type:

```
# ls -l /dev/dsk/c1t4d0s*
```

where: `c1t4d0s*` is the expected device name for the new drive in slot 4.

The new disk drive is now available for use as a block or character device. Refer to the `sd(7)` man pages for further details.

2.4 Configuring the New Disk Drive Within Your Application

Continue adding the disk with the instructions for your application.

- Section 2.5 “Configuring the New Disk Drive for a Unix File System (UFS)” on page 2-6.
- Section 2.6 “Adding the New Device to a Sun StorEdge D1000 Volume Manager (VxVM) Disk Group” on page 2-7.



Caution – These procedures should be performed only by a qualified system administrator. Performing hot-plug operations on an active disk drive may result in data loss.

2.5 Configuring the New Disk Drive for a Unix File System (UFS)

Use the following procedure to configure a slice (single physical partition) on a disk to be used with a UFS file system. For instructions about adding a file system to a VxVM disk, refer to the documentation that came with your application.

1. Verify that the device label meets your requirements.

You can use the `prtvtoc` command to inspect the label for your disk. To modify the label, use the `format` command. Refer to the `prtvtoc(1M)` and `format(1M)` man pages for more information.

2. Once you have selected a disk slice for your UFS file system, create a file system on the slice:

```
# newfs /dev/rdisk/cwtxdysz
```

Refer to the `newfs(1M)` man page for more information.

3. If necessary, create a mountpoint for the new file system:

```
# mkdir mount_point
```

where: *mount_point* is a fully qualified pathname. Refer to the `mount(1M)` man page for more information.

4. After the file system and mountpoint have been created, modify the `/etc/vfstab` file to reflect the new file system.

See the `vfstab(4)` man page for more details.

5. Mount the new file system using the `mount` command:

```
# mount mount_point
```

where: *mount_point* is the directory you created.

The file system is ready to be used.

2.6 Adding the New Device to a Sun StorEdge D1000 Volume Manager (VxVM) Disk Group

Use the following procedure to configure the new device to be used with a new or existing VxVM disk group.

1. Configure the VxVM to recognize the disk drive.

```
# vxdctl enable
```

2. Add the new disk to a new or existing VxVM disk group:

```
# vxdiskadd cwtxdysz
```

where: *cwtxdysz* is the new disk.

Refer to the `vxdiskadd(1M)` man page for further details.

The disk is now ready for use with VxVM: as part of a new volume, added to an existing volume as a plex, or to increase an existing volume. .

Replacing a Faulty Disk in a Sun StorEdge D1000 Tray

This chapter contains information on configuring your system to replace a disk drive while the power is on and the operating system is running.

The way in which you replace a faulty disk drive depends on the application you are using. Each application is different, but requires that you

1. Determine which disk drive is failing or has failed
2. Remove the disk
3. Add the replacement drive
4. Reconfigure the operating environment.

In all cases you must stop any activity or applications on the disk; physically remove the old drive and install the new one; and configure the Solaris environment to recognize the drive. Then you must configure your application to accept the new disk drive.



Caution – These procedures should be performed only by a qualified system administrator. Performing hot-plug operations on an active disk drive may result in data loss and/or data corruption.

3.1 Prepare Spare Drives

If possible, prepare replacement disk drives in advance. Each replacement disk drive should be labeled, and partitioned the same as the disk it will replace. See the documentation for your application for instructions on how to format and partition the disk, and add that disk to your application.

Note – The descriptions do not cover all possible situations and circumstances and should be performed only by a qualified system administrator.

3.2 Identifying the Faulty Disk Drive

Different applications provide various levels of error logging. In general, you can find messages about failing or failed disks in your system console window. The information is also logged in the `/usr/adm/messages` file(s). See the documentation that came with your application for more information.

- **Once you have identified which disk drive is faulty, determine the SCSI ID and slot position for that drive in the Sun StorEdge D1000 tray.**

Refer to “Disk Drive Address ID Assignments” in Chapter 2, “Product Overview” in the *Sun StorEdge Installation, Operations, and Service Manual* for details about SCSI ID assignments.

3.3 Device Naming Convention in the Solaris Environment

3.3.1 UDWIS/S Host Adapter System

The naming convention for disks attached to a UDWIS/S host adapter is *cwt_xdy_z*, where:

- w* corresponds to the SBus controller in your system
- x* corresponds to the Sun StorEdge D1000 disk slot
- y* is the logical unit for the disk drive (always 0)
- z* is the slice (or partition) on the disk

For example, if the Sun StorEdge D1000 tray is connected to a UDWIS/S host adapter corresponding to controller *c2* and a drive was added to slot 4 on a Sun StorEdge D1000 tray, the new drive appears as

/dev/dsk/c2t4d0s[0-7] and */dev/rdsk/c2t4d0s[0-7]*.

3.4 Replacing the Disk Drive Within Your Application

Continue the disk replacement by going to the instructions for your application.

- Section 3.5 “UNIX File System (UFS)” on page 3-11
- Section 3.6 “Solstice Enterprise Volume Manager” on page 3-16

3.5 UNIX File System (UFS)

The following procedure describes how to unconfigure a disk being used by one or more UFS file systems.



Caution – These procedures should be performed only by a qualified system administrator. Performing hot-plug operations on an active disk drive can result in data loss.

3.5.1 Preparing to Replace the Disk Drive

1. Stop any application processes on the file systems to be unconfigured.
2. Back up your system.
3. Determine what file system(s) are on the disk:

```
# mount | grep cwtxdysz
```

For example, if the device to be removed is `c1t3d0`, enter the following:

```
# mount | grep c1t3d0
/export/home (/dev/dsk/c1t3d0s7 ): 98892 blocks 142713 files
/export/home2 (/dev/dsk/c1t3d0s5 ): 153424 blocks 112107 files
```

4. Determine and save the partition table for the disk.

If the replacement disk is the same type as the faulty disk, you can use the `format` command to save the partition table of the disk. Use the `save` command in `format` to save a copy of the partition table to the `/etc/format.dat` file. This will allow you to configure the replacement disk so that its layout matches the current disk.

Refer to the `format(1M)` man page for more information.

5. Unmount any file systems on the disk.

Note – If the file system(s) are on a disk that is failing or has failed, the `umount` operation may not complete. A large number of error messages may be displayed in the system console and in the `/var` directory during the `umount` operation. If the `umount` operation does not complete, you may have to restart the system.

For each file system returned, type:

```
# umount filesystem
```

where *filesystem* is the first field for each line returned in Step 3.

For example:

```
# umount /export/home  
# umount /export/home2
```

6. Using the `df` command, verify that the file system has been unmounted.

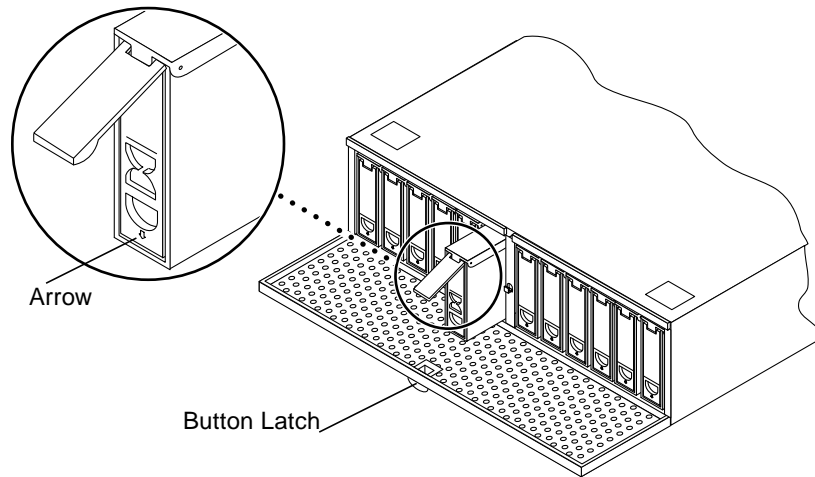


FIGURE 3-1 Removing and Replacing a Sun StorEdge D1000 Hard Disk Drive

3.5.2 Removing the Disk Drive

1. **Spin down the disk drive, if possible.**
2. **Unlock and open the door at the front of the chassis.**
Push down the button latch at the center of the door (FIGURE 3-1).
3. **Unlatch the drive bracket handle to release it.**
Push down in the direction of the arrow to release the latch (FIGURE 3-1).

4. Continue to pivot the disk drive bracket handle against the chassis, applying mild pressure until the drive disconnects.
5. Slide the drive out.

Caution – After extracting the disk, leave it in the drive bay for at least 30 seconds before removing it. When the disk has had time to spin down, you can remove it from the drive bay.

6. Place both hands under the device for support and remove the device from the Sun StorEdge D1000 chassis.

3.5.3 Installing the New Disk Drive

1. Hold the locking handle on the disk drive open (FIGURE 3-1).
2. Slide the replacement disk drive into the vacant slot.
3. Gently push the drive until the locking handle engages.
4. Close the locking handle completely, using gentle downward pressure.

Note – When the drive is firmly installed, it will begin to spin up automatically.

Refer to “Disk Drive Address ID Assignments” in Chapter 2, “Product Overview” in the *Sun StorEdge A1000 and D1000 Installation, Operations, and Service Manual* for drive ID assignment details.

3.5.4 Restoring the UFS File System

Use the following procedure to configure a slice on a disk to be used with the UFS file system.

1. Verify that the device label meets your requirements.

You can use the `prtvtoc` command to inspect the label for your disk. To modify the label, use the `format` command. See the `prtvtoc(1M)` and `format(1M)` man pages for more information.

2. Verify that the device's partition table satisfies the requirements of the file system(s) you intend to re-create.

You can use the `prtvtoc` command to inspect the label for your device. If you need to modify the label, use the `format` command. Refer to the `prtvtoc(1M)` and `format(1M)` man pages for more information.

For example:

```
# prtvtoc /dev/rdisk/cwtxdysz
```

If you have saved a disk partition table using the `format` utility and the replacement disk type matches the old disk type, then you can use the `format` utility's `partition` section to configure the partition table of the replacement disk. See the `select` and `label` commands in the `partition` section.

If the replacement disk is of a different type than the disk it replaced, you can use the partition size information from the previous disk to set the partition table for the replacement disk. Refer to the `prtvtoc(1M)` and `format(1M)` man pages for more information.

You have defined your disk's partition table and have identified the disk slice on which to build your UFS file system.

3. Once you have selected a disk slice for your UFS file system, create a file system on the slice:

```
# newfs /dev/rdisk/cwtxdysz
```

4. Mount the new file system using the `mount` command:

```
# mount mount_point
```

where: `mount_point` is the directory on which the faulty disk was mounted.

The new disk is ready to be used. You can now restore data from your backups.

3.6 Solstice Enterprise Volume Manager

The following procedure assumes that all user- and application-level processes on all volumes, plexes, and/or subdisks that are located on the drive to be removed have been terminated.



Caution – These procedures should be performed only by a qualified system administrator. Performing hot-plug operations on an active disk drive may result in data loss.

3.6.1 Preparing to Replace the Disk Drive

1. **Back up your system.**
2. **Identify the disk media name for the disk you intend to replace.**

```
# vxdisk list | grep cwtxdysz
```

For example, if the disk to be removed is c0t3d0, enter:

```
# vxdisk list | grep c0t3d0
c0t3d0s2      sliced      disk01      rootdg      online
```

The disk media name is the third field in the output above: `disk01`.

You can use the `vxdiskadm` utility to prepare the disk for replacement.

3. **Type `vxdiskadm` in a shell.**

For example:

```
# vxdiskadm
```

This operation is interactive and requires user confirmation of the operation.

4. Select the “Remove a disk for replacement” option.

When prompted for a disk name to replace, type the disk media name from Step 2. `vxdiskadm` marks the disk to be replaced and saves the subdisk information to be rebuilt on the replacement disk.

Redundant data is automatically recovered after the replacement disk has been reattached to VxVM. Non-redundant data is identified as unusable and must be recreated from backups.

Refer to the `vxdiskadm(1M)` man page for further details.

5. Quit the `vxdiskadm` utility.

3.6.2 Removing the Disk Drive

1. Spin down the disk drive.

2. Unlock and open the door at the front of the chassis.

Push down the button latch at the center of the door (FIGURE 3-1).

3. Unlatch the drive bracket handle to release it.

Push down in the direction of the arrow to release the latch (FIGURE 3-1).

4. Continue to pivot the disk drive bracket handle against the chassis, applying mild pressure until the drive disconnects.

5. Slide the drive out.

Caution – After extracting the disk, leave it in the drive bay for at least 30 seconds before removing it. When the disk has had time to spin down, you can remove it from the drive bay.

6. Place both hands under the device for support and remove the device from the Sun StorEdge D1000 chassis.

3.6.3 Installing the New Disk Drive

1. Hold the locking handle on the disk drive open (FIGURE 3-1).

2. Slide the replacement disk drive into the vacant slot.

3. Gently push the drive until the locking handle engages.

4. Close the locking handle completely, using gentle downward pressure.

Note – When the drive is firmly installed, it will begin to spin up automatically.

Refer to the “Disk Drive Address ID Assignments” in Chapter 2, “Product Overview” in the *Sun StorEdge A1000 and D1000 Installation, Operations, and Service Manual* for drive ID assignment details.

3.6.4 Recreating a VxVM Configuration on the New Drive

To recreate the replaced disk on the new drive:

1. Configure the Sun StorEdge D1000 VxVM to recognize the disk drive.

```
# vxdctl enable
```

2. Use the `vxdiskadm` utility to replace the failed disk.

Select the “Replace a failed or removed disk” option.

This operation requires user confirmation. When prompted for a disk name to replace, use the disk media name from Step 2 of Section 3.6.1 “Preparing to Replace the Disk Drive” on page 3-16.

`vxdiskadm` supplies a list of available disks to be used as replacements.

3. Select the replacement drive.

`vxdiskadm` automatically configures the replacement drive to match the failed drive.

Redundant data is recovered automatically. Space for non-redundant data is created and identified. Non-redundant data must be recovered from backing store.

See the `vxdiskadm` man pages for further details.

You have now completed the replacement of the failed drive.