



Sun StorEdge™ T3 Disk Tray Administrator's Guide

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Preface

The *Sun StorEdge T3 Disk Tray Administrator's Guide* describes configuring, monitoring, and troubleshooting the Sun StorEdge™ T3 disk tray using the command-line interface (CLI). It provides information on commands that are specific to the Sun StorEdge T3 disk tray, but it is not intended as a reference for general operating system commands.

This guide is designed for use with the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual* and is written for an experienced system administrator of the Solaris™ operating environment and related disk storage systems.

Before You Read This Book

Read the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual* to install the disk tray.

How This Book Is Organized

Chapter 1 provides an overview of this book.

Chapter 2 describes how to modify disk tray parameters using the CLI.

Chapter 3 provides information for reconfiguring a volume using the CLI.

Chapter 4 describes the commands you can use to check the health and status of the disk tray, and provides procedures for configuring remote monitoring.

Chapter 5 describes how to use the CLI to troubleshoot disk tray problems.

Appendix A lists supported Sun StorEdge T3 disk tray CLI commands with descriptions of command options.

Appendix B contains information on error messages that can be viewed using the CLI.

Glossary contains definitions of terms used in this document.

Typographic Conventions

TABLE P-1 Typographic Conventions

Typeface	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. % You have mail.
AaBbCc123	What you type, when contrasted with on-screen computer output	% su Password:
AaBbCc123	Book titles, new words or terms, words to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type <code>rm filename</code> .

Shell Prompts

TABLE P-2 Shell Prompts

Shell	Prompt
C shell	<i>machine_name%</i>
C shell superuser	<i>machine_name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#
Sun StorEdge T3 disk tray	t300:/:

Related Documentation

TABLE P-3 Related Documentation

Application	Title	PartNumber
Installation overview	<i>Sun StorEdge T3 Disk Tray Installation Task Map</i>	806-1061
Installing, using, and servicing the disk tray	<i>Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual</i>	806-1062
Release notes	<i>Sun StorEdge T3 Disk Tray Release Notes</i>	806-1497
Disk drive specifications	<i>18 Gbyte 10K rpm Disk Drive Specifications</i>	806-1493
	<i>36 Gbyte, 10K rpm Disk Drive Specifications</i>	806-1491
Installing Component Manager	<i>Sun StorEdge Component Manager Installation Guide</i>	806-4811
Using Component Manager	<i>Sun StorEdge Component Manager User's Guide</i>	806-4812
Component Manager Release Notes	<i>Sun StorEdge Component Manager Release Notes</i>	806-4813
Installing and using StorTools	<i>Sun StorEdge StorTools User's Guide</i>	806-1946
StorTools Release Notes	<i>Sun StorEdge StorTools Release Notes</i>	806-1947

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Sun StorEdge T3 Disk Tray Administration Overview

This book provides information on using the command-line interface (CLI) of the Sun StorEdge T3 disk tray for administrative tasks. Each chapter contains a list of the CLI commands as they pertain to performing various tasks related to configuring, monitoring or troubleshooting a Sun StorEdge T3 disk tray.

Note – Throughout this book, the terms “logical volume,” “disks,” and “LUNs” are used interchangeably.

This chapter is organized as follows:

- “Displaying Commands” on page 1-2
- “Displaying Command Syntax” on page 1-2
- “FRU Identifiers” on page 1-3

1.1 Displaying Commands

- To view the available commands on the disk tray, type `help` at the prompt.

```
t300:/:<184>help
arp      cat      cd        cmp       cp        date      echo      head
help     ls        mkdir     mv        ping     pwd       rm        rmdir
tail     touch
boot     disable  disk     enable   fru      id        logger   lpc
more     passwd   port     proc     reset    set       shutdown
sync     sys      tzset    ver      vol      ep        refresh  route
ofdg
```

Note – Because this book is not a reference manual for the operating system, not all of the commands displayed are discussed in this book, such as common UNIX commands. See Appendix A for detail on commands specific to the Sun StorEdge T3 disk tray.

1.2 Displaying Command Syntax

You can type `command-name help` on the Sun StorEdge T3 disk tray to display the syntax of a command.

For example:

- To view the syntax of the `sys` command, type `sys help`.

```
t300:/:<13>sys help
usage:  sys list
        sys stat
        sys blocksize <16k | 32k | 64k>
        sys cache <auto | writebehind | writethrough | off>
        sys mirror <auto | off>
        sys mp_support <none | rw>
        sys rd_ahead <on | off>
        sys recon_rate <high | med | low>
```

1.3 FRU Identifiers

Many commands use a field-replaceable unit (FRU) identifier to refer to a particular FRU in a disk tray. This identifier contains a unit constant (*u*), sometimes referred to as the *enclosure*; the unit number (*n*); the FRU constant (*ctr* for controller card, *pcu* for power and cooling unit, *i* for interconnect card, *d* for disk drive); and the FRU number (*n*).

TABLE 1-1 FRU Identifiers

FRU	Identifier	Unit number
Controller card	<i>unctr</i>	<i>n</i> = unit number (1, 2, ...)
Power and cooling unit	<i>umpcun</i>	<i>n</i> = unit number (1, 2, ...) <i>n</i> = pcu number (1, 2)
Interconnect card	<i>unln</i>	<i>n</i> = unit number (1, 2, ...) <i>n</i> = interconnect card number (1, 2)
Disk drive	<i>undn</i>	<i>n</i> = unit number (1, 2, ...) <i>n</i> = disk drive number (1, 2, ... 9)

Changing Global Parameters

This chapter contains information on modifying disk tray settings within an administrative domain (that is, partner groups or interconnected controller units that share common administration through a master controller). Changing these settings will enable you to configure your disk tray to suit your application and recovery needs.

Note – Cache segment size must be set before volumes are created. Thereafter, volumes must be removed before the cache segment block size can be changed.

This chapter contains the following sections:

- “Setting Cache Block Size” on page 2-2
- “Enabling Partner Group Multipathing” on page 2-3
- “Setting the Cache Mode” on page 2-4
- “Enabling Mirrored Cache” on page 2-4
- “Setting the LUN Reconstruction Rate” on page 2-5
- “Performing Volume Verification” on page 2-6
- “Setting Cache Read-Ahead Threshold” on page 2-7

2.1 Setting Cache Block Size



Caution – Changing the cache segment block size requires that you delete the existing volume; deleting a volume will destroy your data. Back up all data before beginning this procedure.

Cache segments are measured on the disk tray in 8k “blocks” of data. Setting the cache segment size is done by setting the block size of the cache. Because each cache block is 8k, settings are measured in multiples of eight. Optional settings for cache block sizes are 16k, 32k or 64k. The default setting is 64k.

Cache block size is universal throughout an administrative domain. Therefore, you cannot change it after you have created a volume. The only way to change it is to delete a volume, change the block size, and then create a new volume as follows:

1. From the disk tray, delete the existing volume as follows:

```
t300:/:<1>vol list

volume      capacity  raid   data    standby
v0          143.2 GB   5      u1d1-9  none
t300:/:<2>vol unmount volume-name

t300:/:<3>vol remove volume-name
```

2. Type `sys list` to determine the current cache segment size in blocks.

Cache segment size is shown as `blocksize`.

```
t300:/:<2>sys list
blocksize      : 64k
cache          : auto
mirror         : auto
mp_support     : none
rd_ahead       : on
recon_rate     : med
sys memsize    : 32 MBytes
cache memsize  : 256 MBytes
```


3. Specify and confirm the blocksize using the `sys` command.

a. Type `sys blocksize n` to change the blocksize, where $n = 16k, 32k,$ or $64k$.

b. Type `sys list` to display the revised blocksize.

For example:

```
t300:/:<3>sys blocksize 16k
t300:/:<4>sys list
blocksize           : 16k
cache               : auto
mirror              : auto
mp_support           : none
rd_ahead            : on
recon_rate          : med
sys memsize         : 32 MBytes
cache memsize       : 256 MBytes
```

2.2 Enabling Partner Group Multipathing

This task applies only when two controller units are configured as a partner group. For alternate pathing software to function properly, you must enable multipathing support on the disk tray for partner group configurations.

- **On the disk tray, enable multipathing support by typing:**

```
t300:/:<1>sys mp_support rw
```

Refer to the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual* for more information on alternate pathing.

2.3 Setting the Cache Mode

Write caching improves performance for applications because the data is being written to fast memory as opposed to slower disk storage devices. The cache is backed up with redundant battery systems that ensure data will be written to disk in the event of an AC power loss.

There are four possible cache mode options:

- Auto
- Write-behind
- Write-through
- Off

The default cache setting on the Sun StorEdge T3 disk tray is auto, which enables write-behind caching as long as there are no FRU failures. For more information on these settings, refer to Chapter 3 in the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual*.

- **To change the cache mode, type** `sys cache cache-mode`.

For example, if you are setting the cache mode to write-behind, type:

```
t300:/:<3>sys cache writebehind
```

Tip – You can view the cache status by typing `vol mode`.

2.4 Enabling Mirrored Cache

Mirrored cache can safeguard cached data when a controller fails in a partner group configuration. When enabled, cache data is copied to a cache mirror segment on the alternate controller before the write is acknowledged to the host.

Note – There will be a performance impact when cache mirroring is enabled. This overhead is caused by the data being written to two separate controller caches.

- To enable mirrored caching, type:

```
t300:/:<3>sys mirror auto
```

Note – The `auto` setting enables cache mirroring only when disk tray health and conditions are optimal.

2.5 Setting the LUN Reconstruction Rate

You can configure the LUN reconstruction rate to meet your requirements so as not to impact application performance. Reconstruction rate options are high, medium, and low.

Note – You cannot change the reconstruction rate while disk drive reconstruction is in progress.

1. Use the `sys list` command to check the current reconstruction rate (`recon_rate`).

```
t300:/:<55>sys list
blocksize      : 64k
cache          : auto
mirror         : auto
mp_support     : none
rd_ahead      : on
recon_rate     : med
sys memsize    : 32 MBytes
cache memsize  : 256 MBytes
```

2. Use the `sys` command to specify and confirm the reconstruction rate.
 - a. Type `sys recon_rate [high|med|low]` to change the reconstruction rate.

b. Type `sys list` to display the revised rate.

For example:

```
t300:/:<56>sys recon_rate low
t300:/:<57>sys list
blocksize      : 64k
cache          : auto
mirror         : auto
mp_support     : none
rd_ahead       : on
recon_rate     : low
sys memsize    : 32 MBytes
cache memsize  : 256 MBytes
```

2.6 Performing Volume Verification

The `vol verify` command enables Sun StorEdge T3 disk tray administrators to execute manual parity checks on existing volumes. Parity checking applies only to RAID 1 and RAID 5 volumes. Check data parity using the `vol verify` command before performing tape-backup overwrite cycles, approximately once every 30 days.



Caution – Ensure that system health is in optimal condition before running the `vol verify` command. For example, ensure that no LUNs are under reconstruction; the status of all disks is zero, which can be checked using the `vol stat` command; and other similar conditions are resolved before performing this procedure.



Caution – It can take up to several hours for the parity check once you execute the `vol verify` command, depending on system activity and the verification rate selected. Execution of this command will affect system performance depending on these factors.

- Use the `vol verify` command to set parity check rate.

```
t300:/:<7>vol verify volume-name [fix] rate n
```

where:

- *volume-name* is the name of the volume to verify.

Note – The volume name is a name internal to the Sun StorEdge T3 disk tray and is not seen by the host.

- The `[fix]` option corrects parity errors on RAID 5 volumes and corrects mirrored data errors on RAID 1 volumes. If `fix` is *not* specified, then `vol verify` will report errors, but not correct them. If the `fix` option is specified and an error is detected, the `vol verify` command will regenerate parity from the existing data on the volume.
- The verification rate is *n*, where *n* equals any number from 1 to 8. The default rate is 1, which has the minimum performance impact on the data host.

Note – Within a partner group, the `vol verify` command can only be run on one volume at a time.

2.7 Setting Cache Read-Ahead Threshold

Setting read caching can reduce disk I/O by reading data for future retrieval. This refers to the number of sequential reads in a chunk of data. The two cache read-ahead threshold options are `on` and `off`. The default setting for the Sun StorEdge T3 disk tray is `on`.

1. Use the `sys list` command to check the current cache read-ahead threshold (`rd_ahead`).

```
t300:/:<77>sys list
blocksize      : 64k
cache          : auto
mirror         : auto
mp_support     : none
rd_ahead       : on
recon_rate     : med
sys memsize    : 32 MBytes
cache memsize  : 256 MBytes
```

2. Use the `sys rdAhead` command to set the default threshold to `off` and confirm the setting using the `sys list` command.

For example:

```
t300:/:<78>sys rdAhead off
t300:/:<77>sys list
blocksize      : 64k
cache          : auto
mirror         : auto
mp_support     : none
rdAhead        : off
recon_rate     : med
sys memsize    : 32 MBytes
cache memsize  : 256 MBytes
```

Reconfiguring a Volume

This chapter contains information on configuring volume size, RAID level, and a hot spare.

This chapter is organized as follows:

- “Reconfiguration Limitations” on page 3-1
- “Deleting a Logical Volume” on page 3-2
- “Creating a Logical Volume” on page 3-3
- “Volume Labeling” on page 3-5

Note – Cache block size must be configured before volumes are configured. See Chapter 2 for more information.

3.1 Reconfiguration Limitations

Volumes can only be created or deleted. Once a volume has been configured, you cannot reconfigure it to change its size, RAID level, or hot spare configuration. You can only delete a volume and create a new one with the configuration you want.



Caution – Before you reconfigure a volume(s), back up all data on the disk tray. Data that resides in the volume to be deleted will be destroyed.

3.2 Deleting a Logical Volume



Caution – Deleting a volume will destroy your data. Back up all data before beginning this procedure.

1. Use the `vol list` command to display the configuration of the current volumes.

```
t300:/:<1>vol list

volume      capacity  raid  data  standby
v0          143.2 GB   5     u1d1-9  none
```

2. Unmount the volume.

```
t300:/:<2>vol unmount volume-name
```

3. Delete the volume.

```
t300:/:<3>vol remove volume-name
```

3.3 Creating a Logical Volume

When configuring a logical volume, you must define the volume, RAID level, and hot spare at the same time.

Note – Configuring a hot spare drive in the volume is optional. If you are configuring a hot spare in the volume, you can use only disk drive 9 (d9) in the disk tray as a hot spare. You can have only one hot spare per disk tray, which can be shared between two volumes.

Examples of valid volume configurations are shown in the following table:

TABLE 3-1 Volume Configuration Examples

Volume 1	Volume 2	Hot spare
9 disk RAID 5	None	
8 disk RAID 5	None	X
9 disk RAID 1	None	
8 disk RAID 1	None	X
2 disk RAID 1	7 disk RAID 5	
2 disk RAID 1	6 disk RAID 5	X
2 disk RAID 1	7 disk RAID 1	
2 disk RAID 1	6 disk RAID 1	X
4 disk RAID 0	5 disk RAID 1	
2 disk RAID 0	6 disk RAID 5	X

1. On the disk tray, use the `vol add` command to create the volume as follows:
 - a. Define the volume name (`vol add volume-name`).
 - b. Define the drives (`data undn-n`) on which the volume will reside, where:
 - `un` is the disk tray unit number
 - `dn-n` are the disk drives, $n = 1$ to 9
 - c. Define the RAID level (`raid n`), where $n = 0, 1, \text{ or } 5$.

d. Optional: define the hot spare drive (standby und9) where:

- *un* is the disk tray unit number
- *d9* is the number of the hot spare disk drive

```
t300:/:<5>vol add volume-name data undn-n raid n standby und9
```

For example:

```
t300:/:<5>vol add v1 data u2d1-8 raid 5 standby u2d9
```

- *v1* is the volume name
- *u2d1-8* indicates the location of the volume: unit 2, disk drives 1 through 8
- *raid 5* is RAID level 5
- *standby u2d9* is the location of the hot spare: unit 2, drive 9

2. Check the status of the volumes.

The `vol stat` command shows the drive status. The status of all drives must be 0. For example:

```
t300:/:<6>vol stat
```

v1	u2d1	u2d2	u2d3	u2d4	u2d5	u2d6	u2d7	u2d8	u2d9
unmounted	0	0	0	0	0	0	0	0	0

3. Use the `vol init` command to initialize the volume.

Depending on system activity at the time of initialization, it can take up to an hour to initialize a volume. Only one volume can be initialized at a time.

```
t300:/:<7>vol init volume-name data
```

4. Use the `vol mount` command to mount the volume.

```
t300:/:<8>vol mount volume-name
```

5. Use the `vol list` command to confirm that you created the volume correctly.
For example:

```
t300:/:<9>vol list

volume          capacity  raid  data  standby
v1              125.2 GB   5    u2d1-8  u2d9
```

6. On the data host, use the `luxadm(1M)` command to recognize the new volume.
In the Solaris environment, the `luxadm(1M)` command probes for new devices. Refer to the `luxadm(1M)` man page for more information on this command.
 - a. Make sure there is a `/dev/es` directory on the host system. If not, type:

```
# mkdir /dev/es
```

The `/dev/es` directory is necessary for running the `luxadm` command.

- b. On the host system, type `luxadm insert`:

```
# luxadm insert
```

Note – If the `luxadm` utility is not available, you will have to do a reconfiguration reboot (`boot -r`) to ensure that the host recognizes the new volumes. It is preferable, however, to use the `luxadm` command for this procedure instead of the `boot -r` command.

3.4 Volume Labeling

For the Solaris operating environment to recognize a volume, it must be labeled with the `format` command. Whenever you create a volume, label it using the following procedure. For more information on the `format` command, see the `format(1M)` man page.

To change the label of a volume:

1. On the disk tray, type `vol stat` to verify that the volume is mounted.

2. On the data host, type `format` at the root prompt.

Specify the disk number when prompted. In this example, the Sun StorEdge T3 disk tray is shown as disk number 2. It can be identified by the SUN-T300-0113 label.

```
# format
Searching for disks...done

AVAILABLE DISK SELECTIONS:
  0. c0t2d0 <drive type unknown>
     /sbus@1f,0/SUNW,fas@e,8800000/sd@2,0
  1. c0t3d0 <SUN2.1G cyl 2733 alt 2 hd 19 sec 80>
     /sbus@1f,0/SUNW,fas@e,8800000/sd@3,0
  2. clt1d0 <SUN-T300-0113 cyl 34145 alt 2 hd 32 sec 128>
     /sbus@1f,0/SUNW,socal@1,0/sf@0,0/ssd@w50020f2300000172,0
Specify disk (enter its number): 2
selecting clt1d0
[disk formatted]
```

- If the volume had been labeled previously using the `format` command, the next display is the `FORMAT MENU`. If the `FORMAT MENU` is displayed, continue to the next step.
- If the volume had not been labeled previously using the `format` command, you will be prompted with the question: `Disk not labeled. Label it now?` If so, answer `y` at the prompt and press `Return`. The `FORMAT MENU` is displayed.

3. Type `type` to select a drive type.

```
FORMAT MENU:
disk          - select a disk
type          - select (define) a disk type
partition    - select (define) a partition table
current      - describe the current disk
format       - format and analyze the disk
repair       - repair a defective sector
label        - write label to the disk
analyze      - surface analysis
defect       - defect list management
backup       - search for backup labels
verify       - read and display labels
save         - save new disk/partition definitions
inquiry      - show vendor, product and revision
volname      - set 8-character volume name
!<cmd>      - execute <cmd>, then return0
quit

format> type
```

4. Type 0 to choose the Auto configure option.

Select the Auto configure option regardless of which drive types are displayed by the type option. For further information on partitioning, see the Solaris `format(1M)` man page.

```
AVAILABLE DRIVE TYPES:
  0. Auto configure
  1. Quantum ProDrive 80S
  2. Quantum ProDrive 105S
  3. CDC Wren IV 94171-344
  4. SUN0104
  5. SUN0207
  6. SUN0327
  7. SUN0340
  8. SUN0424
  9. SUN0535
 10. SUN0669
 11. SUN1.0G
 12. SUN1.05
 13. SUN1.3G
 14. SUN2.1G
 15. SUN2.9G
 16. SUN-T300-0100
 17. other
Specify disk type (enter its number)[16]: 0
clt1d0: configured with capacity of 33.34GB
<SUN-T300-0100 cyl 34145 alt 2 hd 16 sec 128>
selecting clt1d0
[disk formatted]
```

5. Type label and answer y when prompted to continue.

```
format> label
Ready to label disk, continue? y
```


Monitoring the Disk Tray

This chapter describes how to use the CLI to monitor the Sun StorEdge T3 disk tray, and how to set up the disk tray files for message logging and remote notification.

This chapter contains the following sections:

- “Checking Status” on page 4-1
- “Configuring the Disk Tray for Remote System Logging” on page 4-9
- “Configuring the Disk Tray for SNMP Notification” on page 4-16

4.1 Checking Status

You can check disk tray status by using a variety of CLI commands. This section discusses how to monitor the following:

- Determining Failover
- Checking Drive Status
- Checking the Hot Spare
- Checking Data Parity
- Checking the Battery
- Displaying FRU Information
- Checking FRU Status

4.1.1 Determining Failover

1. To determine which unit is the master or alternate master unit, type `sys stat`. The following example shows a partner group in a normal state:

```
t300:/:<3>sys stat
Unit   State      Role      Partner
-----
 1     ONLINE    Master    2
 2     ONLINE    AlterM    1
```

In a failover state, unit 2 assumes the role of master controller and unit 1 is disabled, as shown in the following example:

```
t300:/:<2>sys stat
Unit   State      Role      Partner
-----
 1     DISABLED  Slave
 2     ONLINE    Master
```

- To display how paths are mapped from the host ports to the volume, type `port listmap`.

```
t300:/:<2>port listmap

port   targetid  addr_type  lun  volume  owner  access
-----
u1p1   1         hard       0    v0      u1     primary
u1p1   1         hard       1    v1      u2     failover
u2p1   2         hard       0    v0      u1     failover
u2p1   2         hard       1    v1      u2     primary
```


4.1.2 Checking Drive Status

- Use the `vol stat` command to check drive status codes.

All drives should show a status of 0 under normal conditions.

```
t300:/:<40>vol stat
```

```
v0          u1d1  u1d2  u1d3  u1d4  u1d5  u1d6  u1d7  u1d8  u1d9
mounted    0      0      0      0      0      0      0      0      0
v1          u2d1  u2d2  u2d3  u2d4  u2d5  u2d6  u2d7  u2d8  u2d9
mounted    0      0      0      0      0      0      0      0      0
```

The numeric drive status codes are listed in the following table.

TABLE 4-1 Drive Status Messages

Value	Description
0	Drive mounted
2	Drive present
3	Drive is spun up
4	Drive is disabled
7	Invalid system area on drive
9	Drive not present
D	Drive disabled; drive is being reconstructed
S	Drive substituted

4.1.3 Checking the Hot Spare

1. Use the `vol list` command to check the location of the hot spare (standby) drive.

```
t300:/:<41>vol list

volume      capacity  raid  data      standby
v0          125.2 GB  5     u1d1-8    u1d9
v1          125.2 GB  5     u2d1-8    u2d9
```

2. Use the `vol stat` command to check the status of the hot spare drive.

```
t300:/:<5>vol stat

v0          u1d1  u1d2  u1d3  u1d4  u1d5  u1d6  u1d7  u1d8  u1d9
mounted    0      0      0      0      0      0      0      0      0
```

All drives should show a status of 0. See TABLE 4-1 for definitions of drive status codes.

4.1.4 Checking Data Parity

Note – Check data parity before performing tape-backup overwrite cycles, approximately once every 30 days.

- Use the `vol verify` command to perform a parity check of the drives.

```
t300:/:<7>vol verify [fix] volume-name
```

where:

- *volume-name* is the name of the volume to verify.

Note – The volume name is a name internal to the Sun StorEdge T3 disk tray and is not seen by the host.

- The `[fix]` option corrects parity errors on RAID 5 volumes and corrects mirrored data errors on RAID 1 volumes. If `fix` is *not* specified, then `vol verify` will report errors, but not correct them. If the `fix` option is specified and an error is detected, the `vol verify` command will regenerate parity from the existing data on the volume.

Note – The `vol` command is not re-entrant. Therefore, you cannot run other `vol` commands on the disk tray until the `vol verify` operation has completed.

See Section 2.6 “Performing Volume Verification” on page 2-6 for more information on checking parity.

4.1.5 Checking the Battery

1. Use the `id read` command to display battery life related information. (Unit number $n = 1$ or 2 ; power cooling unit number $n = 1$ or 2 .)

```
t300:/:<51>id read unpcun
      Revision           : 0000
      Manufacture Week   : 00221999
      Battery Install Week: 00221999
      Battery Life Used   :  0 days, 0 hours
      Battery Life Span   : 730 days, 12 hours
      Serial Number       : 01204
      Vendor ID           : TECTROL
      Model ID            : 300-1454-01
```

2. Use the `refresh -s` command to check the status of a battery refresh cycle.

The following examples show a battery refresh in progress and a normal battery status (no refresh cycle):

```
t300:/:<52>refresh -s

No battery refreshing Task is currently running.

      PCU1                      PCU2
-----
U1           Normal              Normal
U2           Normal              Normal

Current Time           Fri Jun 09 16:54:53 2000
Last Refresh          Thu Jun 01 12:54:19 2000
Next Refresh          Fri Jun 16 12:54:19 2000
```

4.1.6 Displaying FRU Information

- Use the `fru list` command to display fru vendor information, serial number, and firmware levels.

In the event of a FRU failure, `fru list` output is helpful in verifying correct FRU replacement because it contains the serial numbers. Save the output of the `fru list` command for future reference.

```
t300:/:<6>fru list
ID          TYPE          VENDOR      MODEL      REVISION    SERIAL
-----
ulctr      controller card  SCI-SJ      375-0084-01- 0210        000980
u2ctr      controller card  SCI-SJ      375-0084-01- 0210        001098
uld1       disk drive      SEAGATE     ST118202FSUN EA29        LKG78761
uld2       disk drive      SEAGATE     ST118202FSUN EA29        LKG89101
uld3       disk drive      SEAGATE     ST118202FSUN EA29        LKG86881
uld4       disk drive      SEAGATE     ST118202FSUN EA29        LKG89487
uld5       disk drive      SEAGATE     ST118202FSUN EA29        LKH31924
uld6       disk drive      SEAGATE     ST118202FSUN EA29        LKH32009
uld7       disk drive      SEAGATE     ST118202FSUN EA29        LKG90435
uld8       disk drive      SEAGATE     ST118202FSUN EA29        LKG82282
uld9       disk drive      SEAGATE     ST118202FSUN EA29        LKG95302
u2d1       disk drive      SEAGATE     ST118202FSUN EA29        LKG63405
u2d2       disk drive      SEAGATE     ST118202FSUN EA29        LKH57340
u2d3       disk drive      SEAGATE     ST118202FSUN EA29        LKD20515
u2d4       disk drive      SEAGATE     ST118202FSUN EA29        LKG89040
u2d5       disk drive      SEAGATE     ST118202FSUN EA29        LKG89845
u2d6       disk drive      SEAGATE     ST118202FSUN EA29        LKG82866
u2d7       disk drive      SEAGATE     ST118202FSUN EA29        LKG95090
u2d8       disk drive      SEAGATE     ST118202FSUN EA29        LKG90324
u2d9       disk drive      SEAGATE     ST118202FSUN EA29        LKG95460
u1l1       loop card       SCI-SJ      375-0085-01- 5.01 Flash  001594
u1l2       loop card       SCI-SJ      375-0085-01- 5.01 Flash  001579
u2l1       loop card       SCI-SJ      375-0085-01- 5.01 Flash  001562
u2l2       loop card       SCI-SJ      375-0085-01- 5.01 Flash  001735
ulpcu1     power/cooling unit TECTROL-CAN 300-1454-01( 0000        001274
ulpcu2     power/cooling unit TECTROL-CAN 300-1454-01( 0000        001566
u2pcu1     power/cooling unit TECTROL-CAN 300-1454-01( 0000        002283
u2pcu2     power/cooling unit TECTROL-CAN 300-1454-01( 0000        002072
ulmpn      mid plane      SCI-SJ      370-3990-01- 0000        000963
u2mpn      mid plane      SCI-SJ      370-3990-01- 0000        000833
```

4.1.7 Checking FRU Status

- Use the `fru stat` command to provide a status of each fru, including disk drive temperatures.

```
t300:/:<43>fru stat
```

CTLR	STATUS	STATE	ROLE	PARTNER	TEMP		
u1ctr	ready	enabled	master	u2ctr	33.5		
u2ctr	ready	enabled	alt master	u1ctr	33.5		

DISK	STATUS	STATE	ROLE	PORT1	PORT2	TEMP	VOLUME
uld1	ready	enabled	data disk	ready	ready	25	v0
uld2	ready	enabled	data disk	ready	ready	20	v0
uld3	ready	enabled	data disk	ready	ready	24	v0
uld4	ready	enabled	data disk	ready	ready	26	v0
uld5	ready	enabled	data disk	ready	ready	27	v0
uld6	ready	enabled	data disk	ready	ready	27	v0
uld7	ready	enabled	data disk	ready	ready	25	v0
uld8	ready	enabled	data disk	ready	ready	31	v0
uld9	ready	enabled	data disk	ready	ready	31	v0
u2d1	ready	enabled	data disk	ready	ready	25	v1
u2d2	ready	enabled	data disk	ready	ready	21	v1
u2d3	ready	enabled	data disk	ready	ready	26	v1
u2d4	ready	enabled	data disk	ready	ready	25	v1
u2d5	ready	enabled	data disk	ready	ready	23	v1
u2d6	ready	enabled	data disk	ready	ready	22	v1
u2d7	ready	enabled	data disk	ready	ready	29	v1
u2d8	ready	enabled	data disk	ready	ready	28	v1
u2d9	ready	enabled	data disk	ready	ready	29	v1

LOOP	STATUS	STATE	MODE	CABLE1	CABLE2	TEMP		
u2l1	ready	enabled	master	installed	-	29.5		
u2l2	ready	enabled	slave	installed	-	34.0		
u1l1	ready	enabled	master	-	installed	30.5		
u1l2	ready	enabled	slave	-	installed	33.5		

POWER	STATUS	STATE	SOURCE	OUTPUT	BATTERY	TEMP	FAN1	FAN2
u1pcu1	ready	enabled	line	normal	normal	normal	normal	normal
u1pcu2	ready	enabled	line	normal	normal	normal	normal	normal
u2pcu1	ready	enabled	line	normal	normal	normal	normal	normal
u2pcu2	ready	enabled	line	normal	normal	normal	normal	normal

4.2 Configuring the Disk Tray for Remote System Logging

This procedure consists of editing the `/etc/syslog.conf` and the `/etc/hosts` file that exist on the disk tray. Editing these files enables system messages to be logged and directed to a management host. Because you cannot edit files on the disk tray, you must ftp them to a host to make the edits and then ftp them back to the disk tray. This procedure consists of the following tasks:

- Transferring the Disk Tray Files to the Management Host
- Editing the Disk Tray `/etc/syslog.conf` File
- Editing the Disk Tray `/etc/hosts` File
- Transferring the Files Back to the Disk Tray
- Editing the Management Host `/etc/syslog.conf` File

Note – For information on interpreting system messages, see Appendix B.

4.2.1 Transferring the Disk Tray Files to the Management Host

1. Start an ftp session from the management host to the disk tray.

For example:

```
mngt_host:/:<15>ftp 129.146.81.201
Connected to 129.146.81.201.
220 chon-ji FTP server (SunOS 5.7) ready.
Name (129.146.81.201:root):
```

2. Log in to the disk tray by typing `root` and your password at the prompts.

```
Name (129.146.81.201:root): root

331 Password required for root.
Password: password
230 User root logged in.
ftp>
```

3. Move to your working directory on the management host.

For example:

```
ftp> lcd /tmp
Local directory now /tmp
ftp>
```

4. Move to the /etc directory on the disk tray.

```
ftp> cd /etc
250 CWD command successful.
ftp>
```

5. Type `binary` to set the transfer mode.

6. Copy the `syslog.conf` file from the /etc directory on the disk tray to your working directory.

```
ftp> get syslog.conf
200 PORT command successful.
150 Binary data connection for syslog.conf (129.150.47.101,1031) (162 bytes).
226 Binary Transfer complete.
162 bytes received in 1 seconds (0 Kbytes/s)
ftp>
```

7. Copy the `hosts` file from the /etc directory on the disk tray to your working directory.

```
ftp> get hosts
200 PORT command successful.
150 Binary data connection for hosts (129.150.47.101,1034) (47 bytes).
226 Binary Transfer complete.
47 bytes received in 1 seconds (0 Kbytes/s)
ftp>
```

8. Exit the ftp session.

```
ftp>
quit
221 Goodbye.
mngt_host:/:
```


4.2.2 Editing the Disk Tray `/etc/syslog.conf` File

You must edit the `/etc/syslog.conf` file to include the category of messages that you want to have logged with the IP address and host name of the management host that will be logging these messages.

1. **Determine the IP address and host name of the management host that will be logging messages.**

Consult with your system administrator if you do not have this information.

2. **Determine which category of messages you would like to receive from the disk tray.**

Messages generated by the disk tray are grouped into four categories in the order of severity, as described in the following table.

TABLE 4-2 Message Categories

Category	Description
Error	Indicates a critical system event requiring immediate user intervention or attention. For example, inability to flush the write-behind cache.
Warning	Indicates a serious system event requiring eventual user intervention. For example, a disk drive being disabled.
Notice	Indicates a system event that may lead to a more serious condition in the future. For example, the occurrence of hard errors corrected via parity replacement.
Information	Indicates a system event that has no consequence on the running health of the system. For example, user login notifications.

Note – The message categories are cumulative. For example, if you specify that you want to be notified about `notice` messages, you will also receive notification of `error` and `warning` messages. If you specify that you want to be notified about `information` messages, you will receive messages from all categories.



Caution – Use tab spaces to separate field entries when editing the `/etc/syslog.conf` file. If tab spacing is not used, edits will not be recognized by the disk tray.

3. On the management host, use a text editor to edit the `syslog.conf` file in the working directory.

Separate entries with tab spaces. Edits are highlighted in the following example:

```
# syslog.conf
# facility.level action
# messages to local syslog file
*.notice /syslog

# messages to syslogd on another host Remote system logging
*.warn @remote-host
*.warn @129.234.56.73

# messages sent as SNMP traps
*.warn | snmp_trap 129.146.81.201
```

Note – You can use either the IP address or a host name in the `syslog.conf` file. If you use a host name, a corresponding entry must be present on the disk tray's `/etc/hosts` file, as described in the next section.

4.2.3 Editing the Disk Tray `/etc/hosts` File

You must edit the `/etc/hosts` file with the name of the management host and its IP address.

● **On the management host, use a text editor to edit the `/etc/hosts` file in the working directory.**

Separate the IP address from the name with a tab. Edits are highlighted in the following example:

```
#hosts
#ip-address name
129.146.81.201 host-name
```

4.2.4 Transferring the Files Back to the Disk Tray

After editing the `/etc/syslog.conf` and `/etc/hosts` files, ftp the files from the management host back to the disk tray.

1. Start an ftp session from the management host to the disk tray.

For example:

```
mngr_host:/:<15>ftp 129.146.81.201
Connected to 129.146.81.201.
220 chon-ji FTP server (SunOS 5.7) ready.
Name (129.146.81.201:root):
```

2. Log in to the disk tray by typing `root` and your password at the prompts.

```
Name (129.146.81.201:root): root
331 Password required for root.
Password: password
230 User root logged in.
ftp>
```

3. Move to the `/etc` directory on the disk tray.

```
ftp> cd /etc
250 CWD command successful.
ftp>
```

4. Type `binary` to set the transfer mode.

5. Copy the edited `syslog.conf` file from your working directory to the `/etc` directory on the disk tray.

```
ftp> put syslog.conf
200 PORT command successful.
150 Binary data connection for syslog.conf (129.150.47.101,1031) (162 bytes).
226 Binary Transfer complete.
162 bytes received in 1 seconds (0 Kbytes/s)
ftp>
```

6. Copy the edited `hosts` file from your working directory to the `/etc` directory on the disk tray.

```
ftp> put hosts
200 PORT command successful.
150 Binary data connection for hosts (129.150.47.101,1034) (47 bytes).
226 Binary Transfer complete.
47 bytes received in 1 seconds (0 Kbytes/s)
ftp>
```

7. Exit the ftp session.

```
ftp>
quit
221 Goodbye.
mngt_host:::
```

8. On the disk tray, start message traffic to the host.

The `syslogd` must be redirected at the disk tray.

```
t300:/:<23>set logto *
```

4.2.5 Editing the Management Host `/etc/syslog.conf` File

You must edit the `/etc/syslog.conf` file on the management host (the host used for monitoring and administering one or more disk trays through the Ethernet connection) to include a log file for capturing error messages.

- On the management host, add a line with the name of the log file to the host's `/etc/syslog.conf` file, as shown in bold type in the following example:

Note – You must use a tab space between *log-filename* and `/var/adm/messages`.

```
#ident"@(#)syslog.conf1.496/10/11 SMI"/* SunOS 5.0 */
#
# Copyright (c) 1991-1993, by Sun Microsystems, Inc.
#
# syslog configuration file.
#
# This file is processed by m4 so be careful to quote (``) names
# that match m4 reserved words. Also, within ifdef's, arguments
# containing commas must be quoted.
#
*.err;kern.notice;auth.notice/dev/console
*.err;kern.debug;daemon.notice;mail.crit/var/adm/messages

*.alert;kern.err;daemon.erroperator
*.alert      root

*.emerg      *

# if a non-loghost machine chooses to have authentication messages
# sent to the loghost machine, un-comment out the following line:
#auth.noticeifdef(`LOGHOST', /var/log/authlog, @loghost)

mail.debugifdef(`LOGHOST', /var/log/syslog, @loghost)

#
# non-loghost machines will use the following lines to cause "user"
# log messages to be logged locally.
#
ifdef(`LOGHOST', ,
user.err    /dev/console
user.err    /var/adm/messages
user.alert  `root, operator'
user.emerg  *
)
local7.notice /var/adm/messages
```

In this example, all disk trays that use this host for logging will have their messages dumped to `/var/adm/messages`. The file name of the log file may be different depending on the type of disk tray management software you are using.

Note – If you are using the Sun StorEdge StorTools™ product in the Solaris software environment to monitor the disk tray, the `/var/adm/messages` entry will be different. Refer to the StorTools documentation for name of this message file.

4.3 Configuring the Disk Tray for SNMP Notification

The Sun StorEdge T3 disk tray can provide remote notification of disk tray events to designated hosts using Simple Network Management Protocol (SNMP) traps. To enable SNMP notification, you must edit files on the disk tray to configure system message logging. Because you cannot edit files on the disk tray, you must ftp them to a host to make the edits and then ftp them back to the disk tray.

This procedure consists of the following tasks:

- Transferring the Disk Tray Files to the Management Host
- Editing the Disk Tray `/etc/syslog.conf` File
- Editing the Disk Tray `/etc/hosts` File
- Transferring the Files Back to the Disk Tray

Note – For information on interpreting system messages, see Appendix B.

4.3.1 Transferring the Disk Tray Files to the Management Host

1. Start an `ftp` session from the management host to the disk tray.

For example:

```
mngt_host: /:<15>ftp 129.146.81.201
Connected to 129.146.81.201.
220 chon-ji FTP server (SunOS 5.7) ready.
Name (129.146.81.201:root):
```

2. Log in to the disk tray by typing `root` and your password at the prompts.

```
Name (129.146.81.201:root): root

331 Password required for root.
Password: password
230 User root logged in.
ftp>
```

3. Move to your working directory on the management host.

For example:

```
ftp> lcd /tmp
Local directory now /tmp
ftp>
```

4. Move to the `/etc` directory on the disk tray.

```
ftp> cd /etc
250 CWD command successful.
ftp>
```

5. Type `binary` to set the transfer mode.

6. Copy the `syslog.conf` file from the `/etc` directory on the disk tray to your working directory.

```
ftp> get syslog.conf
200 PORT command successful.
150 Binary data connection for syslog.conf (129.150.47.101,1031) (162 bytes).
226 Binary Transfer complete.
162 bytes received in 1 seconds (0 Kbytes/s)
ftp>
```

7. Copy the `hosts` file from the `/etc` directory on the disk tray to your working directory.

```
ftp> get hosts
200 PORT command successful.
150 Binary data connection for hosts (129.150.47.101,1034) (47 bytes).
226 Binary Transfer complete.
47 bytes received in 1 seconds (0 Kbytes/s)
ftp>
```

8. Exit the ftp session.

```
ftp>
quit
221 Goodbye.
mngt_host:::
```

4.3.2 Editing the Disk Tray `/etc/syslog.conf` File

You must edit the `/etc/syslog.conf` file to include the category of messages that you want to have logged with the IP address of the management host that will be receiving these messages.

1. Determine the IP address and host name of the management host that will be logging messages.

Consult with your system administrator if you do not have this information.

2. Determine which category of messages you would like to receive from the disk tray.

Messages generated by the disk tray are grouped into four categories in the order of severity, as described in the following table.

TABLE 4-3 Message Categories

Category	Description
Error	Indicates a critical system event requiring immediate user intervention or attention. For example, inability to flush the write-behind cache.
Warning	Indicates a serious system event requiring eventual user intervention. For example, a disk drive being disabled.
Notice	Indicates a system event that may lead to a more serious condition in the future. For example, the occurrence of hard errors corrected via parity replacement.
Information	Indicates a system event that has no consequence on the running health of the system. For example, user login notifications.

Note – The message categories are cumulative. For example, if you specify that you want to be notified about `notice` messages, you will also receive notification of `error` and `warning` messages. If you specify that you want to be notified about `information` messages, you will receive messages from all categories.



Caution – Use tab spaces to separate field entries when editing the `/etc/syslog.conf` file. If tab spacing is not used, edits will not be recognized by the disk tray.


3. On the management host, use a text editor to edit the `syslog.conf` file in the working directory.

Separate entries with tab spaces. Edits are highlighted in the following example:

```
# syslog.conf
# facility.level action
# messages to local syslog file
*.notice /syslog

# messages to syslogd on another host
*.warn @remote-host
*.warn @129.234.56.73

# messages sent as SNMP traps
*.warn | snmp_trap 129.146.81.201
```



Note – You can use either the IP address or a host name in the `syslog.conf` file. If you use a host name, a corresponding entry must be present on the disk tray's `/etc/hosts` file, as described in the next section.


4.3.3 Editing the Disk Tray `/etc/hosts` File

You must edit the `/etc/hosts` file with the name of the management host and its IP address.

- On the management host, use a text editor to edit the `/etc/hosts` file in the working directory.

Separate the IP address from the name with a tab space.:

```
#hosts
#ip-address name
129.146.81.201 host-name
```



4.3.4 Transferring the Files Back to the Disk Tray

After editing the `/etc/syslog.conf` and `/etc/hosts` files, ftp the files from the management host back to the disk tray.

1. Start an ftp session from the management host to the disk tray.

For example:

```
mngr_host:/:<15>ftp 129.146.81.201
Connected to 129.146.81.201.
220 chon-ji FTP server (SunOS 5.7) ready.
Name (129.146.81.201:root):
```

2. Log in to the disk tray by typing `root` and your password at the prompts.

```
Name (129.146.81.201:root): root
331 Password required for root.
Password: password
230 User root logged in.
ftp>
```

3. Move to the `/etc` directory on the disk tray.

```
ftp> cd /etc
250 CWD command successful.
ftp>
```

4. Type `binary` to set the transfer mode.

5. Copy the edited `syslog.conf` file from your working directory to the `/etc` directory on the disk tray.

```
ftp> put syslog.conf
200 PORT command successful.
150 Binary data connection for syslog.conf (129.150.47.101,1031) (162 bytes).
226 Binary Transfer complete.
162 bytes received in 1 seconds (0 Kbytes/s)
ftp>
```

6. Copy the edited `hosts` file from your working directory to the `/etc` directory on the disk tray.

```
ftp> put hosts
200 PORT command successful.
150 Binary data connection for hosts (129.150.47.101,1034) (47 bytes).
226 Binary Transfer complete.
47 bytes received in 1 seconds (0 Kbytes/s)
ftp>
```

7. Exit the ftp session.

```
ftp>
quit
221 Goodbye.
mngt_host://:
```

8. On the disk tray, start message traffic to the host.

The `syslogd` must be redirected at the disk tray.

```
t300://:<23>set logto *
```

Troubleshooting the Disk Tray

This chapter addresses potential scenarios in which troubleshooting may be necessary.

This chapter contains the following sections:

- “Identifying FRU Failures” on page 5-1
- “Replacing FRUs” on page 5-6
- “Identifying Miscabled Partner Groups” on page 5-13
- “Identifying Data Channel Failures” on page 5-17

5.1 Identifying FRU Failures

The first step in remedying a FRU failure is to determine which FRU has failed. You can do this by examining the output of the `fru stat` command and the messages in the `syslog` file. After evaluating the data, you can confirm the failing FRU and replace it.

1. Display a list of all installed FRUs and check their current status. Type:

```
t300:/:<43>fru stat
```

CTLR	STATUS	STATE	ROLE	PARTNER	TEMP			
ulctr	ready	enabled	master	u2ctr	34.5			
u2ctr	ready	enabled	alt master	ulctr	35.5			
DISK	STATUS	STATE	ROLE	PORT1	PORT2	TEMP	VOLUME	
uld1	ready	enabled	data disk	ready	ready	33	v0	
uld2	ready	enabled	data disk	ready	ready	30	v0	
uld3	ready	enabled	data disk	ready	ready	29	v0	
uld4	ready	enabled	data disk	ready	ready	27	v0	
uld5	ready	enabled	data disk	ready	ready	24	v0	
uld6	ready	enabled	data disk	ready	ready	26	v0	
uld7	ready	enabled	data disk	ready	ready	25	v0	
uld8	ready	enabled	data disk	ready	ready	31	v0	
uld9	ready	enabled	data disk	ready	ready	34	v0	
u2d1	ready	enabled	data disk	ready	ready	31	v1	
u2d2	ready	enabled	data disk	ready	ready	31	v1	
u2d3	ready	enabled	data disk	ready	ready	30	v1	
u2d4	ready	enabled	data disk	ready	ready	26	v1	
u2d5	ready	enabled	data disk	ready	ready	34	v1	
u2d6	ready	enabled	data disk	ready	ready	26	v1	
u2d7	ready	enabled	data disk	ready	ready	28	v1	
u2d8	ready	enabled	data disk	ready	ready	32	v1	
u2d9	ready	enabled	data disk	ready	ready	27	v1	
LOOP	STATUS	STATE	MODE	CABLE1	CABLE2	TEMP		
u2l1	ready	enabled	master	installed	-	31.5		
u2l2	ready	enabled	slave	installed	-	35.0		
u1l1	ready	enabled	master	-	installed	31.5		
u1l2	ready	enabled	slave	-	installed	35.0		
POWER	STATUS	STATE	SOURCE	OUTPUT	BATTERY	TEMP	FAN1	FAN2
ulpcu1	ready	enabled	line	normal	normal	normal	normal	normal
ulpcu2	ready	enabled	line	normal	normal	normal	normal	normal
u2pcu1	ready	enabled	line	normal	normal	normal	normal	normal
u2pcu2	ready	enabled	line	normal	normal	normal	normal	normal

2. Review the output of the fru stat list for any fault or abnormal status messages.

3. Display the `syslog` file.

Use the `tail` command to display the last 10 lines of the file, which contain the most recent log entries. (See Appendix B for a discussion of the `syslog` format.)

```
t300:/:<3>tail syslog
Oct 26 16:24:15 ROOT[2]: W: u2ctr Hardware Reset (1000) occurred
Oct 26 16:24:16 ROOT[2]: N: u2ctr Waiting for configuration data from master...
Oct 26 16:24:31 MNXT[2]: N: u2ctr Initializing host port u2p1 ISP2100 ...
firmware status = 3
Oct 26 16:24:31 MNXT[2]: N: u2ctr Host port u2p1 TARGET_ID = 0x2 (ALPA = 0xe4)
Oct 26 16:24:58 ROOT[2]: N: u2ctr Starting psh...
Oct 26 16:24:58 ISR1[2]: N: u2ctr ISP2100[2] Received LIP(f7,e4) async event
Oct 26 16:24:58 FCC0[2]: N: u2ctr Port event received on port 3, abort 0
Oct 26 16:25:08 FCC2[2]: N: u2ctr (ITL 0 1 0 TT 20 TID 7910 OP 0) Target in Unit
Attention
```

For more extensive investigation, display the complete `syslog` file. You can do this in two ways:

- Using the `cat` command (that is, `cat syslog`), which could overwrite the terminal window
- Moving the `syslog` file to the host using an ftp connection. See “Transferring the Disk Tray Files to the Management Host” on page 4-9 for instructions.

4. Use a text editor to examine the `syslog` file.

Look for Error and Warning messages—these indicate a serious problem with the unit. Error message abbreviations are: E - errors, W - warnings, N - notices, I - informational.

```
Oct 26 17:01:30 LPCT[1]: W: u2pcu1: Switch off
Oct 26 17:01:31 LPCT[1]: W: u2pcu1: Off
Oct 26 17:01:33 LPCT[1]: W: u2pcu1: DC not OK
Oct 26 17:01:36 LPCT[1]: E: u2pcu1: Battery not present
Oct 26 17:01:39 LPCT[1]: E: u2pcu1: Not present
Oct 26 17:01:39 TMRT[1]: E: u2pcu1: Missing; system shutting down in 30 minutes
Oct 26 17:01:40 TMRT[1]: E: u2ctr: Multiple Fan Faults; system shutting down in
30 minutes
Oct 26 17:01:42 LPCT[2]: E: u2pcu1: Not present
Oct 26 17:01:45 LPCT[1]: E: u2pcu1: Over temperature
Oct 26 17:01:45 LPCT[1]: W: u2pcu1: Switch off
Oct 26 17:01:46 LPCT[1]: W: u2pcu1: Off
Oct 26 17:01:46 LPCT[1]: E: u2pcu1: Battery not present
Oct 26 17:01:48 LPCT[1]: N: u2pcu1: Battery not OK
Oct 26 17:04:16 LPCT[1]: E: u2d4: Not present
Oct 26 17:04:16 TMRT[1]: E: u2d4: Missing; system shutting down in 30 minutes
```

This is only a partial output of a syslog file.

Note – There is limited space on the disk tray for syslog files. When the syslog file exceeds the file-size threshold (1 Mbyte), this file is moved to a file called `syslog.old`, overwriting any previous `syslog.old` image.

If you are monitoring an error condition, ftp the syslog file to a host to save the output and prevent any pertinent data from being deleted.

5. Compare syslog entries with the output of the `fru stat` command to see which FRU has failed.

In the following example, a warning (W:) message is shown in disk tray unit 2 for drive 7 (u2d7). The `fru stat` output indicates a problem with u2d7. Based on this information, you would determine whether drive 7 in unit 2 needs to be repaired or replaced.

```
Oct 26 17:13:38 FCC0[1]: N: u1ctr (ITL 7D 1 0 TT 20 TID 77A8 OP 0) Target in
Unit Attention
Oct 26 17:13:37 FCC0[2]: N: u2ctr (ITL 7D 2 1 TT 20 TID 77A8 OP 0) Target in
Unit Attention
Oct 26 17:14:12 ISR1[2]: W: u2d7 SCSI Disk Error Occurred (path = 0x0)
Oct 26 17:14:12 ISR1[2]: W: Sense Key = 0x2, Asc = 0x4, Ascq = 0x2
Oct 26 17:14:12 ISR1[2]: W: Sense Data Description = Logical Unit Not Ready,
Initializing CMD Required
Oct 26 17:14:13 ISR1[1]: N: u1ctr ISP2100[1] Received LIP(f8,e8) async event
Oct 26 17:14:12 ISR1[2]: N: u2d7 SVD_DONE: Command Error = 0x3
Oct 26 17:14:12 ISR1[2]: N: u2d7 sid 0 stype 815 disk error 3
Oct 26 17:14:12 ISR1[2]: W: u2d7 SCSI Disk Error Occurred (path = 0x0)
Oct 26 17:14:15 SVDT[1]: N: 19 fcal ports were detected on l2
Oct 26 17:14:16 LPCT[1]: N: u2d7: Bypassed on loop 1
Oct 26 17:14:12 ISR1[2]: W: Sense Key = 0x2, Asc = 0x4, Ascq = 0x2
Oct 26 17:14:12 ISR1[2]: W: Sense Data Description = Logical Unit Not Ready,
Initializing CMD Required
Oct 26 17:14:12 ISR1[2]: N: u2d7 SVD_DONE: Command Error = 0x3
Oct 26 17:14:17 LPCT[1]: N: u2d7: Bypassed on loop 2
Oct 26 17:14:12 ISR1[2]: N: u2d7 sid 0 stype 405 disk error 3
Oct 26 17:14:12 ISR1[2]: W: u2d7 SCSI Disk Error Occurred (path = 0x0)
Oct 26 17:14:12 ISR1[2]: W: Sense Key = 0x2, Asc = 0x4, Ascq = 0x2
Oct 26 17:14:12 ISR1[2]: W: Sense Data Description = Logical Unit Not Ready,
Initializing CMD Required
Oct 26 17:14:12 ISR1[2]: N: u2d7 SVD_DONE: Command Error = 0x3
Oct 26 17:14:12 ISR1[2]: N: u2d7 sid 0 stype 405 disk error 3
Oct 26 17:14:12 WXFT[2]: W: u2d7: Failed
Oct 26 17:14:12 WXFT[2]: W: u2d7 hard err in vol (v1) starting auto disable
```


t300/:<35>fru stat

CTLR	STATUS	STATE	ROLE	PARTNER	TEMP			
ulctr	ready	enabled	master	u2ctr	34.5			
u2ctr	ready	enabled	alt master	ulctr	33.5			
DISK	STATUS	STATE	ROLE	PORT1	PORT2	TEMP	VOLUME	
uld1	ready	enabled	data disk	ready	ready	33	v0	
uld2	ready	enabled	data disk	ready	ready	30	v0	
uld3	ready	enabled	data disk	ready	ready	29	v0	
uld4	ready	enabled	data disk	ready	ready	27	v0	
uld5	ready	enabled	data disk	ready	ready	24	v0	
uld6	ready	enabled	data disk	ready	ready	26	v0	
uld7	ready	enabled	data disk	ready	ready	25	v0	
uld8	ready	enabled	data disk	ready	ready	31	v0	
uld9	ready	enabled	data disk	ready	ready	34	v0	
u2d1	ready	enabled	data disk	ready	ready	30	v1	
u2d2	ready	enabled	data disk	ready	ready	31	v1	
u2d3	ready	enabled	data disk	ready	ready	30	v1	
u2d4	ready	enabled	data disk	ready	ready	26	v1	
u2d5	ready	enabled	data disk	ready	ready	34	v1	
u2d6	ready	enabled	data disk	ready	ready	26	v1	
u2d7	fault	disabled	data disk	bypass	bypass	-	v1	
u2d8	ready	enabled	data disk	ready	ready	32	v1	
u2d9	ready	enabled	data disk	ready	ready	26	v1	
LOOP	STATUS	STATE	MODE	CABLE1	CABLE2	TEMP		
u2l1	ready	enabled	master	installed	-	31.0		
u2l2	ready	enabled	slave	installed	-	34.5		
u1l1	ready	enabled	master	-	installed	31.0		
u1l2	ready	enabled	slave	-	installed	35.0		
POWER	STATUS	STATE	SOURCE	OUTPUT	BATTERY	TEMP	FAN1	FAN2
ulpcu1	ready	enabled	line	normal	normal	normal	normal	normal
ulpcu2	ready	enabled	line	normal	normal	normal	normal	normal
u2pcu1	ready	enabled	line	normal	normal	normal	normal	normal
u2pcu2	ready	enabled	line	normal	normal	normal	normal	normal

5.2 Replacing FRUs

This section describes how to verify and confirm installation of a replacement FRU. It includes the following sections:

- Verifying the FRU Firmware Level
- Installing the Replacement FRU
- Verifying the FRU Replacement

5.2.1 Verifying the FRU Firmware Level

- **Before removing the FRU, check the current firmware level using the `ver` and `fru list` and output.**

When you install the new FRU, you will check its firmware level to determine if you need to upgrade the existing firmware.

The `ver` command displays the controller firmware level. For example:

```
t300:/:<15>ver

T300 Release 1.13 2000/05/17 16:15:41 (129.150.47.111)
Copyright (C) 1997-2000 Sun Microsystems, Inc.
All Rights Reserved.
```

In the example above, the controller firmware is listed as `Release 1.13`.

The fru list output displays EPROM, disk drive, and interconnect (loop) card firmware. For example:

```
t300:/:<50>fru list
```

ID	TYPE	VENDOR	MODEL	REVISION	SERIAL
ulctr	controller card	SCI-SJ	375-0084-01-	0210	000980
u2ctr	controller card	SCI-SJ	375-0084-01-	0210	001098
uld1	disk drive	SEAGATE	ST118202FSUN	EA29	LKG78761
uld2	disk drive	SEAGATE	ST118202FSUN	EA29	LKG89101
uld3	disk drive	SEAGATE	ST118202FSUN	EA29	LKG86881
uld4	disk drive	SEAGATE	ST118202FSUN	EA29	LKG89487
uld5	disk drive	SEAGATE	ST118202FSUN	EA29	LKH31924
uld6	disk drive	SEAGATE	ST118202FSUN	EA29	LKH32009
uld7	disk drive	SEAGATE	ST118202FSUN	EA29	LKG90435
uld8	disk drive	SEAGATE	ST118202FSUN	EA29	LKG82282
uld9	disk drive	SEAGATE	ST118202FSUN	EA29	LKG95302
u2d1	disk drive	SEAGATE	ST118202FSUN	EA29	LKG63405
u2d2	disk drive	SEAGATE	ST118202FSUN	EA29	LKH57340
u2d3	disk drive	SEAGATE	ST118202FSUN	EA29	LKD20515
u2d4	disk drive	SEAGATE	ST118202FSUN	EA29	LKG89040
u2d5	disk drive	SEAGATE	ST118202FSUN	EA29	LKG89845
u2d6	disk drive	SEAGATE	ST118202FSUN	EA29	LKG82866
u2d7	disk drive	SEAGATE	ST118202FSUN	EA29	LKG95090
u2d8	disk drive	SEAGATE	ST118202FSUN	EA29	LKG90324
u2d9	disk drive	SEAGATE	ST118202FSUN	EA29	LKG95460
u1l1	loop card	SCI-SJ	375-0085-01-	5.01 Flash	001594
u1l2	loop card	SCI-SJ	375-0085-01-	5.01 Flash	001579
u2l1	loop card	SCI-SJ	375-0085-01-	5.01 Flash	001562
u2l2	loop card	SCI-SJ	375-0085-01-	5.01 Flash	001735
ulpcu1	power/cooling unit	TECTROL-CAN	300-1454-01(0000	001274
ulpcu2	power/cooling unit	TECTROL-CAN	300-1454-01(0000	001566
u2pcu1	power/cooling unit	TECTROL-CAN	300-1454-01(0000	002283
u2pcu2	power/cooling unit	TECTROL-CAN	300-1454-01(0000	002072
ulmpn	mid plane	SCI-SJ	370-3990-01-	0000	000963
u2mpn	mid plane	SCI-SJ	370-3990-01-	0000	000833

In this example:

- EPROM firmware version is listed as Controller card, Revision 0210
- Disk drive firmware version is listed as Revision EA29
- Interconnect card (loop card) firmware version is listed as Revision 5.01 Flash

5.2.2 Installing the Replacement FRU



Caution – Make sure you have the replacement FRU available before removing the failed FRU. If you remove a FRU, it must be immediately replaced. There is a timer in the unit that will cause the disk tray and all connected disk trays to power off in 30 minutes if a FRU is removed and not replaced.

- **Refer to the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual* for instructions on replacing FRUs.**

5.2.2.1 Rebuilding a Replaced Drive FRU

A replaced drive FRU is automatically reconstructed by the Sun StorEdge T3 disk tray. If you should need to rebuild the replaced drive FRU manually, do so as follows:

1. **On the disk tray, type:**

```
t300: /: <34> vol recon undn from_standby
```

where `undn` is the unit (u) number (`n`) and the drive (d) number (`n`) of the drive you are rebuilding.

2. **Start a second telnet session with the disk tray to check rebuild progress.**
3. **Check rebuild progress using the `proc list` command.**

The information in the `PERCENT` column and the `TIME` column, which shows the elapsed time, enables you to estimate when the volume will complete reconstruction.

```
t300: /: <35> proc list

VOLUME          CMD_REF  PERCENT   TIME  COMMAND
v1              20241    23       0:09  vol recon
```

4. Check the drive status to ensure reconstruction of the replaced drive FRU has completed.

```

t300:/:<43>fru stat
CTLR      STATUS  STATE      ROLE      PARTNER    TEMP
-----  -
ulctr     ready   enabled    master    u2ctr      34.5
u2ctr     ready   enabled    alt master  ulctr      35.5

DISK      STATUS  STATE      ROLE      PORT1      PORT2      TEMP  VOLUME
-----  -
uld1     ready   enabled    data disk  ready      ready      33    v0
uld2     ready   enabled    data disk  ready      ready      30    v0
uld3     ready   enabled    data disk  ready      ready      29    v0
uld4     ready   enabled    data disk  ready      ready      27    v0
uld5     ready   enabled    data disk  ready      ready      24    v0
uld6     ready   enabled    data disk  ready      ready      26    v0
uld7     ready   enabled    data disk  ready      ready      25    v0
uld8     ready   enabled    data disk  ready      ready      31    v0
uld9     ready   enabled    data disk  ready      ready      34    v0
u2d1     ready   enabled    data disk  ready      ready      31    v1
u2d2     ready   enabled    data disk  ready      ready      31    v1
u2d3     ready   enabled    data disk  ready      ready      30    v1
u2d4     ready   enabled    data disk  ready      ready      26    v1
u2d5     ready   enabled    data disk  ready      ready      34    v1
u2d6     ready   enabled    data disk  ready      ready      26    v1
u2d7     ready   enabled    data disk  ready      ready      28    v1
u2d8     ready   enabled    data disk  ready      ready      32    v1
u2d9     ready   enabled    data disk  ready      ready      27    v1

LOOP      STATUS  STATE      MODE      CABLE1     CABLE2     TEMP
-----  -
u2l1     ready   enabled    master    installed   -          31.5
u2l2     ready   enabled    slave     installed   -          35.0
u1l1     ready   enabled    master    -          installed  31.5
u1l2     ready   enabled    slave     -          installed  35.0

POWER     STATUS  STATE      SOURCE    OUTPUT     BATTERY    TEMP  FAN1  FAN2
-----  -
ulpcu1   ready   enabled    line     normal     normal     normal  normal  normal
ulpcu2   ready   enabled    line     normal     normal     normal  normal  normal
u2pcu1   ready   enabled    line     normal     normal     normal  normal  normal
u2pcu2   ready   enabled    line     normal     normal     normal  normal  normal

```

Note – There can be a delay between the time when drive reconstruction is started and when the `fru stat` output displays an optimal status. If the drive is under reconstruction when you run the `fru stat` command, the command output will show the drive as missing. Once the drive finishes rebuilding, the `fru stat` output will show the drive as ready.

5.2.2.2 Controller Card

Replacing a controller card does not require any special command line administration, other than verifying its state using the `fru stat` command. For information on the controller card and how to replace it, refer to Section 5.2.5, “Controller Card,” in the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual*.

5.2.2.3 Power and Cooling Unit

The replacement of the power cooling unit FRU should be done as quickly as possible to maintain full redundancy. For additional information including replacement instructions, refer to Section 5.2.2, “Power and Cooling Units” in the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual*.

Note – The UPS battery, which is built into the power and cooling unit, will show a fault when the unit is first installed before it recharges. This battery goes through a refresh cycle once every 14 days. To verify the refresh cycle, use the `fru stat` or `refresh -s` command.

5.2.2.4 Interconnect Card

Replacing an interconnect card does not require any special command line administration, other than verifying its state using the `fru stat` command. For information on the interconnect card and how to replace it, refer to Section 5.2.4, “Interconnect Cards,” in the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual*.

Note – In `fru stat` output, information on the interconnect card is listed under the LOOP category.

5.2.2.5 Chassis and Centerplane

It is unlikely that the disk tray chassis and centerplane, which is one FRU, will ever need to be replaced. If it does need to be replaced, contact your Sun service representative. Only trained, qualified service providers should replace a disk tray chassis and centerplane.

5.2.3 Verifying the FRU Replacement

1. **After replacing the FRU, check the firmware level of the new FRU using the `ver` and `fru list` commands to determine if it has the same firmware level as the FRU you replaced.**

See Section 5.2.1 “Verifying the FRU Firmware Level” on page 5-6. If the firmware level of the new FRU is a later release, you will need to upgrade all firmware. For instructions on how to upgrade firmware, refer to the Service chapter in the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual*.

2. Check the FRU status to verify that the failure has been corrected using the `fru stat` command.

```
t300:/:<43>fru stat
```

CTLR	STATUS	STATE	ROLE	PARTNER	TEMP			
ulctr	ready	enabled	master	u2ctr	34.5			
u2ctr	ready	enabled	alt master	ulctr	35.5			
DISK	STATUS	STATE	ROLE	PORT1	PORT2	TEMP	VOLUME	
uld1	ready	enabled	data disk	ready	ready	33	v0	
uld2	ready	enabled	data disk	ready	ready	30	v0	
uld3	ready	enabled	data disk	ready	ready	29	v0	
uld4	ready	enabled	data disk	ready	ready	27	v0	
uld5	ready	enabled	data disk	ready	ready	24	v0	
uld6	ready	enabled	data disk	ready	ready	26	v0	
uld7	ready	enabled	data disk	ready	ready	25	v0	
uld8	ready	enabled	data disk	ready	ready	31	v0	
uld9	ready	enabled	data disk	ready	ready	34	v0	
u2d1	ready	enabled	data disk	ready	ready	31	v1	
u2d2	ready	enabled	data disk	ready	ready	31	v1	
u2d3	ready	enabled	data disk	ready	ready	30	v1	
u2d4	ready	enabled	data disk	ready	ready	26	v1	
u2d5	ready	enabled	data disk	ready	ready	34	v1	
u2d6	ready	enabled	data disk	ready	ready	26	v1	
u2d7	ready	enabled	data disk	ready	ready	28	v1	
u2d8	ready	enabled	data disk	ready	ready	32	v1	
u2d9	ready	enabled	data disk	ready	ready	27	v1	
LOOP	STATUS	STATE	MODE	CABLE1	CABLE2	TEMP		
u2l1	ready	enabled	master	installed	-	31.5		
u2l2	ready	enabled	slave	installed	-	35.0		
u1l1	ready	enabled	master	-	installed	31.5		
u1l2	ready	enabled	slave	-	installed	35.0		
POWER	STATUS	STATE	SOURCE	OUTPUT	BATTERY	TEMP	FAN1	FAN2
ulpcu1	ready	enabled	line	normal	normal	normal	normal	normal
ulpcu2	ready	enabled	line	normal	normal	normal	normal	normal
u2pcu1	ready	enabled	line	normal	normal	normal	normal	normal
u2pcu2	ready	enabled	line	normal	normal	normal	normal	normal

Note – When checking disk drive status, there can be a delay between the time when drive reconstruction is started and when the `fru stat` output displays an optimal status. If the drive is under reconstruction when you run the `fru stat` command, the command output will show the drive as missing. Once the drive finishes rebuilding, the `fru stat` output will show the drive as ready.

5.3 Identifying Miscabled Partner Groups

If you configure a partner group that has booted successfully, but you are unable to establish a telnet connection, a possible cause is that the partner group has been cabled together incorrectly.

The interconnect cable connections between dual controller units are critical for determining which unit is the master controller and which is the alternate master. If the interconnect cables are not properly installed on the interconnect cards, it is possible for the top unit to boot as the master controller, and the bottom unit would assume alternate master status. This becomes a problem because the host has been configured to use the MAC address of the bottom unit.

If the bottom unit is incorrectly cabled making the bottom unit the alternate master, the bottom unit's ethernet port will be inactive unless a failover situation occurs. In that event, the IP and MAC address of the bottom unit will take over the values of the master (top) unit.

If you suspect the partner group has been cabled together incorrectly, the following procedure can help you determine if the top unit is acting as the master controller.

1. Determine the MAC address of the top unit.

The MAC address is located on a pull-out tab at the front of the unit, to the left of the first disk drive. (FIGURE 5-1).

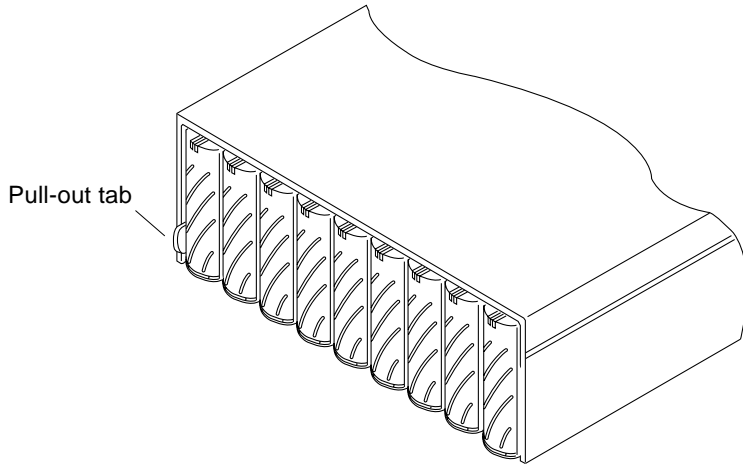


FIGURE 5-1 MAC Address on Pull-out Tab

2. Edit the files on the RARP server to include the MAC address of the top unit.

a. Edit the `/etc/ethers` file by adding the MAC address and disk tray name.

For example:

```
8:0:20:7d:93:7e disk-tray-name
```

In this example:

- `8:0:20:7d:93:7e` is the MAC address
- `disk-tray-name` would be the name of the master controller unit.

b. Edit the `/etc/hosts` file with the IP address and disk tray name.

For example:

```
192.129.122.111 disk-tray-name
```

In this example, `192.129.122.111` is the assigned IP address.

c. Edit the `/etc/nsswitch.conf` file to reference the local system files.

To ensure the Solaris software environment uses the changes made to `/etc/ethers` and `/etc/hosts` files, edit the `host` and `ethers` entries in the `/etc/nsswitch.conf` file so that the `files` parameter appears before the `[NOTFOUND=return]` statements as shown:

```
hosts:      nis files [NOTFOUND=return]
ethers:     nis files [NOTFOUND=return]
```

d. Determine if the RARP daemon is running by typing:

```
# ps -eaf | grep rarpd
```

- If the RARP daemon is running, proceed to Step 3.
- If the RARP daemon is not running, continue to the next step.

e. Start the RARP daemon in the Solaris environment by typing:

```
# /usr/sbin/in.rarpd -a &
```

3. Make sure you have an ethernet connection to the 10BASE-T port of the top unit.

See the cabling section in the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual* for more information. If you do not have an ethernet connection to the top unit but have one to the bottom unit, remove the cable from the bottom unit and connect it to the top unit.

4. Press the power switch on the power and cooling units on both disk trays to remove AC power (FIGURE 5-2).

After pressing the switches, it may take some time for the units to power off while shutdown procedures are performed. Wait until the units have powered off completely.

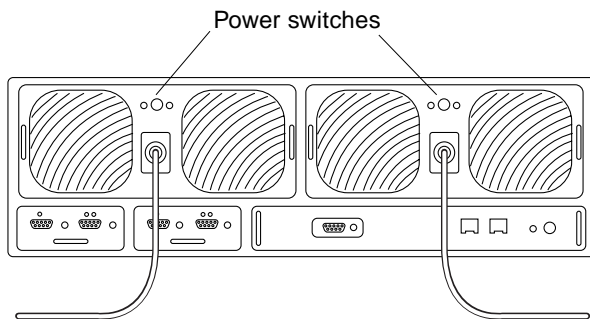


FIGURE 5-2 Power Switch Locations

5. After both units have powered off, press the power switch on the power and cooling units again to restore power to and reset the disk trays.

It may take up to several minutes for the disk trays to power on and come back online. All LEDs will be green when the unit is fully powered on.

6. After the units are fully powered on, start a telnet session.

The telnet session will connect to the top unit.

If you still cannot start a telnet session, investigate the following other possible causes:

- **RARP server not responding.** To determine if this is the problem:
 - Verify that the RARP daemon is running on the host system.
 - Verify that the `/etc/nsswitch.conf` file is properly configured on the RARP server.
 - In the Solaris environment, use the `snoop(1M)` command to verify that the disk tray is attempting to establish RARP communication with the Solaris server.

- **MAC address is incorrect.** In the Solaris environment, use the `snoop(1M)` command to specify the MAC address of the disk tray and see if any RARP packets are transmitted. If nothing is observed during a reboot of the disk tray, verify that the MAC address on the disk tray label matches the MAC address configured on the RARP server.
- **Netmask is incorrect.** The default netmask address used on the disk tray is 255.255.255.0. If your local subnet uses a different netmask, the RARP operation may not work.
- **Inoperable network connections.** If you are using hubs to connect to the network, try eliminating or replacing the hub.

5.4 Identifying Data Channel Failures

The data channel encompasses the host data path that extends from the host bus adapter to the media interface adapter (MIA) attached to the disk tray. Errors in the host data channel are outside of the scope of the Sun StorEdge T3 disk tray. To determine failures in the data path, you must use host-based application diagnostics, such as the StorTools product for the Solaris operating environment.

Refer to the documentation of the selected diagnostics tool for information on identifying data channel failures.

Command Descriptions

This appendix contains descriptions of the commands supported by the Sun StorEdge T3 disk tray and is divided into the following sections:

- “Commands List” on page A-1
- “FRU Identifiers” on page A-3
- “Command Summaries” on page A-4

A.1 Commands List

TABLE A-1 contains an alphabetical listing of the commands supported by the disk tray. To generate the command descriptions, use the *command-name help* command.

For example, for information on the `reset` command, type:

```
t300:/:<9>reset help  
usage: reset [ -y ]
```

TABLE A-1 Commands Listed in Alphabetical Order

Command	Description	Re-entrant¹	Page
boot	Boot system	No	A- 4
disable	Disable certain FRUs	No	A- 5
disk	Disk administration	No	A- 5
enable	Enable certain FRUs	No	A- 6
ep	Program the flash EPROM	No	A- 6
fru	Display the FRU information	No	A- 7
help	Display reference manual pages	Yes	A- 8
id	Display FRU identification summary	No	A- 8
lpc	Get interconnect card property	No	A- 10
ofdg	Perform back-end offline loop diagnostics	No	A- 11
port	Configure the interface port	No	A- 12
proc	Display status of outstanding vol processes	No	A- 13
refresh	Start/stop battery refreshing or display its status	No	A- 13
reset	Reset system	Yes	A- 15
set	Display or modify the set information	No	A- 15
shutdown	Shutdown disk tray or partner group	No	A- 17
sys	Display or modify the system information	No	A- 18
ver	Display software version	No	A- 19
vol	Display or modify the volume information	No	A- 19

1. A re-entrant command is one that can be run in multiple telnet sessions to the same disk tray.

A.2 FRU Identifiers

Many commands use a FRU identifier to refer to a particular FRU in a disk tray. This identifier contains a unit constant (*u*), the unit number (*encid*), the FRU constant (*ctr* for controller card, *pcu* for power and cooling unit, *1* for interconnect card, *d* for disk drive) and the FRU number (*n*). TABLE A-2 lists the possible FRU variables as they appear in this appendix.

TABLE A-2 FRU Identifiers

FRU	Identifier	Unit number
Controller card	<i>uencidctr</i>	<i>encid</i> = unit number (1, 2, ...)
Power and cooling unit	<i>uencidpcu</i> [1 2]	<i>encid</i> = unit number (1, 2, ...) <i>n</i> = pcu number (1, 2)
Interconnect card	<i>uencid1</i> [1 2]	<i>encid</i> = unit number (1, 2, ...) <i>n</i> = interconnect card number (1, 2)
Disk drive	<i>uencidn</i>	<i>encid</i> = unit number (1, 2, ...) <i>n</i> = disk drive number (1 to 9)

A.3 Command Summaries

A.3.1 boot

TABLE A-3 boot Command Summary

Name	boot
Synopsis	boot -f <i>diskno</i> boot -i <i>filename.bin</i> boot -s boot -w
Description	Boots the RAID software according to the boot mode, configured with the <i>set</i> command.
Options	
-f	Clears the position information on the disk label. The disk number is the disk FRU identifier.
-i	Installs new autoboot firmware onto the drives from <i>filename.bin</i> . This new firmware will be executed after the next system restart (if boot mode is set to auto). The new firmware must be downloaded using the <i>ftp</i> command.
-s	Used when all the disks of the master unit are detected as being in the wrong disk position. If this occurs, a special prompt "ADMIN>" is displayed. At this point, use the <code>boot -s</code> command to correct this state and reboot the disk tray.
-w	Sets the default values to system area and configuration setting only. The boot image and local file system will be retained. Use to quickly clear all the system and configuration settings.

A.3.2 disable

TABLE A-4 disable Command Summary

Name	disable
Synopsis	disable <i>uencid</i> disable <i>uencid</i> 1 [1 2]
Description	Disables specified FRUs.
Arguments	See Section A.2 “FRU Identifiers” on page A-3 for definitions.

A.3.3 disk

TABLE A-5 disk Command Summary

Name	disk
Synopsis	disk version <i>drives</i> disk download <i>drives filename</i>
Description	Controls, displays and configures disks.
Options	
version	Displays the firmware version of the selected drive(s).
download	Updates the selected drive(s) with new firmware specified by the <i>filename</i> .
Arguments	
<i>drives</i>	The disk drive numbers.
<i>filename</i>	The file to use for drive firmware updates.

A.3.4 enable

TABLE A-6 enable Command Summary

Name	enable
Synopsis	enable <i>uencid</i> enable <i>uencid</i> 1 [1 2]
Description	Enables specific FRUs.
Arguments	See Section A.2 “FRU Identifiers” on page A-3 for definitions.

A.3.5 ep

TABLE A-7 ep Command Summary

Name	ep
Synopsis	ep download <i>filename</i>
Description	Updates the EPROM with new firmware specified by <i>filename</i> .
Arguments	
<i>filename</i>	The new firmware to be loaded into the controller EPROM. The file must reside in the local file system.

A.3.6 fru

TABLE A-8 fru Command Summary

Name	fru
Synopsis	<pre> fru l[list] fru list sys fru list un fru list unctrl fru list undn fru list unln fru list unpcun fru list ummpnl fru s[tat] fru stat sys fru stat un fru stat unctrl fru stat undn fru stat unln fru stat unpcun fru st[atistic] fru statistic sys fru statistic un fru statistic undn fru statistic unpl [clear] fru statistic unvoln [clear] fru myuid </pre>
Description	Displays the field-replaceable unit (FRU) information.
Options	<pre> list list sys stat sys statistic statistic sys myuid </pre> <p>Displays all FRU IDs types, vendor, model, version, and serial number.</p> <p>Displays the status and role of each tray.</p> <p>Displays I/O statistics.</p> <p>Displays the current controller.</p>
Arguments	See Section A.2 “FRU Identifiers” on page A-3 for definitions.

A.3.7 help

TABLE A-9 help Command Summary

Name	help
Synopsis	help
Description	Displays commands.

A.3.8 id

TABLE A-10 id Command Summary

Name	id
Synopsis	id read <i>uencid</i> id read <i>uencid</i> pcu[1 2] id read <i>uencid</i> l[1 2] id read <i>uencid</i> cl
Description	Displays FRU identification summary.
Arguments	See Section A.2 “FRU Identifiers” on page A-3 for definitions.

A.3.9 logger

TABLE A-11 logger Command Summary

Name	logger
Synopsis	logger [-f <file / ->] [-p <i>facility.priority</i>] [<i>message</i>]
Description	Generates messages to the <code>syslog</code> in the unit.
Options	<p>-f</p> <p>Specifies a particular file or content to be logged. -f <file> specifies a particular file; if used, only the first 20 lines will be logged.</p> <p>-f <-> specifies a request to log standard input; if used, the next line up to Control-c or Control-d followed by a Return will be logged.</p> <p>-p</p> <p>Specifies the message's facility and priority level. The default facility is <code>user</code> and the default priority is <code>notice</code>.</p>
Arguments	
<i>message</i>	Text of message to be logged.
Example	<p>This example shows text being written to the <code>syslog</code> facility as a warning:</p> <pre>t300:/:<1>logger -p syslog.warning this is a test</pre> <p>will write the following into the <code>syslog</code>:</p> <pre>Oct 26 14:44:56 sh01[1]: W: this is a test</pre>

A.3.10 lpc

TABLE A-12 lpc Command Summary

Name	lpc
Synopsis	<pre>lpc version lpc download uencid1{1 2} filename lpc reboot uencid1{1 2} lpc rsn uencid1{1 2} lpc rid uencid1{1 2} lpc ledtest uencid1{1 2} delay</pre>
Description	A utility to display and upgrade interconnect cards.
Options	
version	Displays each interconnect card firmware version.
download	Downloads new interconnect card firmware.
reboot	Executes soft reset to selected interconnect card.
rsn	Displays serial number.
rid	Displays interconnect card vendor id and product id.
ledtest	Tests LEDs controlled through the interconnect card. This option does not test the AC LED on the PCU or the drive activity LED on disk drives; these LEDs are not controlled through the interconnect card.
Arguments	
<i>uencid</i>	Unit ID. See Section A.2 “FRU Identifiers” on page A-3 for definitions.
<i>filename</i>	File name of new firmware to download.

A.3.11 ofdg

TABLE A-13 ofdg Command Summary

Name	ofdg
Synopsis	<pre>ofdg [-y] health_check ofdg [-y] fast_test uencid1[1 2] ofdg [-y] fast_find uencid1[1 2] ofdg [-y] find uencid1[1 2]</pre>
Description	<p>A utility to perform back-end loop diagnostics. All non-u1 disks must be assigned to a volume to perform this diagnostic. Test output is displayed in the <code>syslog</code> file. This test does not detect missing interconnect cables.</p>
Options	
health_check	Performs a fast test on all detected loops in a partner group.
fast_test	Performs a nondisruptive, fast loop test on the specified loop. Disk path failovers are not performed with this test.
fast_find	Performs a loop test on partner groups, providing limited detection of bad FRUs. Use the <code>fast_find</code> option before using the <code>find</code> option to eliminate interconnect cards, interconnect cables, and controller cards as possible bad FRUs. This test reconfigures loops and performs disk path failovers.
find	Performs a loop test on all loops in a partner group and provides loop fault diagnostics, which has the capability to isolate a FRU problem to a single disk port. Use the <code>find</code> option only after using the <code>fast_find</code> option. This test reconfigures loops and by-passes disk ports.
Arguments	
-y	Provides an affirmative answer to the command prompt: WARNING - Volume data will be offline while OFDG is running. Continue? [N]:
uencid	Unit ID. See Section A.2 “FRU Identifiers” on page A-3 for definitions.

A.3.12 port

TABLE A-14 port Command Summary

Name	port
Synopsis	<pre>port list port set <i>port</i> targetid <i>target_id_value</i> s[oft] port host <i>port</i> sun other port listmap [<i>port</i>]</pre>
Description	A utility used to manage ports.
Options	
list	Displays the configuration of the ports.
set	Modify port parameters and change the port target ID value. Any changes to the target ID require a reset for the changes to take effect.
host	Whenever attaching to a Solaris 2.6 host, add the option 'sun' to the end of the port host command. For example: port host ulp1.
listmap	Shows the current mappings between host interface ports and LUNS and volumes.
Arguments	
<i>port</i>	Specifies the port. The format is: <i>udisk_trayportindex</i> . Examples: ulp1, u2p1
<i>targetid_value</i>	Specifies the target ID (FC-AL ALPA). Valid values are from 0 to 125; the optional argument <i>s</i> means soft-addressing.
Examples	<pre>hostname: /:<1>port list port targetid addr_type status host wwn ulp1 1 hard online other 50020f230000036a hostname: /:<2>port listmap port targetid addr_type lun volume owner access ulp1 1 hard 1 ulvol1 ul primary hostname: /:<3>port set ulp1 targetid 6 hostname: /:<4></pre>

A.3.13 `proc`

TABLE A-15 `proc` Command Summary

Name	<code>proc</code>
Synopsis	<code>proc list [cmd_ref vol_name]</code> <code>proc kill cmd_ref vol_name</code>
Description	Displays status of outstanding <code>vol</code> processes.
Options	
<code>list</code>	Displays the command reference number of an active <code>vol init</code> , <code>vol verify</code> or <code>vol recon</code> command currently in progress.
<code>kill</code>	Terminates the active <code>vol init</code> , <code>vol verify</code> or <code>vol recon</code> command by specifying its command reference number.
Arguments	
<code>cmd_ref vol_name</code>	Specifies the command reference number or volume name.

A.3.14 refresh

TABLE A-16 refresh Command Summary

Name	refresh
Synopsis	refresh -c refresh -s refresh -i refresh -k
Description	<p>Starts the battery refresh operation on all power and cooling unit 1 batteries, followed by all power and cooling unit 2 batteries. This operation consists of completely discharging and recharging each power and cooling unit battery. Battery refresh takes up to 10 hours for each power and cooling unit.</p> <p>An automatic battery refresh cycle is performed once every 14 days. A manual battery refresh cycle is not required. During this cycle, one battery is always fully charged. Write-behind cache, if selected, will be disabled during the discharge portion of the refresh cycle (approximately 12 minutes) and is enabled for the remainder of the cycle. A battery refresh cycle will not begin unless both batteries are in optimal condition.</p>
Options	
-c	Starts the refresh cycle.
-s	Reports the refresh cycle status.
-i	Directs the scheduler to reload the battery configuration file; for field service use only.
-k	Kills the current refreshing task.

A.3.15 reset

TABLE A-17 reset Command Summary

Name	reset
Synopsis	reset [-y]
Description	Resets the controller. Use the sync command before a reset command.
Argument	
-y	Answers “yes” when prompted to perform reset.

A.3.16 set

TABLE A-18 set Command Summary

Name	set
Synopsis	set bootmode auto tftp none set bootdelay <i>seconds</i> set ip <i>value</i> set netmask <i>value</i> set gateway <i>value</i> set tftphost <i>value</i> set tftpfile <i>value</i> set hostname <i>value</i> set logto 1 * / <i>filename</i> set loglevel 0 1 2 3 4 set rarp on off
Description	Sets and displays the boot parameters. Without any parameters, the set command shows the values of the parameters.

TABLE A-18 set Command Summary (Continued)

Options	
bootmode	<p>Defines the system bootmode:</p> <ul style="list-style-type: none"> • Use <code>auto</code> boot for loading the RAID software from the local drives. This is the default mode. • If <code>bootmode</code> is using <code>tftp</code>, use <code>tftphost</code> and <code>tftpfile</code>. (Field service procedure only.) • If <code>bootmode</code> is set to <code>none</code>, use system EPROM command line. (Field service procedure only.)
bootdelay	The delay time, in seconds, to cancel a system boot.
ip	The network IP address. The <i>value</i> is expressed in dotted decimal notation (for example, 192.9.200.100).
netmask	The subnet mask for the network. The <i>value</i> is expressed in dotted decimal notation (for example, 255.255.255.0).
gateway	The default gateway on the network. The <i>value</i> is expressed in dotted decimal notation (for example, 192.9.200.1).
tftphost	The IP address of the server from which a <code>tftp</code> boot should be performed. (Field service procedure only.)
tftpfile	The file name on the <code>tftpboot</code> server that contains the RAID software. The <i>value</i> is a string of up to 39 characters. (Field service procedure only.)
hostname	The user assigned name of the Sun StorEdge T3 disk tray.

TABLE A-18 set Command Summary (Continued)

logto	<p>The file where messages are to be logged. :</p> <ul style="list-style-type: none"> • If <code>logto</code> is set to 1, logging occurs only through the serial port; log messages are not sent to the <code>/syslog</code> file. • If <code>logto</code> is set to *, and an <code>/etc/syslog.conf</code> entry specifies an output file name that already exists, the disk tray appends new log information to the end of that output file. If the output file specified in <code>/etc/syslog.conf</code> doesn't exist, the disk tray creates a new file with that name. If the output file does not exist and cannot be created, the entry will be ignored. <p>Note: If there are changes to the <code>/etc/syslog.conf</code> file, you must type <code>set logto *</code> for those changes to take effect.</p> <ul style="list-style-type: none"> • If <code>logto</code> is set to <code>/filename</code>, and the specified file name does not exist, the disk tray creates a new file with that name. If the file name already exists, the disk tray appends new log information to the end of the existing file. If the file name does not exist and cannot be created, the disk tray will attempt to open or create the default syslog file <code>/syslog</code>. If both <code>/filename</code> and <code>/syslog</code> cannot be opened, logging occurs through the serial port only.
loglevel	<p>The level of messages to be logged (0=none, 1=errors, 2=warnings/errors, 3=notices/warnings/errors, 4=informational/notices/warnings/errors).</p>
rarp	<p>If enabled and connected to a rarp server, sets the IP address.</p>

A.3.17 shutdown

TABLE A-19 shutdown Command Summary

Name	shutdown
Synopsis	shutdown [-y]
Description	The <code>shutdown</code> command performs a controlled shutdown of the disk tray and any disk tray connected to it.
Argument	
-y	Answers “yes” when prompted to perform a shutdown.

A.3.18 `sys`

TABLE A-20 `sys` Command Summary

Name	<code>sys</code>
Synopsis	<pre> sys list sys stat sys blocksize 16k 32k 64k sys cache auto writebehind writethrough off sys mirror auto off sys mp_support none rw sys rd_ahead on off sys recon_rate high med low </pre>
Description	A utility used to manage system information.
Options	
<code>list</code>	Displays the current controller configuration.
<code>stat</code>	Displays the current controller status.
<code>blocksize</code>	Sets the system block size, which equals the stripe unit size: the amount of data written to each drive when striping data across drives. The block size can be changed only when there are no volumes defined.
<code>cache</code>	Sets the system caching policy.
<code>mirror</code>	Turns the cache mirror feature on or off when using dual controllers.
<code>mp_support</code>	Enables multipathing support when set to <code>rw</code> .
<code>rd_ahead</code>	Sets the number of sequential read commands before automatically switching to datablock read ahead. Set to <code>off</code> to always perform datablock read ahead.
<code>recon_rate</code>	The disk drive reconstruction rate options: high, medium, or low.

A.3.19 ver

TABLE A-21 ver Command Summary

Name	ver
Synopsis	ver
Description	Displays the current version of controller software.

A.3.20 vol

TABLE A-22 vol Command Summary

Name	vol
Synopsis	<pre> vol add <i>name</i> data <i>drive</i> raid 0 1 5> [standby <i>drive</i>] vol disable <i>drive</i> [to_standby] vol init <i>name</i> data sysarea fast [rate <1-16>] vol list <i>name</i> vol mode <i>name</i> vol mount <i>name</i> vol recon <i>drive</i> to_standby from_standby vol remove <i>name</i> vol stat <i>name</i> vol unmount <i>name</i> vol verify <i>name</i> [fix] [rate <1-8>] </pre>
Description	Used to manage volumes.
Options	
add	Configures a new volume by assigning it data and hot spare (standby) drives. The data drives cannot already be assigned to any other volume. The hot spare (standby) drive can be shared by multiple volumes.
disable	Marks the specified drive unusable. If the to_standby argument is included, data is first reconstructed onto the hot spare (standby) drive (if available), and then it is disabled. The volume must be mounted for this command.

TABLE A-22 vol Command Summary (Continued)

init	<p>Initializes the volume parity or system area label. This argument specifies the initialize option to be performed on the selected volume:</p> <ul style="list-style-type: none"> • data - Initialize the entire data area with correct parity data. This operation will destroy all user data on volume. It will take several minutes to complete. • sysarea - Initialize the system area with correct private label information. • fast - Initialize and bypass data area. The initialization rate can be set to any value from 1 (slowest) to 16 (fastest). The default rate for the disk tray is 16. This option is to be used for RAID 0 volumes only.
list	Displays the configuration of the currently assigned volumes.
mode	Displays cache and mirror settings, and whether the volume is mounted.
mount	Mounts the volume so the host can access it.
recon	Rebuilds (reconstruct) the data of the specified drive. If the <code>to_standby</code> argument is included, data is written to the hot spare (standby) drive. If the <code>from_standby</code> argument is included, data is written back from the hot spare (standby). The volume must be mounted for this command. If necessary, the drive is spun up before reconstruction occurs. Following successful reconstruction, the disabled drive is re-enabled.
remove	Deletes a volume by de-assigning the data and hot spare (standby) drives assigned to it. The drives can then be assigned to a different volume. The volume must be unmounted before it can be removed.
stat	Displays the operational status of a volume.
unmount	Unmounts the volume to disable access from the host.
verify	Enables a Sun StorEdge T3 administrator to execute manual parity checks on existing volumes. The default verification rate is 1 (minimum impact on data host). The verification rate can be set to a value from 1 to 8. Run the <code>vol verify</code> command before performing tape-backup overwrite cycles, approximately once every 30 days. If the <code>fix</code> option is specified and an error is detected, the <code>vol verify</code> command will regenerate parity from the existing data on the volume.

TABLE A-22 vol Command Summary (Continued)

<p>Arguments</p> <p><i>name</i></p> <p><i>drives</i></p>	<p>Specifies the volume name.</p> <p>Specifies the set of drives to be assigned to the volume.</p>
<p>Example</p>	<pre>t300:/:<41>vol list volume capacity raid data standby v0 125.2 GB 5 u1d1-8 u1d9 v1 125.2 GB 5 u2d1-8 u2d9 t300:/:<4>vol add vol-name data u5d1-8 raid 5 standby u5d9</pre>

syslog Error Messages

This appendix contains a list of errors that can be reported by the disk tray, along with error definitions.

This appendix is divided into the following sections:

- “Error Message Syntax” on page B-1
- “Reset Log Types” on page B-12
- “Examples” on page B-12

B.1 Error Message Syntax

Error message syntax consists of the following three components:

- Message type
- FRU identifier
- Message text

These components are described in the following subsections, including a listing of `syslog` error and warning messages.

B.1.1 Message Types

A `syslog` daemon exists in the hardware RAID controller that records system messages and provides for remote monitoring. There are four possible levels of messages, listed in TABLE B-1 in order of severity.

TABLE B-1 Message Types

Message Type	Definition
Error	Indicates a critical system event requiring immediate user intervention or attention. For example, an over temperature condition or a detected FRU being removed.
Warning	Indicates a possible event requiring eventual user intervention. For example, a FRU being disabled and recovery procedure executed.
Notice	Indicates a system event that may be a side effect of other events or may be a normal condition. For example, the power switch is turned off.
Information	Indicates a system event that has no consequence on the running health of the system. For example, a good state of a FRU.

B.1.2 FRU Identifiers

The syntax of the error message uses a FRU identifier to refer to a particular FRU in a disk tray. This identifier contains a unit constant (`u`), the unit number (`n`), the FRU constant (`ctr` for controller card, `pcu` for power and cooling unit, `l` for interconnect card, `d` for disk drive), and the FRU number (`n`).

TABLE B-2 FRU Identifiers

FRU	Identifier	Unit number
Controller card	<code>unctr</code>	$n = \text{unit number (1, 2, ...)}$
Power and cooling unit	<code>umpcun</code>	$n = \text{unit number (1, 2, ...)}$ $n = \text{pcu number (1, 2)}$
Interconnect card	<code>unln</code>	$n = \text{unit number (1, 2, ...)}$ $n = \text{interconnect number (1, 2)}$
Disk drive	<code>undn</code>	$n = \text{unit number (1, 2, ...)}$ $n = \text{disk drive number (1 to 9)}$

B.1.3 Error Message Listing

TABLE B-3 lists possible error messages, which are divided into FRU categories and “other.”

TABLE B-3 Error Messages

Error Message	Description	Solution
Controller		
ERROR "u<n>ctr: Not present"	The disk tray detects that the controller is missing; controller has been removed.	Reseat or replace the controller card.
ERROR "u<n>ctr: Missing; system shutting down in <n> minutes"	A controller is missing and a countdown has started. If the controller is not replaced in 30 minutes, the system will shut down.	Replace the controller.
ERROR "u<n>ctr: Missing; system shutting down now"	A controller card was not replaced within 30-minute time frame; system shutting down now.	Replace the controller card and power on the system.
Interconnect (loop) Card and Cable		
ERROR "u<n>l<n>: Not present"	System detects the interconnect card is missing.	Reseat or replace the interconnect card.
ERROR: "u<n>l<n>: Missing; system shutting down in <n> minutes"	An interconnect card is missing and a countdown has started. If it is not replaced in 30 minutes, the system will shut down.	Replace the interconnect card.
ERROR "u<n>l<n>: Missing; system shutting down now"	An interconnect card was not replaced within 30-minute time frame; system shutting down now.	Replace the interconnect card and power on the system.
ERROR "u<n>l<n>: UP cable not present" or: ERROR "u<n>l<n>: DOWN cable not present"	System detects missing interconnect cable for interconnect card.	Check cables.
Drive		
ERROR "Multi-disk failure, access disallowed"	System detects multiple disk failure in the LUN, and automatically unmounts this volume.	Check the syslog for any other related messages. Replace the failed disks.

TABLE B-3 Error Messages (Continued)

Error Message	Description	Solution
ERROR "u<n>d<n>: Not present"	System detects a drive was removed.	Reseat or replace the disk drive.
ERROR "u<n>d<n>: Missing; system shutting down in in <n> minutes"	A disk drive is missing and a countdown has started. If the drive is not replaced in 30 minutes, the system will shut down.	Replace the missing disk drive.
ERROR "u<n>d<n>: Missing; system shutting down now"	A disk drive was not replaced within 30-minute time frame; system shutting down now.	Replace the disk drive and power on the system.
Power and Cooling Unit		
ERROR "u<n>ctrl: Multiple Fan Faults; system shutting down in N minutes"	The controller has detected a fault on fans in both power and cooling units.	Determine which fans in which power and cooling unit failed; replace the power and cooling unit.
ERROR "u<n>ctrl: Multiple Fan Faults; system shutting down now"	The controller has detected a fault on fans in both power and cooling units.	Determine which fans in which power and cooling unit failed; replace the power and cooling unit.
ERROR "u<n>pcu<n> Not present"	System detects the power and cooling unit is missing.	Reseat or replace the power and cooling unit.
ERROR "u<n>pcu<n>: Missing; system shutting down in <n> minutes"	A power and cooling unit is missing and a countdown has started. If the unit is not replaced in 30 minutes, the system will shut down.	Replace the power and cooling unit.
ERROR "u<n>pcu<n>: Missing; system shutting down now"	A power and cooling unit was not replaced within 30-minute time frame; system shutting down now.	Replace the power and cooling unit; power on the system.
ERROR "u<n>pcu<n>: Over temperature"	System detects that a power and cooling unit has reached an over temperature state.	Replace the power and cooling unit.

TABLE B-3 Error Messages (*Continued*)

Error Message	Description	Solution
ERROR "u<n>pcu<n>: Battery not present"	System detects that the battery is missing.	Replace the power and cooling unit.
Other		
ERROR "Power On self test failed..."	This is a fatal error which means the firmware probably could not talk to the drives. This could have been caused by the interconnect cables, interconnect cards, the controller, disks/firmware, or a bad centerplane.	Troubleshoot the unit. Check the status.

B.1.4 Warning Message Listing

TABLE B-4 lists possible warning messages, which are divided into FRU categories and “other.”

TABLE B-4 Warning Messages

Error Message	Description	Solution
Controller		
WARN "u<n>ctr: ISP2100[N] DMA Error Detected" WARN "u<n>ctr: ISP2100[N] Bad request packet" WARN "u<n>ctr: ISP2100[N] Bad request pkt header"	Indicates an error in one of the ISP 2100 chips in the controller.	Notify your Sun authorized service provider.
WARN "u<n>ctr: ISP2100[2] Received LOOP DOWN async Event"	The connection between the host and the controller is faulty.	Check the connection between the host and the disk tray controller card (including the host adaptor, wires, and cables).
WARN "SCSI Disk Error Occurred (path = 0xN, port = 0x0, lun = 0xN)"	When port has a value from 0x0 to 0x7 in this error message, it indicates a problem with an ISP2100 chip in a controller. The disk tray cache mirroring feature may be affected. In all other cases, the message indicates a disk drive error; see the Drive section in this table for more details.	Replace the affected controller card or notify your Sun authorized service provider.
WARN "u<n>ctr: Offline"	A controller has stopped communicating with the rest of the system. Possibly, the connection between the controller and the rest of the system has been disrupted.	Check that the controller card is connected securely. If its state becomes disabled, replace the controller card.
WARN "u<n>ctr: Rebooting"	A controller has been rebooted because it was removed, disabled, or offline and is now re-enabled. Alternatively, the system was shutdown and restarted.	Check previous messages to determine if the reboot is an unexpected event.
WARN "u<n>ctr: Failed to boot"	The system was not able to reboot a controller successfully, even after repeated attempts.	Replace the controller.

TABLE B-4 Warning Messages (*Continued*)

Error Message	Description	Solution
WARN "u<n>ctr: Disabled"	System disabled a controller.	Check previous message queue to determine why the controller is disabled. Then enable or replace the controller.
Interconnect (loop) card and Cable		
WARN "u<n>l<n>: Offline"	System is not able to poll the interconnect card for information.	<ul style="list-style-type: none"> • If an interconnect card is disabled, it may cause other interconnect cards to go offline. • If no interconnect card is disabled, check cable connections to the interconnect card and make sure it is firmly seated. • If the interconnect card does not come back online, replace the interconnect card.
WARN "u<n>l<n>: Disabled"	System detects the interconnect card is disabled.	Check previous message queue to determine why the interconnect card is disabled. Replace the interconnect card if necessary.
WARN "Loop <n> may be bad – check interconnect cable or loopcard"	System detects a potential loop failure.	Check the <code>syslog</code> for any other related messages and use the <code>fru stat</code> command to determine the problem cause. Remove and replace the bad part.
WARN "Loop <n> may be bad – Please run ofdg"	System detects the possibility of an internal error in the loop interconnection.	Use the <code>ofdg</code> command to run the disk tray loop diagnostic.
Drive		
WARN "u<n>d<n>: Failed"	System detects disk failure and automatically disables the disk drive.	Check the <code>syslog</code> for any other related messages. Replace the failed disk.
WARN "u<n>d<n> write disk failed, err=<errno>"	An attempt to write this disk failed. System will automatically disable this disk.	Check the <code>syslog</code> for any other related messages. Replace the failed disk.
WARN "u<n>d<n> could not open plugged disk"	An attempt to open the newly plugged disk failed.	Unseat the drive and wait a few seconds before reseating it so that the system can retry this operation.

TABLE B-4 Warning Messages (Continued)

Error Message	Description	Solution
WARN "u<n>d<n> could not create system area"	An attempt to create system area on this disk failed.	<ol style="list-style-type: none"> 1. Unseat the drive and wait a few seconds before reseating it so that the system can retry this operation. 2. If step 1 fails, replace this drive with a new drive.
WARN "u<n>d<n> system area is bad"	The system area of the drive has been corrupted.	<ol style="list-style-type: none"> 1. Unseat the drive and wait a few seconds before reseating it so that the system can retry this operation. 2. If step 1 fails, replace this drive with a new drive.
WARN "u<n>d<n> could not open disk, try unplug then plug"	An attempt to bring newly installed drive online failed.	Unseat the drive and wait a few seconds before reseating it.
WARN "u<n>d<n> could not open disk"	An attempt to open this drive failed.	<ol style="list-style-type: none"> 1. Unseat the drive, wait a few seconds, reseat it and retry the volume add procedure. 2. If step 1 fails, replace the drive with a new one.
WARN "u<n>d<n> system area verify failed"	An attempt to verify the data in the system area failed.	<p>Replace the drive.</p> <ul style="list-style-type: none"> • If the volume exists, initialize the system area to fix the problem. • If the volume does not exist, retry the volume add procedure.
WARN "u<n>d<n> Recon attempt failed"	Disk Reconstruct failed for disk u<n>d<n>.	Check the <code>syslog</code> for other related failures. If the disk under reconstruction failed, replace the disk.
WARN "u<n>d<n> Disable attempt failed"	Disk Disable failed for disk u<n>d<n>.	Check if the disk is already disabled by using the <code>vol stat</code> command. If not disabled, disable it by typing the <code>vol disable u<n>d<n></code> command.
WARN "u<n>d<n> Installing u<n>d<n> failed, Try unplugging and then plugging"	Disk drive hot plug installation failed.	Unseat the drive and reseat it.

TABLE B-4 Warning Messages (*Continued*)

Error Message	Description	Solution
<p>WARN "u<n>d<n> SCSI Disk Error Occurred (path = 0xN)"</p> <p>WARN "SCSI Disk Error Occurred (path = 0xN, port = 0xN, lun = 0xN)"</p>	<p>SCSI disk drive returned an error status with the appropriate SCSI Sense Data.</p> <p>If port has a value from 0 to 7, then the message indicates an error in an ISP2100 chip; see the Controller category in this table for more information.</p>	<p>Notify your Sun authorized service provider.</p>
<p>WARN "u<n>d<n> is in wrong disk position"</p> <p>WARN "u<n>d<n> is in wrong disk position, previously in u<n>d<n>"</p>	<p>This indicates a drive is in the wrong position in the unit.</p>	<p>Try to determine correct position for disk from the syslog. Power off the system. Reorder the affected disks and reboot the system.</p>
<p>WARN "u<n>d<n> TMON over temperature threshold exceeded"</p>	<p>A disk drive temperature has been exceeded. The drive is spinning down.</p>	<p>Check drives and possible airflow obstruction.</p>
<p>WARN "u<n>d<n> TMON warning temperature threshold exceeded"</p>	<p>A disk drive temperature threshold has been exceeded; the drive is still online.</p>	<p>Check disk drive and possible airflow obstruction.</p>
<p>WARN "u<n>ctr read failed during recon stripe scb=N"</p>	<p>During reconstruction, another drive failed in the volume.</p>	<p>Check syslog for a multiple drive failure. Replace all failed disk drives.</p>
<p>WARN "u<n>d<n> hard err in vol <i>volume_name</i> starting auto disable"</p>	<p>There was a hard error on this disk that prompted a disable operation on this disk. System will autodisable and reconstruct to the hot spare (standby), if there is one configured.</p>	<p>If disabled, replace the failed disk as soon as possible.</p>
<p>WARN "u<n>ctr disk error during recon, terminating recon"</p>	<p>Possible multiple drive failure in the volume.</p>	<p>Check the syslog file. Replace all failed disk drives.</p>
<p>WARN "Sense Key = 0x%x, Asc = 0x%x, Ascq = 0xN"</p> <p>WARN "Sense Data Description = xxxxx"</p> <p>WARN "Valid Information = 0xN"</p>	<p>SCSI disk drive returned an error status with the appropriate SCSI Sense Data.</p>	<p>Notify your Sun authorized service provider.</p>

TABLE B-4 Warning Messages (Continued)

Error Message	Description	Solution
Power and Cooling Unit		
WARN "u<n>pcu<n>: Fan 1 failed"	System detects fan fault on a power and cooling unit.	1. Verify that the batteries have had ample time to charge. 2. Ensure a refresh operation is not in progress.
WARN "u<n>pcu<n>: Fan 2 failed"		3. Replace the power and cooling unit.
WARN "u<n>pcu<n>: DC not OK"	System detects that the DC power source in the power and cooling unit is not OK.	Replace the power and cooling unit.
WARN "u<n>pcu<n>: Disabled"	A power and cooling unit has been disabled.	Check previous messages to see why the power and cooling unit has been disabled, and replace the power and cooling unit if necessary.
WARN "u<n>pcu<n>: Off"	A power and cooling unit is off.	Check <code>syslog</code> for a fan fault or power and cooling unit overtemp. Replace the power and cooling unit if necessary.
WARN "u<n>pcu<n>: On battery"	System detects that a power and cooling unit has switched to battery.	1. Make sure that the AC power cord is attached. 2. If the unit is receiving AC power, then replace the power and cooling unit.
WARN "u<n>pcu<n>: Switch off"	System detects a power and cooling unit has been powered off.	Power on the unit by pressing the power switch.
WARN "u<n>pcu<n>: Replace battery, hold time low"	System detects that a battery is nearing its end of life.	Replace the power and cooling unit.
WARN "u<n>pcu<n>: Battery life expired, replace battery"	System detects an expired battery.	Replace the power and cooling unit.
WARN "u<n>pcu<n>: Replace battery, battery has been on the shelf for more than two years"	The battery's shelf life has exceeded its warranty period.	Replace the power and cooling unit.
WARN "u<n>pcu<n>: n days battery life left, replace battery"	System detects that battery is approaching expiration date.	Replace the power and cooling unit.
WARN "u<n>pcu<n>: Battery took too long to recharge"	System detects a battery charging fault.	Notify your Sun authorized service provider.

TABLE B-4 Warning Messages (*Continued*)

Error Message	Description	Solution
Other		
WARN "u<n>ctr recon failed in vol <i>volume_name</i> "	Reconstruct operation failed for this volume.	Verify that the volume is still mounted and that there is only one drive disabled. Restart the reconstruct operation manually, or reconstruct the data to another drive. Previous messages in syslog should indicate which disk(s) had a problem.
WARN "u<n>ctr initialization failed in vol <i>volume_name</i> "	Volume data initialization to zero failed.	Check the disk drive status using the <code>vol stat</code> command. If any disk has a non-zero status, either initialize the volume using the <code>vol init</code> command, or replace the disk.
WARN "u<n>ctr <type> Reset RESET_FAIL occurred"	A "hard" reset occurred. Message indicates a controller has been reset manually.	Check adjacent messages to see if this event indicates an error.
WARN "u<n>ctr <type> Reset <i>reset_log_type</i> was initiated at <date> <time> <message>."	A "soft" reset occurred, for one of several reasons. The specific error is indicated by the <type>.	Check Table B-5 for information about the type of reset that occurred. The <type> field here should match one of those listed in Table B-5.
WARN "u<n>ctr starting lun failover"	A LUN failover has occurred.	<ol style="list-style-type: none"> 1. Use the <code>sys stat</code> command to see if the controller is disabled. 2. Check the <code>syslog</code> for possible interconnect, host adapter, or cable problems.
WARN "u<x>d<y>: SVD_PATH_FAILOVER: path_id = <N>" WARN "SVD_PATH_FAILOVER: path_id = <N>, lid = <N>"	A failover has occurred, indicating that any one of the system's replaceable units is faulty.	Troubleshoot and replace the failed component. More information may be derived from related syslog messages and from using the 'fru stat' command.
WARN "u<n>l<n> LMON predictive failure threshold exceeded - LIP"	The fibre-channel loop is exhibiting an unexpected number of LIPs. This problem may be generated from any of the FRU's.	In certain cases, running the <code>ofdg</code> diagnostic command may find the problem. In general, notify your Sun authorized service provider.

B.2 Reset Log Types

If the error level is set to Notice (2) or higher (Warning or Error), you can trace the reason for the reset through the `syslog` file.

TABLE B-5 Reset Log Types

Index	Type	Type Value	Description
0	Hardware	0x1000	User reset
1	Exception	0x2000	Exception
2	Assertion	0x3000	Software assertion
3	RaidFail	0x4000	RAID fatal error
4	Takeover	0x5000	Takeover
5	PsosFail	0x6000	pSOS fatal error
6	SysFail	0x7000	System error

B.3 Examples

This section contains examples for different types of messages.

- Error
- Warning
- Notice

B.3.1 Error

This section provides examples of the types of errors that may be encountered and the corresponding error message.

B.3.1.1 FRU Level Errors

■ Example 1

When a FRU is removed, it must be replaced in less than 30 minutes or the unit will automatically shut down. In this example, the PCU in unit 1 is missing.

```
Jan 28 22:16:16 TMRT[1]: E: ulpcul: Missing; system shutting down in 25 minutes
Jan 28 22:21:16 TMRT[1]: E: ulpcul: Missing; system shutting down in 20 minutes
Jan 28 22:26:16 TMRT[1]: E: ulpcul: Missing; system shutting down in 15 minutes
Jan 28 22:31:16 TMRT[1]: E: ulpcul: Missing; system shutting down in 10 minutes
Jan 28 22:36:16 TMRT[1]: E: ulpcul: Missing; system shutting down in 5 minutes
Jan 28 22:41:16 TMRT[1]: E: ulpcul: Missing; system shutting down now
```

■ Example 2

A Power and Cooling Unit (PCU) over temperature condition.

```
E: u<n>pcu<n>: Over temperature
```

■ Example 3

The Power and Cooling Unit (PCU) is flagged as not being present.

```
E: u<n>pcu<n>: Not present
```

B.3.2 Warning

This section provides examples of the types of errors that may occur and the corresponding warning message.

B.3.2.1 Unrecoverable Drive Error

Data drive u1d4 error occurred while using interconnect path 0.

```
Jan 25 00:09:20 ISR1[1]: W: u1d4 SCSI Disk Error Occurred (path = 0x0)
Jan 25 00:09:20 ISR1[1]: W: Sense Key = 0x4, Asc = 0x15, Ascq = 0x1
Jan 25 00:09:20 ISR1[1]: W: Sense Data Description = Mechanical Positioning Error
```

This example shows the decode of the prior SCSI sense key information (from the data drive) regarding the drive error. In this case, the drive error was a "Mechanical Position Error."

```
Jan 25 00:09:21 WXFT[1]: W: u1d4 hard err in vol (n1) starting auto disable
```

This message indicates that drive u1d4 was disabled as a result of the previous error. The unit will continue to operate with a disabled drive, with possible performance degradation. A repair action must be planned. However, since the drive automatically disabled, the repair can be deferred.

B.3.2.2 Cache Parity Error

The Fibre Channel chip, model ISP2100 interconnect 1, on the controller card detected a parity error.

```
Dec 22 14:09:50 ROOT[1]: W: (ctr) SysFail Reset (7010) was initiated at 19981222  
130800 ISP2100[1] detected parity error
```

In this example:

- `W: (ctr)` indicates that the controller card needs to be replaced.
- `SysFail Reset (7010)` indicates a reset log type.

This message points to a parity error occurring on the local bus of the controller. This error causes a controller panic. The controller is reset and a warning message is logged.

B.3.2.3 Software Assertion or Panic

Reset type.

```
Jan 30 03:01:48 ROOT[1]: W: ulctr Assertion Reset (3000) was initiated at
20000130 030050 g78/src/noblep/sdl/scsi/svd.c line 829, Assert(lid >=
SVD_START_LID) => 0 BOOT

Jan 30 03:01:48 ROOT[1]: N: CPU state...
Jan 30 03:01:48 ROOT[1]: N: R0 = 00000000 01554588 00250ea4 015545cc 00000000
ffffffff 01554634 00efe334
Jan 30 03:01:48 ROOT[1]: N: R8 = ffffffff 00002051 000d7438 00440000 00438f74
00252418 2fff0000 00000001
Jan 30 03:01:48 ROOT[1]: N: R16= 00000000 00000000 0023b828 00e40308 00e40308
00000008 00000009 00000000
Jan 30 03:01:48 ROOT[1]: N: R24= 00000000 2ffe0000 0023abe8 00060894 00000000
00efe324 00efe318 0023b940
```

This message points to a software assertion or panic on the controller. This error causes a controller panic. The controller is reset and a warning message is logged.

B.3.2.4 Unrecoverable Drive Error

```
Dec 22 16:57:55 ISR1[1] : W: (dr) SCSI Disk Error Occurred (path = 0x0,uld8)
```

- W: (dr) indicates that the disk drive requires repair.
- path = 0x0 indicates that the error was detected while using the interconnect served by interconnect card 1 (path 0x1 is interconnect served by interconnect card 2).
- uld8 is the address of the failing drive.

```
Dec 22 16:57:55 ISR1[1] : W: (dr) Sense key = 0xb, Asc 0x47, Ascq = 0x0
Dec 22 16:57:55 ISR1[1] : W: (dr) Sense Data Description = SCSI Parity Error
```

- Sense key 0xb = ABORTED COMMAND. Indicates that the TARGET aborted the command. The INITIATOR may be able to recover by re-trying the command.
- The meaning of Asc and Ascq is decoded in the second line.
- SCSI Parity Error is the decode of the most important information contained in the Sense key message of the previous line.

These messages point to a parity error being detected and reported by the associated disk drive.

B.3.2.5 Recoverable Drive Error

```
Feb 04 22:39:11 ISR1[1] : W: u1d1 SCSI Disk Error Occurred (path = 0x1)
```

- W: u1d1 indicates the failing drive.
- path = 0x1 indicates that the error was detected while using the interconnect served by interconnect card 2 (path 0x0 is interconnect served by interconnect card 1).

```
Feb 04 22:39:11 ISR1[1] : W: Sense key = 0x1, Asc 0x47, Ascq = 0x1  
Feb 04 22:39:11 ISR1[1] : W: Sense Data Description = Recovered Data With Retries
```

- Sense key (N (hex)) = RECOVERED ERROR. Indicates that the last command completed successfully after some recovery action was performed.
- The meaning of Asc and Ascq is decoded in the second line.
- Recovered Data With Retries is the decode of the most important information contained in the Sense key message of the previous line.

B.3.3 Notice

```
Feb 25 21:47:03 LPCT[1]: N: ulpcu2: Switch off
```

- N: is the Notice level message.
- ulpcu2 is unit 1, power and cooling unit 2.
- Switch off indicates the power switch is off.

Glossary

A

- administrative domain** Partner groups (interconnected controller units) that share common administration through a master controller.
- alternate master unit** The secondary disk tray unit in a partner group that provides failover capability from the master unit.
- alternate pathing (AP)** A mechanism that reroutes data to the other disk tray controller in a partner group upon failure in the host data path. Alternate pathing requires special software to perform this function.
- auto cache mode** The default cache mode for the Sun StorEdge T3 disk tray. In a fully redundant configuration, cache is set to write-behind mode. In a nonredundant configuration, cache is set to write-through. Read caching is always performed.

B

- buffering** Data that is being transferred between the host and the drives.

C

**command-line interface
(CLI)**

The interface between the Sun Sun StorEdge T3 disk tray's pSOS operating system and the user in which the user types commands to administer the disk tray.

controller unit

A Sun StorEdge T3 disk tray that includes a controller card. It can be use as a standalone unit or configured with other Sun Sun StorEdge T3 disk trays.

E

**erasable programmable
read-only memory
(EPROM)**

Memory stored on the controller card; useful for stable storage for long periods without electricity while still allowing reprogramming.

expansion unit

A Sun StorEdge T3 disk tray without a controller card. It must be connected to a controller unit to be operational.

F

**Fibre Channel
Arbitrated Loop
(FC-AL)**

A 100 MB/s serial channel, which allows connection of multiple devices (disk drives and controllers).

**field-replaceable unit
(FRU)**

A component that is easily removed and replaced by a field service engineer or a system administrator.

G

**gigabit interface
converter (GBIC)**

An adapter used on an SBus card to convert fiber-optic signal to copper.

gigabyte (GB or Gbyte) One gigabyte is equal to one billion bytes (1x10⁹).

graphical user interface (GUI) A software interface that enables configuration and administration of the Sun Sun StorEdge T3 disk tray using a graphic application.

H

hot spare A drive in a RAID 1 or RAID 5 configuration that contains no data and acts as a standby in case another drive fails.

hot-swap The characteristic of a field-replaceable unit (FRU) to be removed and replaced while the system remains powered on and operational.

I

input/output operations per second (IOPS) A performance measurement of the transaction rate.

interconnect cable An FC-AL cable with a unique switched-loop architecture that is used to interconnect multiple Sun Sun StorEdge T3 disk trays.

interconnect card A disk tray component that contains the interface circuitry and two connectors for interconnecting multiple Sun Sun StorEdge T3 disk tray units.

L

light-emitting diode (LED) A device that converts electrical energy into light that is used to display activity.

logical unit number (LUN) One or more drives that can be grouped into a unit; also called a volume.

M

master unit	The main controller unit in a partner-group configuration.
media access control (MAC) address	A unique address that identifies a storage location or a device.
media interface adapter (MIA)	An adapter that converts fiber-optic light signals to copper.
megabyte (MB or Mbyte)	One megabyte is equal to one million bytes (1x10 ⁶).
megabytes per second (MB/s)	A performance measurement of the sustained data transfer rate.

P

parity	Additional information stored with data on a disk that enables the controller to rebuild data after a drive failure.
partner group	A pair of interconnected controller units. Expansion units interconnected to the pair of controller units can also be part of the partner group.
power and cooling unit	A FRU component in the Sun Sun StorEdge T3 disk tray. It contains a power supply, cooling fans, and an integrated UPS battery. There are two power and cooling units in a Sun Sun StorEdge T3 disk tray.

R

read caching	Data for future retrieval, to reduce disk I/O as much as possible.
redundant array of independent disks (RAID)	A configuration in which multiple drives are combined into a single virtual drive, to improve performance and reliability.

**reliability, availability,
serviceability (RAS)**

A term to describe product features that include high availability, easily serviced components, and very dependable.

S

**Simple Network
Management Protocol
(SNMP)**

A network management protocol designed to give a user the capability to remotely manage a computer network.

**synchronous dynamic
random access memory
(SDRAM)**

A form of dynamic random access memory (DRAM) that can run at higher clock speeds than conventional DRAM.

system area

Located on the disk drive label, the space that contains configuration data, boot firmware, and file-system information.

U

**uninterruptable power
source (UPS)**

A component within the power and cooling unit. It supplies power from a battery in the case of an AC power failure.

V

volume

Also called a LUN, a volume is one or more drives that can be grouped into a unit for data storage.

W

**world wide number
(WWN)**

Number used to identify disk tray volumes in both the disk tray system and Solaris environment.

write caching

Data used to build up stripes of data, eliminating the read-modify-write overhead. Write caching improves performance for applications that are writing to disk.

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