Sun StorEdge™ StorTools™ User's Guide

Version 3.3

THE NETWORK IS THE COMPUTER™

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Preface

Sun StorEdge StorTools User's Guide describes the Sun StorTools™ diagnostic package provided for monitoring and troubleshooting Sun StorEdge A5x00 array and Sun StorEdge T300 disk trays. This document describes the StorTools menu selections and command-line utilities and provides procedures for using the tools.

This guide is written for system administrators and support personnel who are already familiar with Sun's disk array products and have completed the required training in the use of the StorTools package.

Before You Read This Book

Do not use the StorTools diagnostic package unless you have passed the StorTools usage test.

How This Book Is Organized

This book contains the following topics:

Chapter 1 “StorTools Overview and Installation,” provides an overview of the StorTools diagnostic package and identifies the tasks you can perform using the tools in the package. It also includes installation information.

Chapter 2 “Main Menu Features,” describes the StorTools start up procedure and the selections provided on the stormenu Main Menu.

Chapter 3 “Task Overview,” identifies the storage-specific tasks you can perform using the StorTools package.

Chapter 4 “Checking Revisions,” describes using the StorTools package to check the revisions of software and firmware.

Chapter 5 “Creating a Configuration Snapshot,” describes creating a configuration snapshot file.

Chapter 6 “Displaying the Configuration,” describes how to display system configuration information.

Chapter 7 “Checking the Current Status,” describes using the StorTools package to check the status of the current configuration.

Chapter 8 “Monitoring the Storage Environment,” describes how to use the Storage Monitor feature to monitor the storage environment.

Chapter 9 “Running Diagnostics,” describes the diagnostic menu selections and the diagnostics provided in the StorTools package.

Chapter 10 “Verifying the Installation,” describes how to use the tools to verify the storage installation.

Chapter 11 “Command-Line Utilities,” describes the command-line utilities provided in the package and their functions.

Chapter 12 “Troubleshooting Sun StorEdge A5x00 Arrays,” provides troubleshooting information and fault isolation flowcharts for A5*x*00 storage arrays.

Chapter 13 “Troubleshooting Sun StorEdge T300 Disk Trays,” provides troubleshooting information for Sun StorEdge T300 Disk Trays.

Appendix A “Sun StorEdge A5x00 Array Front Panel Module Bypass Examples,” contains Front Panel Module bypass illustrations.

Using UNIX Commands

This document may not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

See one or more of the following for this information:

- *Solaris Handbook for Sun Peripherals*
- AnswerBook2™ online documentation for the Solaris™ operating environment
- Other software documentation that you received with your system

Typographic Conventions

TABLE P-1 Typographic Conventions

Typeface	Meaning	Examples
`AaBbCc123`	The names of commands, files, and directories; on-screen computer output	Edit your `.login` file. Use `ls -a` to list all files. `% You have mail.`
`AaBbCc123`	What you type, when contrasted with on-screen computer output	`% su` `Password:`

TABLE P-1 Typographic Conventions

Typeface	Meaning	Examples
AaBbCc123	Book titles, new words or terms, words to be emphasized	Read Chapter 6 in the *User's Guide.* These are called *class* options. You *must* be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type **`rm`** *filename.*

.
.
.
	The vertical ellipsis indicates continuation of system output. In system output display examples, the vertical ellipsis indicates that some of the information displayed has been omitted.	In the following example, additional information would be displayed in place of the vertical ellipsis:
		
		`StorTools Storage Management`
		`PCI A5K Series Storage`
		`Menu: Main`
		.
		.
		.
		`Select an operation to perform:`

...	In system output display examples, the horizontal ellipsis indicates that some of the information displayed has been omitted.	In the following example, part of the World Wide Number has been omitted: `200...891`

The following variables are used in program output examples throughout this document. Additional variables are described on the pages where they are used.

TABLE P-2 Variables

Variable	Description
x.x	The version of the StorTools diagnostic package.
hostname	The name of the host running the StorTools diagnostic software.

Note – The program output examples in this document were generated on various systems. The actual output will vary depending on the system configuration.

Shell Prompts

TABLE P-3 Prompts

Type	Prompt
C shell	*machine_name*%
C shell superuser	*machine_name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Related Documentation

Refer to the Sun StorEdge A5*x*00 Array documentation set and the Sun StorEdge T300 Disk Tray documentation set for related documentation.

Accessing Sun Documentation Online

The `docs.sun.com`[sm] web site enables you to access Sun technical documentation on the Web. You can browse the `docs.sun.com` archive or search for a specific book title or subject at:

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CHAPTER 1

StorTools Overview and Installation

This chapter contains the following topics:

Package Features

The StorTools diagnostic package simplifies the monitoring and troubleshooting of Sun StorEdge A5x00 arrays and Sun StorEdge T300 disk tray installations. The package provides an easy to use menu-driven front-end program with task explanations and help information. Command-line utilities are provided for advanced customized use. The utilities have standard man pages for online documentation.

The StorTools diagnostic package provides tools for performing the following tasks:

Revision Checking

You can use the tools to check the revisions of:

- Software patches
- Firmware

Configuration Management

Configuration management tools perform the following operations:

- Display and map the StorEdge FC-AL loop configurations. You can create a live snapshot of the current state of the FC-AL loops that can be used in the future to detect any offline conditions or additional new hardware.
- Check the configuration status for hardware failures and software or firmware changes.
- Ensure that the minimum disk configuration is present.

Monitoring and Notification

Monitoring and notification features include:

- A summary of storage related syslog messages from the `/var/adm/messages` file. This function counts FC-AL loop LIPs and disk SCSI warnings, checking for failure trends that indicate possible future hardware failures.
- A Check Current Status function that uses the storage snapshot file as the known good configuration state and compares the current configuration with the snapshot configuration. Any change is reported.
- A monitor of the Sun StorEdge T300 disk tray syslog messages file (`/var/adm/messages.t300`) for error conditions.
- A `crontab` setup feature for automating the above functions and assigning addresses for email notification.

Troubleshooting and Fault Isolation

The StorTools diagnostic package provides the following types of diagnostic tests for troubleshooting and isolating faults in FC-AL disk arrays:

- Loop integrity tests
- Host adapter tests
- Disk exercisers
- Installation verification load tests

Installing the Package

You can obtain the StorTools diagnostic package either from the CD-ROM or by downloading it from the following web site:
`http://webhome.central.sun.com/stortools`.

Note – The bootable CD image contains a minimum Solaris™ image which means some features like man page viewing is not supported during installation. Also, you must start the `syslogd`(1M) after booting from the CD-ROM to activate `/var/adm/messages`.

If an existing StorTools diagnostic package is installed on the system, remove it before installing the latest version.

- To determine if a package is installed, type:

```
# pkginfo STORtools
```

If the package exists, the following is displayed:

```
Diagnostics STORtools                STORtools Diagnostic Package
```

- To remove the package, type:

```
# pkgrm STORtools
```

The following messages and prompt are displayed:

```
The following package is currently installed:
STORtools           STORtools Diagnostic Package
                    (sparc) STORtools 3.n

Do you want to remove this package?
```

Type `y` to remove the previous version of the StorTools diagnostic package.

Once you remove the previous version of the package, continue with the installation.

Installing From the Web Site

To install the package after downloading it from the web site, type:

```
# uncompress STORtools.tar.Z
# tar -xf STORtools.tar
# pkgadd -d . STORtools
```

Installing From CD-ROM

1. **Load the disc with the label-side facing up into the CD-ROM drive.**
2. **Mount the CD-ROM drive.**
   a. **If the Solaris Volume Manager daemon (`vold`) is running, the CD-ROM drive should be available at the `/cdrom/cdrom0` mount point. Proceed to Step 3.**
   b. **If `vold` is not running, create the following mount point and mount the CD-ROM drive by typing:**

```
# mkdir /cdrom/cdrom0
# mount -F hsfs -o ro /dev/dsk/cXtXdXsX /cdrom/cdrom0
```

Where c*X*t*X*d*X*s*X* is the device node of the CD-ROM (for example, `c0t6d0s0`) and `/cdrom/cdrom0` is the mount point.

3. **Change directories.**

```
# cd /cdrom/cdrom0/s0
```

Note – The path to the `cdrom` directory may vary depending on the directory where the CD-ROM was manually mounted.

---

4. **To install the package, type:**

```
# pkgadd -d . STORtools
```

Once installation starts, a series of messages and prompts are displayed. The following prompt is displayed during installation to give you the opportunity to continue the installation process or exit:

```
Press Enter to continue [continue,quit,?]
```

5. **Press Enter to continue package installation, type** `quit` **to exit the process, or type** `?` **to display help information.**

   The StorTools package includes a Binary Code License Agreement. During installation, the terms of this agreement are displayed followed by the prompt:

```
Do you accept the terms? [yes,no,view,?]
```

6. **Type one of the following:**

Response	Description
`yes`	Accepts the terms of the license agreement and continues the installation process.
`no`	Rejects the terms of the license agreement and exits.
`view`	Redisplays the terms of the license agreement.
`?`	Displays help information.

   If you type `yes` to accept the terms, the following prompt is displayed:

```
View Release Notes? [yes,no,?]
```

7. **Type** `y` **to display the Release Notes,** `n` **to continue without displaying the Release Notes, or** `?` **to display help information.**

Installation continues and the following messages are displayed:

```
Using </opt> as the package base directory.
## Processing package information.
## Processing system information.
   9 package pathnames are already properly installed.
## Verifying disk space requirements.
## Checking for conflicts with package already installed.
## Checking for setuid/setgid programs.

This package contains scripts which will be executed with super-user
permission during the process of installing this package.

Do you want to continue with the installation of <STORtools> [y,n,?]
```

8. **Type** `y` **to continue the installation,** `n` **to exit the process, or** `?` **to display help information.**

   If you type `y` to continue installation, the following messages are displayed:

```
Installing StorTools Diagnostic Package as <STORtools>

## Installing part 1 of 1
```

   As the installation process continues, it displays the path of each file installed. The following messages indicate that installation is complete:

```
## Executing postinstall script.

Installation of <STORtools> was successful.
```

Path Requirements

After installing the StorTools diagnostic package, set the environment variables PATH and MANPATH to include the StorTools directories /var/opt/STORtools/bin and /var/opt/STORtools/man.

FIGURE 1-1 illustrates a Korn or Bourne shell .profile example and FIGURE 1-2 illustrates a C shell .cshrc example.

```
PATH=/var/opt/STORtools/bin:$PATH

MANPATH=/var/opt/STORtools/man:$MANPATH
export PATH MANPATH
```

FIGURE 1-1 Example of Korn or Bourne Shell PATH and MANPATH Entries

```
setenv $PATH PATH:/var/opt/STORtools/bin

setenv $MANPATH MANPATH:/var/opt/STORtools/man
```

FIGURE 1-2 Example of C Shell path and MANPATH Entries

Locale Requirements

Since the StorTools diagnostic package does not support all locales, use the “C” locale to avoid problems with unsupported characters in the configuration snapshot and other text files. The following is an example command line for setting the C locale:

```
setenv LANG C
```

Online Help

An important part of the Sun StorTools package is the help that is provided. One of the most used types of help are man(1) pages, which are provided for each of the commands included in the StorTools package. There is also a help file for all

A help file that explains all supported operations is also available from the main StorTools menu. When a ? is entered, the help file is displayed.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Main
----------

 [1] Check Revisions
 [2] Create Configuration Snapshot File
 [3] Display Configuration
 [4] Check Current Status
 [5] Storage Monitor
 [6] Run Diagnostics
 [7] Installation Verification

 [?] Display Help
 [q] Quit

        Current Date:   date
        Gold Snapshot date:  snapdate
        Gold Snapshot path:  path

Select an operation to perform: ?

Operations supported:

[1] Check Revisions
Use this menu operation to perform a system patch, array firmware
and minimum disk configuration check.  This operation uses the
"StorTools SSA, Sun StorEdge A5x00 array and Sun StorEdge T300
disk tray Software Firmware Configuration Matrix" for information
on current patches and firmware.

StorTools Matrix patches are available at:
...
```

The man pages include the following:

- dex32(1M)
- disk_inquiry(1M)
- disklist(1M)
- filtr(1M)
- lbf(1M)
- rawdump(1M)
- sanbox(1M)
- sedr(1M)

- storconfig(1M)
- stormenu(1M)
- storstat(1M)
- A5000_errors(5)

Man pages can be accessed in two ways:

1. By invoking the man command at the command line.
2. By entering a ? (Help) from the main StorTools menu. The following example shows the Help from the Disk Read Loop. The dex32 man page is displayed.

```
 Disk Exerciser Options                 Value
============================          ====================
[t] Select Test Type                   Sequential
    Mode of Test (not selectable)      Read Only
[a] Select Range Across Media          2m
[s] Select Data Transfer Size          128k
[l] Select Time Limit                  720m

[n] Select Number of I/O's per Pass    1
[o] Select Open/Close On Every Pass    no
[i] Select Iterations (Passes)         unlimited
[p] Select Processes per Device        1
[d] Select IO, Pass & Start Delays     I/O: 0, Pass: 0, Start: 0
[e] Select Error Limit                 none
[c] Select Compare Error Limit         none
[f] Select Initialize Device First     no
[b] Select Buffer Test Pattern         default
[v] Verbose Mode                       On

[u] Undo, Restore Default Settings
[?] Help

[q] Quit

Enter Selection: ?
Reformatting page.  Wait... done

User Commands                                          dex32(1M)

NAME
     dex32 - Device Exerciser for Sun StorEdge A5x00 arrays and
Sun StorEdge T300 disk trays
...
```

CHAPTER 2

Main Menu Features

You access the StorTools Main Menu through the `stormenu` command. Once executed, this command runs the `initcheck` program which identifies all attached storage and identifies components available for testing.

This chapter contains the following topics:

`stormenu` Options

The `stormenu`(1M)command has the following command-line options:

TABLE 2-1 `stormenu` Options

Option	Description
`-s`	Performs a faster (short) test startup when the loops are known to be functional. When this option is specified, the `stormenu` program performs a single disk inquiry to the first disk on the loop.
`-t`	Enables time stamps.
`-c`	Enables color printing.

FIGURE 2-1 and FIGURE 2-2 show examples of `stormenu` command execution.

```
# ./stormenu
StorTools Storage Management   Version   x.x

   NOTICE: Use of this software and associated packages is authorized
   ONLY by personnel trained in it's use and trained on the Products
   for which it was intended to be used on.

   The execution of this toolkit assumes the user accepts the licensing
   terms and agreements as contained in the file NOTICE.txt.

 ---- Offline port(s) (HBA tests only) ----
 ---- Offline ports: /devices/sbus@3,0/SUNW,socal@d,10000/sf@0,0:devctl --
--
 ---- Offline ports: /devices/pci@9,2000/pci@2/SUNW,qlc@5/fp@0,0:devctl --
--



 ---- FCAL HBA(s) within the StorTools domain ----
 ---- Online: /devices/sbus@3,0/SUNW,socal@d,10000/sf@1,0:devctl ----
       (c2) (sf1)  (socal0:Port 1)
2 T300 LUN(s) Primary: 1  Alternate: 1  ..

 ---- Online: /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0:devctl ----
       (c3) (sf5)  (socal2:Port 1)
22 drive(s) in A5x00 enclosures  ......................

 ---- Online: /devices/pci@e,2000/pci@2/SUNW,qlc@4/fp@0,0:devctl ----
       (c10) (fp0)  (qlc0:Port 0)
2 T300 LUN(s) Primary: 1  Alternate: 1  ..

 ---- Online: /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0:devctl ----
       (c5) (fp1)  (qlc1:Port 0)
21 drive(s) in A5x00 enclosures
.............................................................

PASS
Press <return> to continue ...
```

FIGURE 2-1 stormenu Command Example

Main Menu Selections

After running the `initcheck` program, `stormenu` displays the Main Menu as shown in FIGURE 2-2. The Main Menu selections are summarized in TABLE 2-3.

Note – The StorTools diagnostic package expects the software and firmware files to be at certain revision levels to run the tools. Always use the `Check Revisions` selection and ensure that the system is up to the minimum revision requirements before using any of the other Main Menu selections.

Although the Main Menu selections can be used in any order, refer to Chapter 3 for the recommended task implementation order.

The Main Menu also displays the current date, creation date, and file name of the *Gold Snapshot* file. This file is a system log of the storage configuration and is required for most StorTools functions. Refer to Chapter 5 for additional information about the configuration snapshot file.

```
StorTools Storage Management    Version x.x
StorEdge on host hostname
Menu: Main
----------

 [1] Check Revisions
 [2] Create Configuration Snapshot File
 [3] Display Configuration
 [4] Check Current Status
 [5] Storage Monitor
 [6] Run Diagnostics
 [7] Installation Verification

 [?] Display Help
 [q] Quit

        Current Date:   date
        Gold Snapshot date:  snapdate
        Gold Snapshot path:  path

Select an operation to perform:
```

FIGURE 2-2 StorTools Main Menu

TABLE 2-2 StorTools Main Menu Variables

Variable	Description
x.x	The version of the StorTools diagnostic package.
hostname	The name of the host running the StorTools diagnostic software.
date	The current date and time.
snapdate	The creation date of the Gold Snapshot file or `No Gold Snapshot` if the configuration snapshot was not created.
path	The path to the file containing the Gold Snapshot or `None` if the configuration snapshot was not created.

TABLE 2-3 Main Menu Selections

Selection	Description
`[1] Check Revisions`	Checks the current revisions of software and firmware. Also checks for a valid minimum disk configuration. Refer to Chapter 4 for additional information.
`[2] Create Configuration Snapshot File`	Creates a *Gold Snapshot* file containing the current configuration. Refer to Chapter 5 for additional information.
`[3] Display Configuration`	Displays the configuration information either for a live system or from the Configuration Snapshot file. Refer to Chapter 6 for additional information.
`[4] Check Current Status`	Compares the current configuration with the contents of the Configuration Snapshot file. Refer to Chapter 7 for additional information.
`[5] Storage Monitor`	Scans the messages files and summarizes any storage related events and errors. Enables you to set up `crontab` entries to automate status checking and messages summary operations. Refer to Chapter 8 for additional information.
`[6] Run Diagnostics`	Displays a menu of the diagnostic tests available and enables viewing the diagnostic log files. Refer to Chapter 9 for additional information.

TABLE 2-3 Main Menu Selections *(Continued)*

Selection	Description
[7] Installation Verification	Performs extended stress testing of the fiber loop and disk drives. Displays a menu that enables you to start and stop testing, check status, and examine test output information. Refer to Chapter 10 for additional information.
[?] Display Help	Displays Main Menu help information.
[q] Quit	Exits the Main Menu.

CHAPTER 3

Task Overview

You can use the tools in the StorTools diagnostic package to perform storage-specific tasks related to installing, monitoring, maintaining, and troubleshooting storage arrays. This chapter lists the recommended tasks for each operation and the order in which you should perform them. The chapter contains the following topics:

Note – The StorTools diagnostic package expects the software and firmware to be at certain revision levels to run the tools. Always use the `Check Revisions` selection on the Main Menu to ensure that the system is up to the minimum revision requirements before using any of the other tools.

Setting Up New Storage Arrays

Perform the following tasks after installing new storage arrays:

1. Check the software and firmware revisions and upgrade any FC-AL storage arrays or system patches if necessary. The `Check Revisions` operation is described in Chapter 4.
2. Create the Configuration Snapshot File. (See Chapter 5.)
3. ForSun StorEdge T300 disk trays and Sun StorEdge A5*x*00 arrays, execute the Installation Verification test. Refer to Chapter 10 for information about executing the Installation Verification test.

4. Use the Storage Monitor to generate a message summary. Review the summary to verify that the system is operating within acceptable parameters. (See Chapter 8 and FIN I0465-1.)
5. Set up the Storage Monitor to perform Status Checks and Message Summary.

Monitoring Storage Arrays

Perform the following tasks to monitor the storage array environment:

1. Obtain the current revision matrix StorTools patch from SunSolve (`http://sunsolve.Sun.COM`) and check the revisions. The `Check Revisions` operation is described in Chapter 4.
2. Check the current status of the configuration. (See Chapter 6.)
3. Use the Storage Monitor to produce a Messages Summary. (See Chapter 8 and FIN I0465-1.)
4. Use the `crontab` setup function to automate the Storage Monitor checks and input email addresses for event notification.

Performing Maintenance Tasks

Perform the following tasks when doing maintenance operations such as changing the configuration by adding, removing, or reconfiguring storage arrays.

1. Check the software and firmware revisions and upgrade any FC-AL storage arrays or system patches if necessary. The `Check Revisions` operation is described in Chapter 4.
2. Create the Configuration Snapshot File. (See Chapter 5.)
3. Run Diagnostics. The diagnostics and their tests are described in Chapter 9.
4. Use the Storage Monitor to create a message summary. Verify that the system is operating within acceptable parameters. (See Chapter 8.)

Troubleshooting Storage Array Problems

Perform the following tasks when troubleshooting storage array problems:

1. Check the software and firmware revisions and upgrade any FC-AL storage arrays or system patches if necessary. The `Check Revisions` operation is described in Chapter 4.
2. Use the Storage Monitor to obtain a Messages Summary. (See Chapter 8.)
3. Use the `Display Configuration` feature to identify the loop or disk in error. (See Chapter 6.)
4. Run Diagnostics on the suspect loop. For Sun StorEdge A5*x*00 arrays, or when the failing loop and data patterns have been identified, run `filtr`. If the failing loop has not been identified or if the storage type is unknown use StorEdgeDr (`sedr`). See Chapter 9 for additional information.
5. Replace the failing Field Replaceable Unit (FRU).
6. Check the software and firmware revisions and upgrade any FC-AL storage arrays or system patches if necessary. The `Check Revisions` operation is described in Chapter 4.
7. Run Installation Verification to validate the replaced components. See Chapter 9 for additional information.
8. Select option 4 (`Check Current Status`) from the Main Menu. If the replaced FRU is a detectable component, this operation should detect the component and report a configuration anomaly. Use option 2 (`Create Configuration Snapshot File`) from the Main Menu to create a new Golden Snapshot and repeat the `Check Current Status` operation.

CHAPTER 4

Checking Revisions

Use selection 1 (`Check Revisions`) on the `stormenu` Main Menu to check the software and firmware revision levels. This operation uses the *StorTools-StorEdge Software/Firmware/Hardware Revision Matrix* for information on current patches and firmware. See the SunSolve website (`http://sunsolve.Sun.COM`) for the latest matrix and the associated StorTools patch.

On Sun StorEdge A5*x*00 arrays, `Check Revisions` also checks for a valid minimum disk configuration. The minimum disk configuration for a 14-disk array is 5 disks installed in front slots 3 and 6, and rear slots 0, 3, and 6. The 22-disk array requires 7 disks installed in front slots 0, 5, and 10, and rear slots 0, 3, 6, and 10. These minimum disk configurations are required because circuitry on the disk drives regenerates and retimes the data signals which corrects signal loss accumulated through the bypass circuitry between empty slots. Empty backplanes can generate errors that are intermittent and difficult to isolate. (Refer to FIN I0400-1.)

Note – The StorTools diagnostic package expects the software and firmware files to be at certain revision levels to run the tools. Always use the `Check Revisions` selection and ensure that the system is up to the minimum revision requirements before using any of the other Main Menu selections.

This chapter contains the following topics:

Revision Check Menu Selections

Once selected, `Check Revisions` displays the Revision Check Menu shown in FIGURE 4-1.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Main
----------

 [1] Check Revisions
 .
 .
 .
 Select an operation to perform: 1

StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Revision Check
--------------------
This check is done against the most recent “StorTools-StorEdge
Software/Firmware/Hardware Revision Matrix” available.
Always run with the latest version of this matrix!


This probe can take 30 seconds per array to complete.

[r] Run With Default Options
[s] Select Options
[q] Quit

Enter Choice [<r>, s, q]:
```

FIGURE 4-1 Revision Check Menu

The Revision Check Menu selections are described in TABLE 4-1.

TABLE 4-1 Revision Check Menu Selections

Selection	Description
r	Runs the revision checking routine with default `storstat` options.
s	Displays a list of `storstat` options.
q	Exits the menu.

`storstat` Options

The revision checking routine uses the `storstat`(1M) diagnostic program to check the status of firmware, patches, and field-replaceable units (FRUs). If you select `r` from the Revision Check Menu, `storstat` runs with default options. If you select `s`, a list of available options and their values is displayed. The options available for checking Sun StorEdge A5*x*00 arrays are shown in FIGURE 4-2. All of the `storstat` options are described in TABLE 4-2.

Note – If you change option `s` (`All Checks`) to `no`, you must select another `Check` option before quitting the `storstat` Options menu.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Revision Check
--------------------
By default, revisions are verified using the most recent
"StorTools-StorEdge
Software/Firmware/Hardware Revision Matrix" available.
Always run with the official version of this matrix!

Reference: http://sunsolve.Sun.COM
Select "site map"
Select "SSA/A5K/T300 Matrix"

(Continued on Following Page)
```

FIGURE 4-2 `storstat` Options - Sun StorEdge A5*x*00 Arrays

```
If the current StorTools Matrix is not up-to-date, load
the latest StorTools patch or version.
Reference the Release Notes for more information.

This probe can take 30 seconds per array to complete.
[r] Run with User Defined Options
[s] Select Options
[q] Quit

Enter Choice [<r>, s, q]: s

Storstat Options                        Value
================                        ================
 [a] All Checks                         yes
 [d] Check Disks                        yes
 [f] Check Fans                         yes
 [m] Check Minimum Configuration        yes
 [p] Check Power Supplies               yes
 [k] FRU Checks (disk, fans, power)     yes
 [c] Check Patch Levels                 yes
 [e] Check Veritas Patch Levels         yes
 [n] Check Drivers                      yes
 [w] Check Firmware                     yes

 [v] Verbose Mode                       no
 [s] Show Warnings                      yes
 [l] Log To /var/adm/messages           yes
 [o] Show Activity Dots                 no
 [t] Email Results To                   <none>

 [u] Undo, Restore Default Settings
 [q] Quit

Enter Selection:
```

TABLE 4-2 `storstat` Options

Option	Description
`[a] All Checks`	Performs all status checks.
`[d] Check Disks`	Checks status of disks. This option is not applicable to Sun StorEdge T300 disk trays.
`[f] Check Fans`	Checks status of fans. This option is not applicable to Sun StorEdge T300 disk trays.
`[p] Check Power Supplies`	Checks status of power supplies. This option is not applicable to Sun StorEdge T300 disk trays.
`[k*] FRU Checks (disk, fans, power)`	Checks status of Field Replaceable Units (FRUs) including disks, fans, and power supplies. This option is not applicable to Sun StorEdge T300 disk trays.
`[w] Check Firmware`	Checks firmware revisions.
`[m] Check Minimum Configuration`	Checks disk drive placement for minimum configuration requirements. This option is not applicable to Sun StorEdge T300 disk trays.
`[c] Check Patch Levels`	Checks patch revisions.
`[e] Check Veritas Patch Levels`	Checks the Veritas version and patches.
`[v] Verbose Mode`	Displays detailed progress reports.
`[s] Show Warnings`	Displays warning messages.
`[l] Log To /var/adm/messages`	Logs error messages to `/var/adm/messages`.
`[o] Show Activity Dots`	Displays dots during enclosure queries.
`[t] Email Results To`	Posts error or warning messages.
`[u] Undo, Restore Default Settings`	Restores the options to their default selections.
`[q] Quit`	Exits the program.

Revision Checking Examples

FIGURE 4-3 shows an example of revision checking.

```
StorTools Storage Management Version x.x
StorEdge on host hostname
Menu: Main
----------

 [1] Check Revisions
 .
 .
 .
Select an operation to perform: 1

StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Revision Check
--------------------
This check is done against the most recent “StorTools-StorEdge
Software/Firmware/Hardware Revision Matrix” available.
Always run with the latest version of this matrix!


This probe can take 30 seconds per array to complete.

[r] Run With Default Options
[s] Select Options
[q] Quit

Enter Choice [<r>, s, q]: r
Please wait for system probe...
ERROR : ses driver not configured
ERROR : ifp driver not configured
No A5K Series enclosures were found.
Please wait for system probe...
ERROR : Incorrect T300 fw : c1t1d0 : T300 : has 0091 : needs 0092
ERROR : Incorrect T300 fw : c2t1d0 : T300 : has 0091 : needs 0092
storstat result (Rev. 1.22 10/01/1999) : FAIL

Press <return> to continue ...
```

FIGURE 4-3 Revision Checking Example

CHAPTER 5

Creating a Configuration Snapshot

Use selection 2 (`Create Configuration Snapshot File`) on the `stormenu` Main Menu to create a *snapshot* of the storage configuration. The configuration information is put into a *golden* or master document.

The Configuration Snapshot is used for fast configuration queries or as a reference point for checking storage status, enabling both error detection and configuration control. The configuration snapshot is also required for detailed message analysis by the `mess_sum` and `mess_alert` programs. `mess_alert` is used for remote monitoring of the storage.

It is important that this file be kept current. Re-create the snapshot after any storage related hardware or software change. Failure to do so causes the `Check Current Status` option to fail.

Note – The StorTools diagnostic package expects the software and firmware to be at certain revision levels to run the tools. Always use the `Check Revisions` selection and ensure that the system is up to the minimum revision requirements before using any of the other Main Menu selections.

Verify that the online component information displayed is accurate before creating the Configuration Snapshot file.

The golden snapshot file name has an attached date and timestamp. The StorTools diagnostic package uses the most current file.

Configuration Snapshot Example

FIGURE 5-1 shows an example of creating a Configuration Snapshot file for a Sun StorEdge A5*x*00 array SBus system.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Main
----------
[1] Check Revisions
[2] Create Configuration Snapshot File
 . . .
Select an operation to perform: 2

This command will examine the live system and create or overwrite the
Configuration Snapshot File. This file is used as the baseline storage
configuration for use with Display Configuration and Check Current
Status commands.

All storage and fc-al loops should be online before creating the
Configuration Snapshot File.
Would you like to see a storage summary now?  [<y>, n]: y
Live: probing system... (please allow 30 seconds for each Enclosure)
(Online Components Only)

socal0    sf1      /devices/sbus@3,0/SUNW,socal@d,10000/sf@1,0:devctl
    Port 1  Controller c2  0 disks(s)  0 A5K enclosure(s)  1 T300(s)  2 LUN(s)
         T300 c2t1: 1 Primary LUN(s)     1 Alternate LUN(s)

socal1    sf3      /devices/sbus@3,0/SUNW,socal@0,0/sf@1,0:devctl
    Port 1  Controller c11  0 disks(s)  0 A5K enclosure(s)  1 T300(s)  2 LUN(s)
         T300 c11t1: 1 Primary LUN(s)     1 Alternate LUN(s)

socal2    sf5      /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0:devctl
    Port 1  Controller c3  22 disks(s)  1 A5K enclosure(s)  0 T300(s)  0 LUN(s)
         A5K Enclosure: b                22 disk(s)

qlc0      fp0      /devices/pci@e,2000/pci@2/SUNW,qlc@4/fp@0,0:devctl
    Port 0  Controller c10  0 disks(s)  0 A5K enclosure(s)  1 T300(s)  2 LUN(s)
         T300 c10t2: 1 Primary LUN(s)     1 Alternate LUN(s)

(Continued on Following Page)
```

FIGURE 5-1 Creating a Configuration Snapshot File

```
qlc1      fp1      /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0:devctl
    Port 0  Controller c5  21 disks(s)  1 A5K enclosure(s)  0 T300(s)  0 LUN(s)
         A5K Enclosure: b                22 disk(s)

ifp0      ifp0     /devices/pci@f,2000/SUNW,ifp@2:devctl
    Port 0  Controller c6  22 disks(s)  1 A5K enclosure(s)  0 T300(s)  0 LUN(s)
         A5K Enclosure: e                22 disk(s)

Is this configuration correct?  [<y = create snapshot>, n]: y
Creating Configuration Snapshot File
Golden Snapshot: /var/opt/STORtools/logs/Golden_Snapshot_20000320_1216
Press ENTER to continue:
```

Note – The golden snapshot has a dated timestamp attached to the file name. The StorTools diagnostic package uses the most current file.

CHAPTER 6

Displaying the Configuration

Use selection 3 (`Display Configuration`) on the `stormenu` Main Menu to display the Sun StorEdge A5x00 arrays and Sun StorEdge T300 disk tray storage configuration. You can display configuration information by specifying `sf`, `socal`, enclosure, or disks.

This chapter contains the following topics:

Display Configuration Summary Menu

Once selected, `Display Configuration` prompts you to specify displaying the configuration information from either the live system or the Configuration Snapshot. Displaying from the Snapshot enables fast nondisruptive storage configuration queries. Probing the live configuration may disrupt disk access causing soft SCSI retries if loop hardware errors are encountered. The program then displays a Display Configuration Summary Menu as shown in FIGURE 6-1.

.

```
StorTools Storage Management  Version x.x
StorTools on host hostname
Menu: Display Configuration
--------------------------
Configuration information can be displayed from either the
live system or the Configuration Snapshot File.  Displaying from
the file is recommended as probing the live config can take
about 30 seconds per array and may be disruptive.
Display live config: [y, <n>]: y
Live: probing system... (please allow 30 seconds for each
Enclosure)



StorTools Storage Management    Version  x.x
StorTools on host hostname
Menu: Display Configuration Summary
-----------------------------------

View more details by selecting a component number [x] or quit:
 [1] Display Configuration Summary
 [2] Display Loop Map Summary
 [3] Host Adaptor / socal#
 [4] Port #
 [5] Enclosure
 [6] LUN/Disk Drive List
 [7] LUN/Disk Inquiry
 [8] Dump Raw Data
 [9] Cluster Check
 [s] Save Configuration

 [q] Quit

Enter Choice:
```

FIGURE 6-1 Display Configuration Summary Menu

Note – If you are not sure that the Configuration Snapshot file is up to date or that the data shown with the `Display Configuration Summary` is valid, use selection 2 (`Create Configuration Snapshot File`) on the `stormenu` Main Menu to create a new file. You can also type `y` to `Display live config`, and then type `y` to save the new configuration snapshot.

The Display Configuration Summary Menu selections are listed in TABLE 6-1.

TABLE 6-1 Display Configuration Summary Menu Selections

Selection	Description
[1] Display Configuration Summary	Displays a summary of the online storage configuration.
[2] Display Array Map	Displays a map of the storage arrays.
[3] Host Adaptor / socal#	Displays configuration information for the specified socal number. This selection is not applicable to Sun StorEdge T300 disk trays or PCI Bus systems.
[4] Port #	Displays configuration information for the specified port number.
[5] Enclosure	Displays configuration information for the specified enclosure. This selection is not applicable to Sun StorEdge T300 disk trays or PCI Bus systems.
[6] LUN/Disk Drive List	Lists drives from /dev/dsk and uses data from /e/etc/path_to_inst to get sd and ssd information.
[7] LUN/Disk Inquiry	Executes SCSI Inquiry command to disks found in /dev/rdsk.
[8] Dump Raw Data	Displays detailed information about all the FC-AL devices.
[9] Cluster Check	Checks if the host system is in a cluster.
[s] Save Configuration	Creates a new configuration snapshot. This selection is only available when live data is requested.
[q] Quit	Exits the menu.

Configuration Summary Displays

Use selection 1 (`Display Configuration Summary`) on the Display Configuration Menu to display a summary of the storage configuration. FIGURE 6-2 shows an example of a Configuration Summary display for a Sun StorEdge A5*x*00 array SBus system and FIGURE 6-3 shows an example for a Sun StorEdge T300 disk tray PCI Bus system.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Display Configuration, Config Summary
-----------------------------------------
View more details by selecting a component number [x] or quit:
 [1] Display Configuration Summary
  . . .
 [q] Quit

Enter Choice:  1

StorTools Storage Management    Version    x.x
StorEdge on host hostname
Menu: Display Configuration, Config Summary
-----------------------------------------

(Online Components Only)

socal0    sf1      /devices/sbus@3,0/SUNW,socal@d,10000/sf@1,0:devctl
    Port 1  Controller c2  0 disks(s)  0 A5K enclosure(s)  1 T300(s)  2 LUN(s)
         T300 c2t1: 1 Primary LUN(s)     1 Alternate LUN(s)

socal1    sf3      /devices/sbus@3,0/SUNW,socal@0,0/sf@1,0:devctl
    Port 1  Controller c11  0 disks(s)  0 A5K enclosure(s)  1 T300(s)  2 LUN(s)
         T300 c11t1: 1 Primary LUN(s)     1 Alternate LUN(s)

socal2    sf5      /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0:devctl
    Port 1  Controller c3  22 disks(s)  1 A5K enclosure(s)  0 T300(s)  0 LUN(s)
         A5K Enclosure: b                22 disk(s)

qlc0      fp0      /devices/pci@e,2000/pci@2/SUNW,qlc@4/fp@0,0:devctl
    Port 0  Controller c10  0 disks(s)  0 A5K enclosure(s)  1 T300(s)  2 LUN(s)
         T300 c10t2: 1 Primary LUN(s)     1 Alternate LUN(s)

qlc1      fp1      /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0:devctl
    Port 0  Controller c5  21 disks(s)  1 A5K enclosure(s)  0 T300(s)  0 LUN(s)
         A5K Enclosure: b                22 disk(s)

ifp0      ifp0     /devices/pci@f,2000/SUNW,ifp@2:devctl
    Port 0  Controller c6  22 disks(s)  1 A5K enclosure(s)  0 T300(s)  0 LUN(s)
         A5K Enclosure: e                22 disk(s)

Press <return> to continue...
```

FIGURE 6-2 Configuration Summary Display (Sun StorEdge A5*x*00 Array Example

Array Map Displays

Use selection 2 (`Display Array Map`) on the Display Configuration Menu to display a map of the storage array. FIGURE 6-3 shows an example of the display. Notice the hardware totals at the bottom of the Array Map information.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Display Configuration Summary
-----------------------------------

View more details by selecting a component number [x] or quit:
 [1] Display Configuration Summary
 [2] Display Array Map
  .
  .
  .
Enter Choice: 2

StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Display Configuration, Array Map
--------------------------------------


socal2   Port 1    sf5      c1      1 enclosure(s)  10 Drives     /devices/sbus@2,0
/SUNW,socal@1,0:1

ENCLOSURES:

sf5: d

DRIVE MAP:

sf5     d      Loop A

c1t96,20000020370d9463     c1t112,20000020370d8711
c1t97,20000020370bd908     c1t113,20000020370d9162
c1t98,20000020370d87ff     c1t114,20000020370c2060
c1t99,20000020370bdc39     c1t115,20000020370d905b
c1t100,20000020370bd91c    c1t116,20000020370be164
.
.
.
Totals: 1 socal(s), 2 sf(s), 1 enclosure(s), 10 Drives
```

FIGURE 6-3 Array Map Display

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Display Configuration Summary
-----------------------------------
View more details by selecting a component number [x] or quit:
  .
 [2] Display Loop Map Summary
  .
  .
  .

 [q] Quit

Enter Choice: 2

StorTools Storage Management    Version  x.x
StorEdge on host hostname
Menu: Display Configuration, Array Map
---------------------------------------

LOOP SUMMARY:

socal0    Port 1  sf1    c2    0 enclosure(s)      0 disks     1 T300(s)    2 LU
N(s)       /devices/sbus@3,0/SUNW,socal@d,10000/sf@1,0:devctl
socal1    Port 1  sf3    c11   0 enclosure(s)      0 disks     1 T300(s)    2 LU
N(s)       /devices/sbus@3,0/SUNW,socal@0,0/sf@1,0:devctl
socal2    Port 1  sf5    c3    1 enclosure(s)      22 disks    0 T300(s)    0 LU
N(s)       /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0:devctl
qlc0      Port 0  fp0    c10   0 enclosure(s)      0 disks     1 T300(s)    2 LU
N(s)       /devices/pci@e,2000/pci@2/SUNW,qlc@4/fp@0,0:devctl
qlc1      Port 0  fp1    c5    1 enclosure(s)      21 disks    0 T300(s)    0 LU
N(s)       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0:devctl
ifp0      Port 0  ifp0   c6    1 enclosure(s)      22 disks    0 T300(s)    0 LU
N(s)       /devices/pci@f,2000/SUNW,ifp@2:devctl

ENCLOSURES:

fp1: b
ifp0: e
sf5: b

DRIVE MAP:

fp1     b       Loop B
c5t0,2000002037450651      c5t16,20000020373cf90c
c5t1,20000020374504e5      c5t17,20000020373cfc86
c5t2,20000020373cceca      c5t18,20000020373cfd07
c5t3,20000020373c9ee1 c5t19,2000002037450cfc
(Continued on following page)
```

FIGURE 6-4 Array Map Display (PCI Bus)

```
c5t4,20000020373cdcb3      c5t20,2000002037450616
-                          c5t21,20000020373cf77f
c5t6,20000020373cb4e4      c5t22,20000020373cfd01
c5t7,20000020373c978e      c5t23,20000020373cf783
c5t8,20000020373c7c53      c5t24,2000002037450431
c5t9,20000020373ccdca      c5t25,20000020374504c7
c5t10,20000020373ccfa8     c5t26,20000020373cfcba

ifp0    e       Loop A
c6t64,200000203733b1a5     c6t80,200000203733b360
c6t65,200000203733b4e7     c6t81,200000203733aff4
c6t66,200000203733b2ed     c6t82,200000203733b3a0
c6t67,200000203733b3be     c6t83,200000203733afdb
c6t68,200000203733b3ae     c6t84,200000203733abf7
c6t69,200000203733b333     c6t85,200000203733b0fd
c6t70,200000203733b316     c6t86,200000203733abea
c6t71,200000203733b351     c6t87,200000203733ae3d
c6t72,200000203733b3ad     c6t88,200000203733b235
c6t73,200000203733b3c3     c6t89,200000203733ae4b
c6t74,200000203733b345     c6t90,200000203733ab77

sf5     b       Loop A
c3t0,2000002037450651      c3t16,20000020373cf90c
c3t1,20000020374504e5      c3t17,20000020373cfc86
c3t2,20000020373cceca      c3t18,20000020373cfd07
c3t3,20000020373c9ee1      c3t19,2000002037450cfc
c3t4,20000020373cdcb3      c3t20,2000002037450616
c3t5,20000020373cdcbc      c3t21,20000020373cf77f
c3t6,20000020373cb4e4      c3t22,20000020373cfd01
c3t7,20000020373c978e      c3t23,20000020373cf783
c3t8,20000020373c7c53      c3t24,2000002037450431
c3t9,20000020373ccdca      c3t25,20000020374504c7
c3t10,20000020373ccfa8     c3t26,20000020373cfcba
LUN MAP:
T300      c2t1        2 LUN(s)
Primary               Alternate
c2t1d0                c2t1d1

T300      c11t1       2 LUN(s)
Primary               Alternate
Totals: 6 ports(s), 12 sf(s), 2 enclosure(s), 65 disk(s), 3 T300(s), 6 LUN(s)

Press <return> to continue...
```

Host Adaptor Configuration Display

Use selection 3 (`Host Adaptor / socal#`) on the Display Configuration Menu to display configuration information for a specific host adapter. An example is shown in FIGURE 6-5.

```
StorTools Storage Management    Version  x.x
StorEdge on host hostname
Menu: Display Configuration Summary
-----------------------------------
View more details by selecting a component number [x] or quit:

 [3] Host Adaptor / socal#
[q] Quit
Enter Choice: 3

StorTools Storage Management    Version    STORtools 3.3 Alpha 3.0 03/16/00
StorEdge on host diag250.Central.Sun.COM.
Menu: Display Configuration, Host Adaptors
-----------------------------------------

View more details by selecting a number or [q] to quit
 [1]    ifp0
 [2]    qlc0
 [3]    qlc1
 [4]    socal0
 [5]    socal1
 [6]    socal2
 [q]    Quit
Enter Choice: 2
Name               Node WWN         Port WWN         Logical Path  ALPA HAdr ID
Typ DrInst          Physical Path

Enclosures Connected to this loop:

HA/s
qlc0    port1   fp0   /devices/pci@e,2000/pci@2/SUNW,qlc@4/fp@0,0:devctl

Name              Enclosure      WWN              ALPA   ID   ses     Physical
Path

(Continued on Following Page)
```

FIGURE 6-5 Host Adaptor Configuration Display

```
Name              Disks          WWN               ALPA   ID   ssd     Physical
Path

T300,0           c10t2d0       50020f2000000134  e4     2    ssd322  /devices/
pci@e,2000/pci@2/SUNW,qlc@4/fp@0,0/ssd@w50020f2300000134,0:a,raw
T300,1           c10t2d1       50020f2000000134  e4     2    ssd322  /devices/
pci@e,2000/pci@2/SUNW,qlc@4/fp@0,0/ssd@w50020f2300000134,1:a,raw

Press <return> to continue...
Name              Enclosure      WWN                ALPA  ID  ses    Physical
Path

d,A1              ses1           508002000000fe70   1     7d  ses54  /devices/
sbus@2,0/SUNW,socal@1,0/sf@1,0/ses@w508002000000fe72,0:0
d,A0              ses0           508002000000fe70   29    6d  ses53  /devices/
sbus@2,0/SUNW,socal@1,0/sf@1,0/ses@w508002000000fe71,0:0
Name              Disks          WWN                ALPA  ID  ssd    Physical
Path

d,r0              c1t112d0       20000020370d8711   25    70  ssd85  /devices/
sbus@2,0/SUNW,socal@1,0/sf@1,0/ssd@w21000020370d8711,0:a,raw
d,r1              c1t113d0       20000020370d9162   23    71  ssd83  /devices/
sbus@2,0/SUNW,socal@1,0/sf@1,0/ssd@w21000020370d9162,0:a,raw
d,r2              c1t114d0       20000020370c2060   1f    72  ssd76  /devices/
sbus@2,0/SUNW,socal@1,0/sf@1,0/ssd@w21000020370c2060,0:a,raw
d,r3              c1t115d0       20000020370d905b   1e    73  ssd80  /devices/
sbus@2,0/SUNW,socal@1,0/sf@1,0/ssd@w21000020370d905b,0:a,raw
d,r4              c1t116d0       20000020370be164   1d    74  ssd78  /devices/
sbus@2,0/SUNW,socal@1,0/sf@1,0/ssd@w21000020370be164,0:a,raw
d,f0              c1t96d0        20000020370d9463   3a    60  ssd84  /devices/
sbus@2,0/SUNW,socal@1,0/sf@1,0/ssd@w21000020370d9463,0:a,raw
d,f1              c1t97d0        20000020370bd908   39    61  ssd77  /devices/
sbus@2,0/SUNW,socal@1,0/sf@1,0/ssd@w21000020370bd908,0:a,raw
d,f2              c1t98d0        20000020370d87ff   36    62  ssd79  /devices/
sbus@2,0/SUNW,socal@1,0/sf@1,0/ssd@w21000020370d87ff,0:a,raw
d,f3              c1t99d0        20000020370bdc39   35    63  ssd82  /devices/
sbus@2,0/SUNW,socal@1,0/sf@1,0/ssd@w21000020370bdc39,0:a,raw
d,f4              c1t100d0       20000020370bd91c   34    64  ssd81  /devices/
sbus@2,0/SUNW,socal@1,0/sf@1,0/ssd@w21000020370bd91c,0:a,raw

=========== End of Loop: socal2 ===========
```

(Continued on Following Page)

```
##### Program Finished #####

StorTools Storage Management  Version x.x
SBUS A5K Series Storage on host hostname
Menu: Display Configuration, Host Adaptors
-----------------------------------------

View more details by selecting a number or [q] to quit
 [1]    socal2
 [q]    Quit

Enter Choice:
```

Port Display

Use selection 4 (Port #) on the Display Configuration Menu to display configuration information for a specific port. An example is shown in FIGURE 6-6.

```
StorTools Storage Management    Version  x.x
StorEdge on host hostname
Menu: Display Configuration Summary
-----------------------------------

View more details by selecting a component number [x] or quit:

 [4] Port #

 [q] Quit

Enter Choice: 4

StorTools Storage Management    Version  x.x
StorEdge on host hostname
Menu: Display Configuration, Port(s)
---------------------------------------

      sf1               Port             c2        2 Drive(s)
      sf3               Port             c11       2 Drive(s)
      sf5               Port             c3        22 Drive(s)
      fp0               Port             c10       2 Drive(s)
      fp1               Port             c5        22 Drive(s)
      ifp0              Port             c6        22 Drive(s)

View more details by selecting a number or [q] to quit
 [1]    sf1
 [2]    sf3
 [3]    sf5
 [4]    fp0
 [5]    fp1
 [6]    ifp0
 [q]    Quit
Enter Choice: 1
Name              Node WWN         Port WWN         Logical Path  ALPA HAdr ID
Typ DrInst          Physical Path
(Continued on Following Page)
```

FIGURE 6-6 Port Display

```
Enclosures Connected to this loop:

HA/s
socal0  port1   sf1   /devices/sbus@3,0/SUNW,socal@d,10000/sf@1,0:devctl

Name              Enclosure      WWN              ALPA   ID   ses     Physical
Path

Name              Disks          WWN              ALPA   ID   ssd     Physical
Path

T300,0            c2t1d0         50020f200000017a  e8     1    ssd359  /devices/
sbus@3,0/SUNW,socal@d,10000/sf@1,0/ssd@w50020f230000017a,0:a,raw
T300,1            c2t1d1         50020f200000017a  e8     1    ssd359  /devices/
sbus@3,0/SUNW,socal@d,10000/sf@1,0/ssd@w50020f230000017a,1:a,raw

Press <return> to continue...
.....
Enter Choice: 5
Name               Node WWN         Port WWN         Logical Path  ALPA HAdr ID
Typ DrInst          Physical Path

Enclosures Connected to this loop:
        b        Loop B

HA/s
qlc1    port1   fp1   /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0:devctl

Name              Enclosure      WWN              ALPA   ID   ses     Physical
Path

b,B0              ses28          5080020000083f30  d2     d    ses104  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ses@w5080020000083f33,0:0
b,B1              ses29          5080020000083f30  b5     1d   ses105  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ses@w5080020000083f34,0:0

Name              Disks          WWN              ALPA   ID   ssd     Physical
Path

b,f8              c5t8d0         20000020373c7c53  d9     8    ssd382  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373c7c53,0:c,raw
b,f4              c5t4d0         20000020373cdcb3  e1     4    ssd394  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373cdcb3,0:c,raw

(Continued on Following Page)
```

```
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w2200002037450cfc,0:c,raw
b,f1              c5t1d0         20000020374504e5  e8     1    ssd385  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w20000020374504e5,0:c,raw
b,r9              c5t25d0        20000020374504c7  bc     19   ssd383  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w20000020374504c7,0:c,raw
b,r10             c5t26d0        20000020373cfcba  ba     1a   ssd402  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w20000020373cfcba,0:c,raw
b,r5              c5t21d0        20000020373cf77f  c7     15   ssd386  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w20000020373cf77f,0:c,raw
b,f10             c5t10d0        20000020373ccfa8  d5     a    ssd387  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w20000020373ccfa8,0:c,raw
b,f9              c5t9d0         20000020373ccdca  d6     9    ssd396  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w20000020373ccdca,0:c,raw
b,f6              c5t6d0         20000020373cb4e4  dc     6    ssd399  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w20000020373cb4e4,0:c,raw
*Disk*            *              20000020373cdcbc  e0     5    ssd398  /pci@e,20
00/pci@2/SUNW,qlc@5/fp@0,0/ssd@w20000020373cdcbc,0:c,raw
b,f2              c5t2d0         20000020373cceca  e4     2    ssd397  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w20000020373cceca,0:c,raw
b,r7              c5t23d0        20000020373cf783  c5     17   ssd388  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w20000020373cf783,0:c,raw
b,r8              c5t24d0        2000002037450431  c3     18   ssd403  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w2000002037450431,0:c,raw
b,r6              c5t22d0        20000020373cfd01  c6     16   ssd389  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w20000020373cfd01,0:c,raw
b,f3              c5t3d0         20000020373c9ee1  e2     3    ssd390  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w20000020373c9ee1,0:c,raw
b,f0              c5t0d0         2000002037450651  ef     0    ssd384  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w2000002037450651,0:c,raw
b,r1              c5t17d0        20000020373cfc86  cc     11   ssd391  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w20000020373cfc86,0:c,raw
b,r2              c5t18d0        20000020373cfd07  cb     12   ssd392  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w20000020373cfd07,0:c,raw
b,r4              c5t20d0        2000002037450616  c9     14   ssd401  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w2000002037450616,0:c,raw
b,r0              c5t16d0        20000020373cf90c  cd     10   ssd393  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w20000020373cf90c,0:c,raw
b,f7              c5t7d0         20000020373c978e  da     7    ssd400  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w20000020373c978e,0:c,raw

Press <return> to continue...
```

Enclosure Display

Use selection 5 (A5000 Enclosure) on the Display Configuration Menu to display configuration information for a specific enclosure. This option is not applicable to Sun StorEdge T300 disk tray. An example is shown in FIGURE 6-7.

```
StorTools Storage Management    Version  x.x
StorEdge on host hostname
Menu: Display Configuration Summary
-----------------------------------

View more details by selecting a component number [x] or quit:

 [5] Enclosure
  . . .
 [q] Quit

Enter Choice: 5

StorTools Storage Management    Version    STORtools 3.3 Alpha 3.0 03/16/00
StorEdge on host diag250.Central.Sun.COM.
Menu: Display Configuration, Enclosure(s)
-----------------------------------------------

View more details by selecting a number or [q] to quit
 [1]    b
 [2]    e
 [q]    Quit

Enter Choice: 1

=============  Enclosure: b ==============

 --- Loop A ---
HA/s
socal2  port1   sf5   /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0:devctlLoop A

Name              Enclosure      WWN              ALPA   ID   ses     Physical
Path

(Continued on Following Page)
```

FIGURE 6-7 Enclosure Display

```
b,A0              ses26          5080020000083f30  d2     d    ses102  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ses@w5080020000083f31,0:0
b,A1              ses27          5080020000083f30  b5     1d   ses103  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ses@w5080020000083f32,0:0

Name              Disks          WWN               ALPA   ID   ssd     Physical
Path

b,f0              c3t0d0         2000002037450651  ef     0    ssd376  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w2000002037450651,0:c,raw
b,f1              c3t1d0         20000020374504e5  e8     1    ssd363  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w20000020374504e5,0:c,raw
b,f2              c3t2d0         20000020373cceca  e4     2    ssd371  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w20000020373cceca,0:c,raw
b,f3              c3t3d0         20000020373c9ee1  e2     3    ssd375  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w20000020373c9ee1,0:c,raw
b,f4              c3t4d0         20000020373cdcb3  e1     4    ssd361  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w20000020373cdcb3,0:c,raw
b,f5              c3t5d0         20000020373cdcbc  e0     5    ssd370  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w20000020373cdcbc,0:c,raw
b,f6              c3t6d0         20000020373cb4e4  dc     6    ssd369  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w20000020373cb4e4,0:c,raw
b,f7              c3t7d0         20000020373c978e  da     7    ssd381  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w20000020373c978e,0:c,raw
b,f8              c3t8d0         20000020373c7c53  d9     8    ssd360  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w20000020373c7c53,0:c,raw
b,f9              c3t9d0         20000020373ccdca  d6     9    ssd368  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w20000020373ccdca,0:c,raw
b,f10             c3t10d0        20000020373ccfa8  d5     a    ssd367  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w20000020373ccfa8,0:c,raw
b,r0              c3t16d0        20000020373cf90c  cd     10   ssd380  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w20000020373cf90c,0:c,raw
b,r1              c3t17d0        20000020373cfc86  cc     11   ssd377  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w20000020373cfc86,0:c,raw
b,r2              c3t18d0        20000020373cfd07  cb     12   ssd378  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w20000020373cfd07,0:c,raw
b,r3              c3t19d0        2000002037450cfc  ca     13   ssd362  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w2000002037450cfc,0:c,raw
b,r4              c3t20d0        2000002037450616  c9     14   ssd379  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w2000002037450616,0:c,raw
b,r5              c3t21d0        20000020373cf77f  c7     15   ssd366  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w20000020373cf77f,0:c,raw
b,r6              c3t22d0        20000020373cfd01  c6     16   ssd374  /devices/
```

(Continued on Following Page)

```
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373cfd01,0:c,raw
b,r7              c3t23d0        20000020373cf783  c5     17   ssd372  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373cf783,0:c,raw
b,r8              c3t24d0        2000002037450431  c3     18   ssd373  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w2100002037450431,0:c,raw
b,r9              c3t25d0        20000020374504c7  bc     19   ssd364  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020374504c7,0:c,raw
b,r10             c3t26d0        20000020373cfcba  ba     1a   ssd365  /devices/
sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373cfcba,0:c,raw

 --- Loop B ---
HA/s
qlc1    port1   fp1   /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0:devctlLoop B

Name              Enclosure      WWN               ALPA   ID   ses     Physical
Path

b,B0              ses28          5080020000083f30  d2     d    ses104  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ses@w5080020000083f33,0:0
b,B1              ses29          5080020000083f30  b5     1d   ses105  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ses@w5080020000083f34,0:0

Name              Disks          WWN               ALPA   ID   ssd     Physical
Path

b,f8              c5t8d0         20000020373c7c53  d9     8    ssd382  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373c7c53,0:c,raw
b,f4              c5t4d0         20000020373cdcb3  e1     4    ssd394  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373cdcb3,0:c,raw
b,r3              c5t19d0        2000002037450cfc  ca     13   ssd395  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w2000002037450cfc,0:c,raw
b,f1              c5t1d0         20000020374504e5  e8     1    ssd385  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020374504e5,0:c,raw
b,r9              c5t25d0        20000020374504c7  bc     19   ssd383  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020374504c7,0:c,raw
b,r10             c5t26d0        20000020373cfcba  ba     1a   ssd402  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373cfcba,0:c,raw
b,r5              c5t21d0        20000020373cf77f  c7     15   ssd386  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373cf77f,0:c,raw
b,f10             c5t10d0        20000020373ccfa8  d5     a    ssd387  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373ccfa8,0:c,raw

(Continued on Following Page)
```

```
b,f9              c5t9d0         20000020373ccdca  d6     9    ssd396  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373ccdca,0:c,raw
b,f6              c5t6d0         20000020373cb4e4  dc     6    ssd399  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373cb4e4,0:c,raw
b,f2              c5t2d0         20000020373cceca  e4     2    ssd397  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373cceca,0:c,raw
b,r7              c5t23d0        20000020373cf783  c5     17   ssd388  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373cf783,0:c,raw
b,r8              c5t24d0        2000002037450431  c3     18   ssd403  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w2200002037450431,0:c,raw
b,r6              c5t22d0        20000020373cfd01  c6     16   ssd389  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373cfd01,0:c,raw
b,f3              c5t3d0         20000020373c9ee1  e2     3    ssd390  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373c9ee1,0:c,raw
b,f0              c5t0d0         2000002037450651  ef     0    ssd384  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w2200002037450651,0:c,raw
b,r1              c5t17d0        20000020373cfc86  cc     11   ssd391  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373cfc86,0:c,raw
b,r2              c5t18d0        20000020373cfd07  cb     12   ssd392  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373cfd07,0:c,raw
b,r4              c5t20d0        2000002037450616  c9     14   ssd401  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w2200002037450616,0:c,raw
b,r0              c5t16d0        20000020373cf90c  cd     10   ssd393  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373cf90c,0:c,raw
b,f7              c5t7d0         20000020373c978e  da     7    ssd400  /devices/
pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373c978e,0:c,raw

=========== End of Enclosure: b ==========

Press <return> to continue...
```

LUN / Disk Drive List Display

Use selection 6 (`LUN/Disk Drive List`) on the Display Configuration Menu to display a list of disk drives. The information is displayed as shown in FIGURE 6-8.

```
StorTools Storage Management    Version  x.x
StorEdge on host hostname
Menu: Display Configuration Summary
---------------------------------

View more details by selecting a component number [x] or quit:

 [6] LUN/Disk Drive List

 [q] Quit

Enter Choice: 6

StorTools Storage Management    Version  x.x
StorEdge on host hostname
Menu: Display Configuration, LUN/Disk Drive List
-----------------------------------------------

c0t10d0  sd39     /sbus@3,0/SUNW,fas@3,8800000/sd@a,0
c0t11d0  sd40     /sbus@3,0/SUNW,fas@3,8800000/sd@b,0
c0t6d0   sd36     /sbus@3,0/SUNW,fas@3,8800000/sd@6,0
c10t2d0  ssd322   /pci@e,2000/pci@2/SUNW,qlc@4/fp@0,0/ssd@w50020f2300000134,0
c10t2d1  ssd321   /pci@e,2000/pci@2/SUNW,qlc@4/fp@0,0/ssd@w50020f2300000134,1
c11t1d0  ssd449   /sbus@3,0/SUNW,socal@0,0/sf@1,0/ssd@w50020f2300000108,0
c11t1d1  ssd448   /sbus@3,0/SUNW,socal@0,0/sf@1,0/ssd@w50020f2300000108,1
c12t1d0  ssd173   /sbus@3,0/SUNW,usoc@0,0/fp@1,0/ssd@w50020f2300000108,0
c12t1d1  ssd172   /sbus@3,0/SUNW,usoc@0,0/fp@1,0/ssd@w50020f2300000108,1
c1t0d0   sd0      /sbus@a,0/QLGC,isp@1,10000/sd@0,0
c1t8d0   sd7      /sbus@a,0/QLGC,isp@1,10000/sd@8,0
c2t1d0   ssd359   /sbus@3,0/SUNW,socal@d,10000/sf@1,0/ssd@w50020f230000017a,0
c2t1d1   ssd358   /sbus@3,0/SUNW,socal@d,10000/sf@1,0/ssd@w50020f230000017a,1
c3t0d0   ssd376   /sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w2100002037450651,0
c3t10d0  ssd367   /sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373ccfa8,0
c3t16d0  ssd380   /sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373cf90c,0
c3t17d0  ssd377   /sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373cfc86,0

(Continued on Following Page)
```

FIGURE 6-8 LUN / Disk Drive List Display

```
. . .
c4t210000203733ABEAd0 ssd87   /pci@e,2000/pci@2/scsi@5/fp@0,0/ssd@w210000203733
abea,0
c4t210000203733ABF7d0 ssd91   /pci@e,2000/pci@2/scsi@5/fp@0,0/ssd@w210000203733
abf7,0
c4t210000203733AE3Dd0 ssd79   /pci@e,2000/pci@2/scsi@5/fp@0,0/ssd@w210000203733
ae3d,0
c4t210000203733AE4Bd0 ssd83   /pci@e,2000/pci@2/scsi@5/fp@0,0/ssd@w210000203733
ae4b,0
c4t210000203733AFDBd0 ssd85   /pci@e,2000/pci@2/scsi@5/fp@0,0/ssd@w210000203733
afdb,0
. . .
c5t0d0   ssd384   /pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w2200002037450651,0
c5t10d0  ssd387   /pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373ccfa8,0
c5t16d0  ssd393   /pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373cf90c,0
c5t17d0  ssd391   /pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373cfc86,0
. . .
c6t100d0 ssd218   /pci@f,2000/SUNW,ifp@2/ssd@w210000203733af67,0
c6t101d0 ssd227   /pci@f,2000/SUNW,ifp@2/ssd@w210000203733b0b1,0
. . .
c7t100d0 ssd433   /pci@9,2000/pci@2/SUNW,qlc@4/fp@0,0/ssd@w220000203733af67,0
c7t101d0 ssd411   /pci@9,2000/pci@2/SUNW,qlc@4/fp@0,0/ssd@w220000203733b0b1,0
c7t102d0 ssd409   /pci@9,2000/pci@2/SUNW,qlc@4/fp@0,0/ssd@w220000203733aa36,0
. . .
c8t1d0   ssd324   /sbus@3,0/SUNW,socal@d,10000/sf@0,0/ssd@w50020f230000017a,0
c8t1d1   ssd323   /sbus@3,0/SUNW,socal@d,10000/sf@0,0/ssd@w50020f230000017a,1

Press <return> to continue...
```

LUN / Disk Inquiry Display

Use selection 7 (`LUN/Disk Inquiry`) on the Display Configuration Menu to perform a SCSI Inquiry to the disks in `/dev/rdsk` and display the available devices.

```
StorTools Storage Management    Version  x.x
StorEdge on host hostname
Menu: Display Configuration Summary
-----------------------------------

View more details by selecting a component number [x] or quit:

 [7] LUN/Disk Inquiry
 [q] Quit

Enter Choice: 7

StorTools Storage Management    Version    x.x
StorEdge on host hostname
Menu: Display Configuration, LUN/Disk Inquiry
-------------------------------------------

AVAILABLE SCSI DEVICES:

               Vendor          Product         Rev     Serial Number   Dual Pt

 c0t10d0       IBM        DNES30917SUN9.0G     SAD0    99361CD207      primary

 c0t11d0       IBM        DNES30917SUN9.0G     SAD0    99361CE936      primary

 c1t0d0        SEAGATE    ST136403LSUN36G      034A    9935049725      primary

 c1t8d0        SEAGATE    ST136403LSUN36G      034A    9934042817      primary

 c2t1d0        SUN        T300                 0100    0000037810      primary

c2t1d1         SUN        T300                 0100    0000037811      alt

 c3t0d0        SEAGATE    ST39103FCSUN9.0G     034A    9945678425      primary

 c3t1d0        SEAGATE    ST39103FCSUN9.0G     034A    9945675154      primary

 c3t2d0        SEAGATE    ST39103FCSUN9.0G     034A    9944655987      primary

(Continued on Following Page)
```

FIGURE 6-9 LUN / Disk Inquiry Display

Note – The Rev field in FIGURE 6-9 contains the revision level of the disk firmware.

```
c3t3d0          SEAGATE    ST39103FCSUN9.0G     034A    9944645629      primary
c3t4d0          SEAGATE    ST39103FCSUN9.0G     034A    9944663916      primary
c3t5d0          SEAGATE    ST39103FCSUN9.0G     034A    9944663657      primary
c3t6d0          SEAGATE    ST39103FCSUN9.0G     034A    9944650035      primary
c3t7d0          SEAGATE    ST39103FCSUN9.0G     034A    9944640322      primary
c3t8d0          SEAGATE    ST39103FCSUN9.0G     034A    9944620001      primary
c3t9d0          SEAGATE    ST39103FCSUN9.0G     034A    9944656367      primary
c3t10d0         SEAGATE    ST39103FCSUN9.0G     034A    9944656301      primary
c3t16d0         SEAGATE    ST39103FCSUN9.0G     034A    9944672524      primary
c3t17d0         SEAGATE    ST39103FCSUN9.0G     034A    9944674652      primary
c3t18d0         SEAGATE    ST39103FCSUN9.0G     034A    9944675098      primary
c3t19d0         SEAGATE    ST39103FCSUN9.0G     034A    9945680948      primary
c3t20d0         SEAGATE    ST39103FCSUN9.0G     034A    9945678817      primary
c3t21d0         SEAGATE    ST39103FCSUN9.0G     034A    9944673435      primary
c3t22d0         SEAGATE    ST39103FCSUN9.0G     034A    9944674417      primary
c3t23d0         SEAGATE    ST39103FCSUN9.0G     034A    9944673562      primary
c3t24d0         SEAGATE    ST39103FCSUN9.0G     034A    9945672434      primary
c3t25d0         SEAGATE    ST39103FCSUN9.0G     034A    9945679006      primary
c3t26d0         SEAGATE    ST39103FCSUN9.0G     034A    9944675356      primary
c5t0d0          SEAGATE    ST39103FCSUN9.0G     034A    9945678425      primary
c5t1d0          SEAGATE    ST39103FCSUN9.0G     034A    9945675154      primary
```

(Continued on Following Page)

```
c5t1d0          SEAGATE    ST39103FCSUN9.0G     034A    9945675154      primary
c5t2d0          SEAGATE    ST39103FCSUN9.0G     034A    9944655987      primary
c5t3d0          SEAGATE    ST39103FCSUN9.0G     034A    9944645629      primary
c5t4d0          SEAGATE    ST39103FCSUN9.0G     034A    9944663916      primary
c5t6d0          SEAGATE    ST39103FCSUN9.0G     034A    9944650035      primary
c5t7d0          SEAGATE    ST39103FCSUN9.0G     034A    9944640322      primary
c5t8d0          SEAGATE    ST39103FCSUN9.0G     034A    9944620001      primary
c5t9d0          SEAGATE    ST39103FCSUN9.0G     034A    9944656367      primary
c5t10d0         SEAGATE    ST39103FCSUN9.0G     034A    9944656301      primary
c5t16d0         SEAGATE    ST39103FCSUN9.0G     034A    9944672524      primary
c5t17d0         SEAGATE    ST39103FCSUN9.0G     034A    9944674652      primary
c5t18d0         SEAGATE    ST39103FCSUN9.0G     034A    9944675098      primary
c5t19d0         SEAGATE    ST39103FCSUN9.0G     034A    9945680948      primary
c5t20d0         SEAGATE    ST39103FCSUN9.0G     034A    9945678817      primary
c5t21d0         SEAGATE    ST39103FCSUN9.0G     034A    9944673435      primary
c5t22d0         SEAGATE    ST39103FCSUN9.0G     034A    9944674417      primary
c5t23d0         SEAGATE    ST39103FCSUN9.0G     034A    9944673562      primary
c5t24d0         SEAGATE    ST39103FCSUN9.0G     034A    9945672434      primary
c5t25d0         SEAGATE    ST39103FCSUN9.0G     034A    9945679006      primary
c5t26d0         SEAGATE    ST39103FCSUN9.0G     034A    9944675356      primary
c6t64d0         SEAGATE    ST39102FCSUN9.0G     0929    9940226423      primary
```

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```
c6t65d0        SEAGATE    ST39102FCSUN9.0G     0929    9940228610      primary
c6t66d0        SEAGATE    ST39102FCSUN9.0G     0929    9939184000      primary
c6t67d0        SEAGATE    ST39102FCSUN9.0G     0929    9940222413      primary
c6t68d0        SEAGATE    ST39102FCSUN9.0G     0929    9940227496      primary
c6t69d0        SEAGATE    ST39102FCSUN9.0G     0929    9940221035      primary
c6t70d0        SEAGATE    ST39102FCSUN9.0G     0929    9940226546      primary
c6t71d0        SEAGATE    ST39102FCSUN9.0G     0929    9940225057      primary
c6t72d0        SEAGATE    ST39102FCSUN9.0G     0929    9940221613      primary
c6t73d0        SEAGATE    ST39102FCSUN9.0G     0929    9939222669      primary
c6t74d0        SEAGATE    ST39102FCSUN9.0G     0929    9940220647      primary
c6t80d0        SEAGATE    ST39102FCSUN9.0G     0929    9940226068      primary
c6t81d0        SEAGATE    ST39102FCSUN9.0G     0929    9940176969      primary
c6t82d0        SEAGATE    ST39102FCSUN9.0G     0929    9940227658      primary
c6t83d0        SEAGATE    ST39102FCSUN9.0G     0929    9940S41096      primary
c6t84d0        SEAGATE    ST39102FCSUN9.0G     0929    9939221590      primary
c6t85d0        SEAGATE    ST39102FCSUN9.0G     0929    9939225446      primary
c6t86d0        SEAGATE    ST39102FCSUN9.0G     0929    9939225116      primary
c6t87d0        SEAGATE    ST39102FCSUN9.0G     0929    9939225651      primary
c6t88d0        SEAGATE    ST39102FCSUN9.0G     0929    9939221595      primary
c6t89d0        SEAGATE    ST39102FCSUN9.0G     0929    9939225615      primary
c6t90d0        SEAGATE    ST39102FCSUN9.0G     0929    9939221448      primary
```

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```
 c10t2d0        SUN        T300                0100    0000037810      alt

 c10t2d1        SUN        T300                0100    0000037811      primary

 c11t1d0        SUN        T300                0100    0000026410      primary

 c11t1d1        SUN        T300                0100    0000026411      alt

Press <return> to continue...
```

Raw Data Displays

Use selection 8 (Dump Raw Data) on the Display Configuration Summary Menu to display detailed information about all the FC-AL devices. FIGURE 6-10 shows a Raw Data display example.

```
StorTools Storage Management    Version  x.x
StorEdge on host hostname
Menu: Display Configuration Summary
-----------------------------------
View more details by selecting a component number [x] or quit:
  . . .
 [8] Dump Raw Data
  . . .
 [q] Quit

Enter Choice: 8

StorTools Storage Management    Version    x.x
StorEdge on host hostname
Menu: Display Configuration, Dump Raw Data
-----------------------------------------

*HA*              2004080020b43b26 2001080020b43b26 *             1    1    7d
HA  socal0  sf1     /devices/sbus@3,0/SUNW,socal@d,10000/sf@1,0:devctl
T300,0            50020f200000017a 50020f230000017a c2t1d0        e8   e8   1
DD  ssd359  *     /devices/sbus@3,0/SUNW,socal@d,10000/sf@1,0/ssd@w50020f23000
0017a,0:a,raw
T300,1            50020f200000017a 50020f230000017a c2t1d1        e8   e8   1
DD  ssd359  *     /devices/sbus@3,0/SUNW,socal@d,10000/sf@1,0/ssd@w50020f23000
0017a,1:a,raw

*HA*              50200200000bced8 20030200000bced8 *             1    1    7d
HA  socal1  sf3     /devices/sbus@3,0/SUNW,socal@0,0/sf@1,0:devctl
T300,0            50020f2000000108 50020f2300000108 c11t1d0       e8   e8   1
DD  ssd449  *     /devices/sbus@3,0/SUNW,socal@0,0/sf@1,0/ssd@w50020f230000010
8,0:a,raw
T300,1            50020f2000000108 50020f2300000108 c11t1d1       e8   e8   1
DD  ssd449  *     /devices/sbus@3,0/SUNW,socal@0,0/sf@1,0/ssd@w50020f230000010
8,1:a,raw

(Continued on Following Page)
```

FIGURE 6-10 Raw Data Display

```
*HA*               2014080020b43b26 2005080020b43b26 *             1    1    7d
HA  socal2  sf5     /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0:devctl
b,A0               5080020000083f30 5080020000083f31 ses26         d2   d2   d
IB  ses102  *      /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ses@w50800200000
83f31,0:0
b,f0               2000002037450651 2100002037450651 c3t0d0        ef   ef   0
DD  ssd376  *      /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020374
50651,0:c,raw
b,f1               20000020374504e5 21000020374504e5 c3t1d0        e8   e8   1
DD  ssd363  *      /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020374
504e5,0:c,raw
b,f2               20000020373cceca 21000020373cceca c3t2d0        e4   e4   2
DD  ssd371  *      /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373
cceca,0:c,raw
b,f3               20000020373c9ee1 21000020373c9ee1 c3t3d0        e2   e2   3
DD  ssd375  *      /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373
c9ee1,0:c,raw
b,f4               20000020373cdcb3 21000020373cdcb3 c3t4d0        e1   e1   4
DD  ssd361  *      /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373
cdcb3,0:c,raw
b,f5               20000020373cdcbc 21000020373cdcbc c3t5d0        e0   e0   5
DD  ssd370  *      /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373
cdcbc,0:c,raw
b,f6               20000020373cb4e4 21000020373cb4e4 c3t6d0        dc   dc   6
DD  ssd369  *      /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373
cb4e4,0:c,raw
b,f7               20000020373c978e 21000020373c978e c3t7d0        da   da   7
DD  ssd381  *      /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373
c978e,0:c,raw
b,f8               20000020373c7c53 21000020373c7c53 c3t8d0        d9   d9   8
DD  ssd360  *      /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373
c7c53,0:c,raw
b,f9               20000020373ccdca 21000020373ccdca c3t9d0        d6   d6   9
DD  ssd368  *      /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373
ccdca,0:c,raw
b,f10              20000020373ccfa8 21000020373ccfa8 c3t10d0       d5   d5   a
DD  ssd367  *      /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373
ccfa8,0:c,raw
b,A1               5080020000083f30 5080020000083f32 ses27         b5   b5   1d
IB  ses103  *      /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ses@w50800200000
83f32,0:0
b,r0               20000020373cf90c 21000020373cf90c c3t16d0       cd   cd   10
DD  ssd380  *      /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373
```

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```
b,r1                20000020373cfc86 21000020373cfc86 c3t17d0       cc   cc   11
DD  ssd377  *       /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373
cfc86,0:c,raw
b,r2                20000020373cfd07 21000020373cfd07 c3t18d0       cb   cb   12
DD  ssd378  *       /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373
cfd07,0:c,raw
b,r3                2000002037450cfc 2100002037450cfc c3t19d0       ca   ca   13
DD  ssd362  *       /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020374
50cfc,0:c,raw
b,r4                2000002037450616 2100002037450616 c3t20d0       c9   c9   14
DD  ssd379  *       /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020374
50616,0:c,raw
b,r5                20000020373cf77f 21000020373cf77f c3t21d0       c7   c7   15
DD  ssd366  *       /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373
cf77f,0:c,raw
b,r6                20000020373cfd01 21000020373cfd01 c3t22d0       c6   c6   16
DD  ssd374  *       /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373
cfd01,0:c,raw
b,r7                20000020373cf783 21000020373cf783 c3t23d0       c5   c5   17
DD  ssd372  *       /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373
cf783,0:c,raw
b,r8                2000002037450431 2100002037450431 c3t24d0       c3   c3   18
DD  ssd373  *       /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020374
50431,0:c,raw
b,r9                20000020374504c7 21000020374504c7 c3t25d0       bc   bc   19
DD  ssd364  *       /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020374
504c7,0:c,raw
b,r10               20000020373cfcba 21000020373cfcba c3t26d0       ba   ba   1a
DD  ssd365  *       /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0/ssd@w21000020373
cfcba,0:c,raw
b,f8                20000020373c7c53 22000020373c7c53 c5t8d0        d9   d9   8
DD  ssd382  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373
c7c53,0:c,raw
b,f4                20000020373cdcb3 22000020373cdcb3 c5t4d0        e1   e1   4
DD  ssd394  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373
cdcb3,0:c,raw
b,r3                2000002037450cfc 2200002037450cfc c5t19d0       ca   ca   13
DD  ssd395  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020374
50cfc,0:c,raw
b,f1                20000020374504e5 22000020374504e5 c5t1d0        e8   e8   1
DD  ssd385  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020374
504e5,0:c,raw
```

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```
b,r9                20000020374504c7 22000020374504c7 c5t25d0       bc   bc   19
DD  ssd383  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020374
504c7,0:c,raw
b,r10               20000020373cfcba 22000020373cfcba c5t26d0       ba   ba   1a
DD  ssd402  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373
cfcba,0:c,raw
b,r5                20000020373cf77f 22000020373cf77f c5t21d0       c7   c7   15
DD  ssd386  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373
cf77f,0:c,raw
b,f10               20000020373ccfa8 22000020373ccfa8 c5t10d0       d5   d5   a
DD  ssd387  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373
ccfa8,0:c,raw
b,f9                20000020373ccdca 22000020373ccdca c5t9d0        d6   d6   9
DD  ssd396  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373
ccdca,0:c,raw
b,B0                5080020000083f30 5080020000083f33 ses28         d2   d2   d
IB  ses104  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ses@w50800200000
83f33,0:0
b,B1                5080020000083f30 5080020000083f34 ses29         b5   b5   1d
IB  ses105  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ses@w50800200000
83f34,0:0
b,f6                20000020373cb4e4 22000020373cb4e4 c5t6d0        dc   dc   6
DD  ssd399  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373
cb4e4,0:c,raw
*Disk*              20000020373cdcbc 22000020373cdcbc *             e0   e0   5
DD  ssd398  *       /pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373cdcbc,0:
c,raw
b,f2                20000020373cceca 22000020373cceca c5t2d0        e4   e4   2
DD  ssd397  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373
cceca,0:c,raw
b,r7                20000020373cf783 22000020373cf783 c5t23d0       c5   c5   17
DD  ssd388  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373
cf783,0:c,raw
b,r8                2000002037450431 2200002037450431 c5t24d0       c3   c3   18
DD  ssd403  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020374
50431,0:c,raw
b,r6                20000020373cfd01 22000020373cfd01 c5t22d0       c6   c6   16
DD  ssd389  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373
cfd01,0:c,raw
b,f3                20000020373c9ee1 22000020373c9ee1 c5t3d0        e2   e2   3
DD  ssd390  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373
c9ee1,0:c,raw
```

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```
b,f3                20000020373c9ee1 22000020373c9ee1 c5t3d0        e2   e2   3
DD  ssd390  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373
c9ee1,0:c,raw
b,f0                2000002037450651 2200002037450651 c5t0d0        ef   ef   0
DD  ssd384  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020374
50651,0:c,raw
b,r1                20000020373cfc86 22000020373cfc86 c5t17d0       cc   cc   11
DD  ssd391  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373
cfc86,0:c,raw
b,r2                20000020373cfd07 22000020373cfd07 c5t18d0       cb   cb   12
DD  ssd392  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373
cfd07,0:c,raw
b,r4                2000002037450616 2200002037450616 c5t20d0       c9   c9   14
DD  ssd401  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020374
50616,0:c,raw
b,r0                20000020373cf90c 22000020373cf90c c5t16d0       cd   cd   10
DD  ssd393  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373
cf90c,0:c,raw
b,f7                20000020373c978e 22000020373c978e c5t7d0        da   da   7
DD  ssd400  *       /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w22000020373
c978e,0:c,raw
*HA*                200100e08b015bf6 210100e08b015bf6 *             1    0    7d
HA  qlc1    fp1      /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0:devctl

e,r10               200000203733ab77 210000203733ab77 c6t90d0       49   49   5a
DD  ssd279  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733ab77,0:c,raw
*HA*                2000080020b43b26 2100080020b43b26 *             1    0    7d
HA  ifp0    ifp0     /devices/pci@f,2000/SUNW,ifp@2:devctl
e,A0                508002000007a608 508002000007a609 ses14         5a   5a   4d
IB  ses92   *        /devices/pci@f,2000/SUNW,ifp@2/ses@w508002000007a609,0:0
e,f0                200000203733b1a5 210000203733b1a5 c6t64d0       72   72   40
DD  ssd271  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733b1a5,0:c,raw
e,f1                200000203733b4e7 210000203733b4e7 c6t65d0       71   71   41
DD  ssd274  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733b4e7,0:c,raw
e,f2                200000203733b2ed 210000203733b2ed c6t66d0       6e   6e   42
DD  ssd275  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733b2ed,0:c,raw
e,f3                200000203733b3be 210000203733b3be c6t67d0       6d   6d   43
DD  ssd288  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733b3be,0:c,raw
e,f4                200000203733b3ae 210000203733b3ae c6t68d0       6c   6c   44
DD  ssd277  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733b3ae,0:c,raw
e,f5                200000203733b333 210000203733b333 c6t69d0       6b   6b   45
DD  ssd282  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733b333,0:c,raw
e,f6                200000203733b316 210000203733b316 c6t70d0       6a   6a   46
```

(Continued on Following Page)

```
DD  ssd284  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733b316,0:c,raw
e,f7                200000203733b351 210000203733b351 c6t71d0       69   69   47
DD  ssd281  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733b351,0:c,raw
e,f8                200000203733b3ad 210000203733b3ad c6t72d0       67   67   48
DD  ssd276  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733b3ad,0:c,raw
e,f9                200000203733b3c3 210000203733b3c3 c6t73d0       66   66   49
DD  ssd270  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733b3c3,0:c,raw
e,f10               200000203733b345 210000203733b345 c6t74d0       65   65   4a
DD  ssd272  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733b345,0:c,raw
e,A1                5080020000007a608 5080020000007a60a ses15       45   45   5d
IB  ses93   *        /devices/pci@f,2000/SUNW,ifp@2/ses@w5080020000007a60a,0:0
e,r0                200000203733b360 210000203733b360 c6t80d0       55   55   50
DD  ssd290  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733b360,0:c,raw
e,r1                200000203733aff4 210000203733aff4 c6t81d0       54   54   51
DD  ssd280  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733aff4,0:c,raw
e,r2                200000203733b3a0 210000203733b3a0 c6t82d0       53   53   52
DD  ssd289  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733b3a0,0:c,raw
e,r3                200000203733afdb 210000203733afdb c6t83d0       52   52   53
DD  ssd285  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733afdb,0:c,raw
e,r4                200000203733abf7 210000203733abf7 c6t84d0       51   51   54
DD  ssd278  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733abf7,0:c,raw
e,r5                200000203733b0fd 210000203733b0fd c6t85d0       4e   4e   55
DD  ssd287  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733b0fd,0:c,raw
e,r6                200000203733abea 210000203733abea c6t86d0       4d   4d   56
DD  ssd269  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733abea,0:c,raw
e,r7                200000203733ae3d 210000203733ae3d c6t87d0       4c   4c   57
DD  ssd286  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733ae3d,0:c,raw
e,r8                200000203733b235 210000203733b235 c6t88d0       4b   4b   58
DD  ssd283  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733b235,0:c,raw
e,r9                200000203733ae4b 210000203733ae4b c6t89d0       4a   4a   59
DD  ssd273  *       /devices/pci@f,2000/SUNW,ifp@2/ssd@w210000203733ae4b,0:c,raw


Press <return> to continue...
```

Cluster Checking

Use selection 9 (`Cluster Check`) on the Display Configuration Menu to determine if the host is in a cluster. If the host is configured in a cluster, the program displays the name of the cluster.

Saving the Configuration

Use selection `s` (`Save Configuration`) on the Display Configuration Menu when you requested live configuration information and want to save it to a file.

CHAPTER 7

Checking the Current Status

Use selection 4 (`Check Current Status`) on the `stormenu` Main Menu to compare the current configuration status with the Configuration Snapshot. This enables the detection of offline loops, failed power supplies and fan trays, or other configuration changes. Using the Configuration Snapshot as a known good configuration source is required because it can be normal to have single loop Sun StorEdge A5*x*00 arrays or a two power supply minimum configuration array. Be aware that this comparison will also flag any storage related configuration change such as a patch addition, whether or not that change is an error condition. This facilitates configuration control.

On all configurations, a comparison of the current configuration against the golden snapshot will flag any software, firmware, or hardware configuration changes pertaining to the server attached to the storage device.

On Sun StorEdge A5*x*00 array configurations, the golden snapshot contains all the hardware and firmware information for the FRUs within the Sun StorEdge A5*x*00 arrays. Therefore, a comparison of the live configuration with the golden snapshot may reveal failed FRUs within the Sun StorEdge A5*x*00 arrays. For example, a missing or disabled power supply would be detected.

On Sun StorEdge T300 disk tray configurations, the firmware detects a failed FRU independently and forwards messages to `/var/adm/messages.t300`. This event will be emailed by the StorTools `crontab` entry (`mess_alert`) to the selected users. Therefore, the golden snapshot is only used for `/var/adm/message` analysis, server software/firmware/hardware, Sun StorEdge T300 c-number and Sun StorEdge T300 f/w revision information. It is NOT used for Sun StorEdge T300 disk tray failed FRU detection,

Expect this live system probe to take approximately 30 seconds per Sun StorEdge A5*x*00 array to complete. Sun StorEdge T300 disk tray probes require less time.

Note – The `Check Current Status` selection does NOT check the revision level of components against the StorTools revision matrix. It only compares the revision of the components against the revision saved in the golden snapshot.

Status Checking Example

An example of status checking is shown in FIGURE 7-1.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Main
----------

 .
 .
 .
 [4] Check Current Status
 .
 .
 .
Select an operation to perform: 4

This command uses the Configuration Snapshot File as the baseline
storage configuration state.  It then examines the live system to
check the current storage configuration and looks for change.

This command can take 30 seconds per array to complete.
Would you like to continue? [<y>, n]: y

Check Current Status
Please wait for system probe...
No changes detected between system snapshots!

Press <return> for previous menu ...
```

FIGURE 7-1 Check Current Status Example

The example in FIGURE 7-1 indicates that the current configuration matches the Golden Snapshot file.

CHAPTER 8

Monitoring the Storage Environment

Use selection 5 (`Storage Monitor`) on the `stormenu` Main Menu to proactively monitor the storage environment. This chapter contains the following topics:

Storage Checking Recommendations

This section contains recommendations for checking messages and status related to the storage environment.

Message Checking

The default run time for the automated messages check run against `/var/adm/messages` is once a day. You can run this more often if desired, but the check will always be done for messages occurring 24 hours prior to the run time, meaning the check is a sliding window. For example, if the message check is cron'ed to run twice a day at noon and midnight the noon check will scan all errors since the previous day at noon. The midnight check will scan for errors since the previous midnight. Running this check more than three times a day is not necessary and will generate many redundant email alerts.

Note – Be aware that after the problem has been resolved you may still receive email alerts until 24 hours have passed since the repair.

The message checking is done by the `mess_alert` script. The script has thresholds set for both warnings and errors. When a warning email is received service should be scheduled; when an error email is received service should be performed as soon as possible. Examine the `mess_alert` script to view the conditions detected and thresholds for email notification. The thresholds as set are considered optimal and should not be changed.

In addition to checking `/var/adm/messages` for both Sun StorEdge A5*x*00 arrays and Sun StorEdge T300 disk trays, a separate `mess_alert` `crontab` entry checks the Sun StorEdge T300 disk trays `syslog` forwarded file `/var/adm/messages.t300` for any Sun StorEdge T300 disk trays related error or warning messages. This entry may be run as often as desired. The sliding window is adjustable to match the `crontab` entry.

Refer to “Monitoring Sun StorEdge T300 Messages” on page 8-10 for an example of how to establish the `/var/adm/messages.t300` file.

Status Checking

The default run time for the automated status checking is also once a day, but it can be beneficial to run this more often so that solid hardware failures are detected as soon as possible. Just be aware that the status checking does have a minimal performance impact while it is probing the loops and arrays for status.

Storage Monitor Menu

Once selected, the Storage Monitor displays the menu shown in FIGURE 8-1.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Main
----------
 .
 .
 .
 [5] Storage Monitor
 .
 .
 .
Select an operation to perform: 5

StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Storage Monitor
---------------------

 [1] Storage Messages Summary
 [2] Storage Status Check Setup

 [q] Quit

Select an operation to perform:
```

FIGURE 8-1 Storage Monitor Menu

Storage Messages Summary

Selection 1 (`Storage Messages Summary`) on the Storage Monitor Menu scans the `/var/adm/messages` files and summarizes any storage related events and errors. An example is shown in FIGURE 8-2.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Main
----------
 .
 .
 .
 [5] Storage Monitor
 .
 .
 .
Select an operation to perform: 5

StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Storage Monitor
---------------------

 [1] Storage Messages Summary
 .
 .
 .
Select an operation to perform: 1

StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Messages Summary
----------------------

This menu function will scan the specified system messages file and
produce a summary of all Storage related events. The program will
prompt for the messages file or directory, start and end dates. The
system's "snapshot" or storage configuration file will be used if
available for better device translation.

(Continued on Following Page)
```

FIGURE 8-2 Messages Summary Example

```
Start and End dates must be given in the following format:

month/day:hour:minute
Example:
11/12:9:00      - November 12, 9:00am
11/12           - November 12, midnight
18:00           - 6:00pm of the current day

 [1] Summarize a single messages file
 [2] Summarize multiple messages files in a directory

 [q] Quit

Select an operation to perform: 2

Messages directory: [</var/adm>, q]:
Start date [ <09/09/1999:11:17:37>, mm/dd/yyyy, mm/dd/yyyy:hh:mm, q]
End date [ <09/10/1999:11:17:37> , mm/dd/yyyy, mm/dd/yyyy:hh:mm, q]
Start Date: 09/09/1999:11:17:37 End Date: 09/10/1999:11:17:38
Checking /var/adm ...
StorTools Storage Management   Version x.x
PCI A5K Series Storage on host hostname
FCAL Messages Summary
---------------------
The following counters represent events recorded in the specified
messages file(s). A non-zero value does not necessarily
indicate a problem. Some non-zero values indicate normal
operation. The values are presented to facilitate diagnosis
of a FCAL disk sub-system.

Note: A current Golden Snapshot is required for a meaningful
message analysis. Use the cli mess_sum -l if the
snapshot is invalid.

Scanning /var/adm/messages.errors for FC-AL related messages.
Skipping /var/adm/messages.3 reason: file is older than start date.
Skipping /var/adm/messages.2 reason: file is older than start date.
Skipping /var/adm/messages.1 reason: file is older than start date.
Skipping /var/adm/messages.0 reason: file is older than start date.

Scanning /var/adm/messages for FC-AL related messages.

Summary report start time = Tue Jul 6 00:00:00 1999
Summary report end time   = Tue Jul 6 14:45:32 1999

Controller(s)                              FC100:Port
-------------                              ----------
/devices/pci@1f,4000/SUNW,ifp@5,0:0 (c1)   ifp2:0
/devices/pci@1f,4000/SUNW,ifp@4,0:0 (c2)   ifp1:0

(Continued on Following Page)
```

```
FC100:Port   OFF   CRC   PARITY   DMA
----------   ---   ---   ------   ---
ifp2:0        0     0       0      0
ifp1:0        0     0       0      0

Disk(s)    Enclosure,Location  ssd    offline  WARNING  CRC  PARITY
-------    ------------------  ---    -------  -------  ---  ------
c2t3d0            p2,f3        ssd64     0        1      0      0
c2t6d0            p2,f6        ssd15     0        0      0      0
c2t16d0           p2,r0        ssd66     0        0      0      0
c2t19d0           p2,r3        ssd67     0        0      0      0
c2t22d0           p2,r6        ssd65     0        0      0      0
```

Note – The example in FIGURE 8-2 summarizes all the messages in the specified directory.

Automated Status Checks

Selection 2 (`Storage Status Check Setup`) on the Storage Monitor Menu sets up `cron`(1M) entries to automate the Check Current Status and Messages Summary operations and provide email notification if a failure is detected. Once entered, this selection displays the Automate Status Checks with Crontab Utility Menu shown in FIGURE 8-3.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Main
----------
 .
 .
 .
 [5] Storage Monitor
 .
 .
 .
Select an operation to perform: 5

StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Storage Monitor
---------------------

 [1] Storage Messages Summary
 [2] Storage Status Check Setup

 [q] Quit

Select an operation to perform: 2
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Automate Status/Message Checks with Crontab Utility
------------------------------------------------------------

StorEdge Messages checking is DISABLED
T3 syslogd checking is DISABLED

 [1] Enable Status Checking
 [2] Disable Status Checking
 [3] Enable StorEdge /var/adm/messages Checking
 [4] Disable StorEdge /var/adm/messages Checking
 [5] Enable T300 syslogd /var/adm/messages.t300 Checking
 [6] Disable T300 syslogd /var/adm/messages.t300 Checking
 [s] Send A Test Email Message
 [c] Check all StorTools Crontab Entries
 [q] Quit

Select an operation to perform:
```

FIGURE 8-3 Automate Status Checks with Crontab Utility Menu

The example in FIGURE 8-4 enables messages checking for Sun StorEdge T300 disk trays.

```
StorTools Storage Management    Version    x.x
StorEdge on host hostname
Menu: Automate Status/Message Checks with Crontab Utility
-----------------------------------------------------

Storage status checking is DISABLED
StorEdge Messages checking is DISABLED
syslogd checking is DISABLED

 [1] Enable Status Checking
 [2] Disable Status Checking
 [3] Enable StorEdge /var/adm/messages Checking
 [4] Disable StorEdge /var/adm/messages Checking
 [5] Enable T300 syslogd /var/adm/messages.t300 Checking
 [6] Disable T300 syslogd /var/adm/messages.t300 Checking
 [c] Check all StorTools Crontab Entries
 [s] Send A Test Email Message

 [q] Quit

Select an operation to perform: 5

StorTools Storage Management    Version    x.x
StorEdge on host hostname
Menu: Add  StorTools 'syslogd' Checking
----------------------------------------

Status Checking will be performed by adding an entry to the
systems root crontab.

When would you like to schedule your status checks?
The default is everyday at midnight.

Note: asterisk (*) matches all legal values.

Day of the Week [0(SUN)-6(SAT)  <* = all>, q ] : *
Hour    [0-23 (* = all) <0>, q] : 0
Minute    [0-59 (* = all), <0>, q] : 0

For email notification, specify email address(es) separated

(Continued on Following Page)
```

FIGURE 8-4 Enable Messages Checking Example

```
by a comma. NO SPACES!

nsccst@central.sun.com is the SUN Command Center e-mail address.

To <root,nsccst@central.sun.com> :

Each time the crontab entry for a scan of /var/adm/messages.t300
is invoked it will scan backwards 24 hours for errors (default).
To change the default behavior, select a scan window to match
the above crontab parameters (hours & minutes).
Enter window to scan backwards in hours (default 24): 24
Enter window to scan backwards in minutes (default 0): 0
Would you like to continue?  Please confirm. [<y>, n]: y
storcron:  creating /var/opt/STORtools/logs/tools.cron
storcron:  created /var/opt/STORtools/logs/tools.cron
StorTools syslogd Checking is being scheduled.

Press <return> for previous menu ...
```

Monitoring Sun StorEdge T300 Messages

Before using the StorTools diagnostic package to monitor messages from a Sun StorEdge T300 disk tray, you must set up the Sun StorEdge T300 disk tray to mirror its `/syslog` messages to the host that is running the StorTools package. The Sun StorEdge T300 disk tray messages must be mirrored to the file `/var/adm/messages.t300` on the host. Use the following procedures to set up the Sun StorEdge T300 disk tray and the host to forward `/syslog` messages.

▼ To Set Up the Host

1. **Add the following line to the `/etc/syslog.conf` file on the host:**

```
local7.debug /var/adm/messages.t300
```

2. **Ensure that the `/var/adm/messages.t300` file exists by typing:**

```
# touch /var/admin/messages.t300
```

3. **Send a hangup signal to the `syslog` daemon. An example follows.**

```
# ps -ef|grep syslog
    root   242     1   0     Sep 22 ?       0:00 /usr/sbin/syslogd
    root 23537 21154   0   18:16:19 pts/5   0:00 grep syslog
# kill -HUP 242
```

▼ To Set Up the Sun StorEdge T300

Note – To `ftp`(1) the syslog.conf and host files to the T300, you must have set a root password on the T300. Otherwise the `ftp` login will fail.

---

1. **Use a text editor on the host to create a** `syslog.conf` **file in the** `/tmp` **directory containing the following line:**

```
*.info @hostname
```

hostname specifies the name of the host running the StorTools package.

Note – This allows Info, Notice, Warning, and Error messages to be passed from the Sun StorEdge T300 disk tray to the host.

---

2. **Use a text editor on the host to create a** `hosts` **file in the** `/tmp` **directory containing the following line identifying the host's IP address and name:**

```
192.xxx.xxx.xxx hostname
```

3. **Telnet into the Sun StorEdge T300 disk tray and** `ftp` **the** `syslog.conf` **and** `hosts` **files you created in steps 1 and 2 over to the disk tray. An example follows.**

```
hostname# ftp t300name
Connected to t300name
220 172.20.67.216 pSOSystem FTP server (NUPPC/2.0.0-G) ready.
Name (diag216:root): root
331 Password required for root.
Password:
230 User root logged in.
ftp> cd etc
250 CWD command successful.
ftp> put syslog.conf
200 PORT command successful.
150 Opening ASCII mode data connection for syslog.conf.
226 Transfer complete.
local: syslog.conf remote: syslog.conf
17 bytes sent in 0.00046 seconds (36.17 Kbytes/s)
ftp> put hosts
200 PORT command successful.
150 Opening ASCII mode data connection for hosts.
226 Transfer complete.
local: hosts remote: hosts
ftp> quit
221 Goodbye
hostname#
```

hostname specifies the name of the host running the StorTools package.

t300name specifies the name of the Sun StorEdge T300 disk tray.

4. **Disable the Sun StorEdge T300 disk tray local** `/syslog` **and switch to SNMP by typing the following at the command prompt:**

```
t300name:/etc:<4>set logto *
```

5. **Type the following to reboot the Sun StorEdge T300 disk tray:**

```
t300name:/etc:<5>sync
t300name:/etc:<5>reset
Reset the system, are you sure? [N]: y
```

6. **Reboot host or restart SNMP daemon.**

CHAPTER 9

Running Diagnostics

This chapter describes the Diagnostics Menu and the tests available through the `stormenu` Main Menu. The following topics are included:

Diagnostic Deployment

Run the diagnostics in the order listed in the menu. To diagnose a suspect problem loop, you would first run the Loop Integrity Test. If failures occur, continue using this test with Process of Elimination (POE) to diagnose (the FRU Isolation Tool may be used for automated POE). Refer to Chapter 12 for information about POE. If the system under test uses a single-port PCI FC-AL Adapter, the Loop Integrity Test is not supported and you must use the Disk Exerciser.

If no errors are produced by the Loop Integrity Test, run the Disk Read Loop Test to test the loop with heavy I/O. If failures occur, continue using this test with POE to isolate cause.

The Host Adapter Test uses specific data patterns to test the host adapter interface and should be run on any new or suspect host adapters.

The Disk Load Generator / Exerciser is useful for disk performance checks or disk testing without loop testing. Note that error output is not sent to the screen and you should monitor the messages file with the `mess_sum` script for any disk errors.

The FRU Isolation Tool is used for automated or assisted / manual POE after a failing loop is identified using the Loop Integrity Test.

FIGURE 9-1 illustrates the parts of a loop tested by each diagnostic.

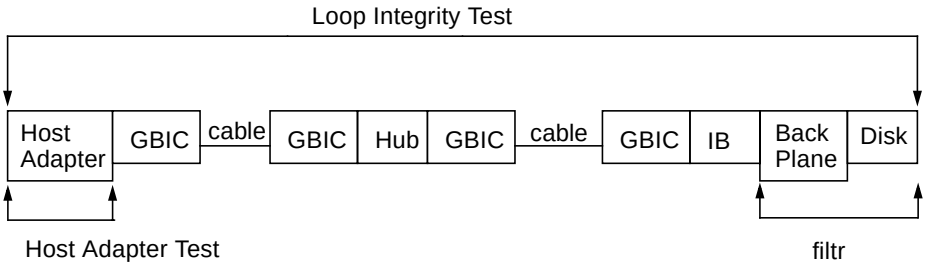
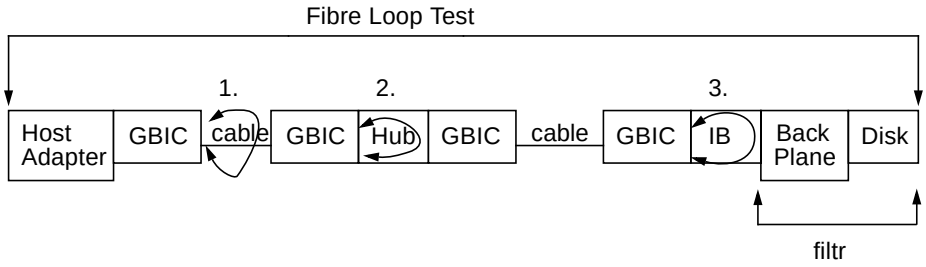


FIGURE 9-1 Sun StorEdge A5*x*00 Array Tests Block Diagram

FIGURE 9-2 shows the diagnostic loop back points for Process of Elimination (POE). Refer to Chapter 12 for additional information.



1. Host adapter/GBIC - loop back with loop back cable or connector
2. Hub - loop back by pulling all array GBICs
3. IB - loop back by bypassing both backplanes (part of filtr test)

FIGURE 9-2 Diagnostic Loop Back Points for Process of Elimination (POE)

Diagnostics Menu Selections

Use selection 6 (Run Diagnostics) on the stormenu Main Menu to access the diagnostic tests. This selection displays the Diagnostics Menu shown in FIGURE 9-3.

```
StorTools Storage Management    Version    x.x
StorEdge on host hostname
Menu: Main
----------

  .
  .
  .
 [6] Run Diagnostics
  .
  .
  .

Select an operation to perform: 6


StorTools Storage Management    Version    x.x
StorEdge on host hostname
Menu: Diagnostics
-----------------

 [1] Loop Integrity Test (light load)
 [2] Disk Read Loop Test (heavy load)
 [3] Host Adaptor Test
 [4] Disk Load Generator / Exerciser
 [5] FRU Isolation Tool (filtr)
 [6] Log File Manager
 [7] Display Last Loop Test Summary
 [8] StorEdgeDr (sedr)


 [q] Quit

Select an operation to perform:
```

FIGURE 9-3 Diagnostics Menu

Note – Selection 8 (Volume Manager Path Management) is displayed only in Volume Manager environments.

Loop Integrity Test (light load)

Use selection 1 on the Diagnostics Menu to run the Loop Integrity Test. This test uses the loop back frame (`lbf`(1M)) diagnostic with varying data patterns to identify loops with errors.

Note – This test degrades performance by about 10%, and CPU utilization equivalent to about one processor. If this is acceptable, you may run this test on storage arrays that are currently in use. A full pass takes approximately thirty minutes depending on loop traffic.

Once selected, the Loop Integrity Test displays its menu of options as shown in FIGURE 9-4. The options are described in TABLE 9-1.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Loop Integrity Test (light load)
--------------------------------


Options                          Value
=======================          =======================
[l] Loop(s) under test           c2 c1
[m] Select lbf Parameters        Default Parameters
[p] Select lbf Patterns          All Patterns

[r] Run

[q] Quit


Enter Selection:
```

FIGURE 9-4 Loop Integrity Test (light load) Menu

TABLE 9-1 Loop Integrity Test Options

Option	Description
`l`	Displays a list of the loops available for testing. By default, the program tests all loops. The `Value` field displays the loop numbers.
`m`	Displays the `lbf Parameter Selection Menu` which enables you to modify the default parameter values. The `Value` field displays either `Default Parameters` or `User Defined`. Refer to the `lbf` man page for additional information about `lbf` parameters.
`p`	Enables you to select the patterns used for testing. The `Value` field displays either `All Patterns` or `User Defined`.
`r`	Starts test execution.
`q`	Exits this menu and returns to the previous menu.

Loop Selection

Use the `l` option to display the loops available for testing and to select a specific loop. The test defaults to testing all loops. If you select option `l`, the program displays the available loops. An example is shown in FIGURE 9-5.

```
Loops Available for Testing
---------------------------
1. (c2) (sf1) /devices/sbus@3,0/SUNW,socal@d,10000/sf@1,0:devctl (2 Drive(s))
2. (c11) (sf3) /devices/sbus@3,0/SUNW,socal@0,0/sf@1,0:devctl (2 Drive(s))
3. (c3) (sf5) /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0:devctl (11 Drive(s))
4. (c13) (fp11) /devices/pci@8,2000/pci@2/SUNW,qlc@5/fp@0,0:devctl (2 Drive(s))
5. (c7) (fp12) /devices/pci@9,2000/pci@2/SUNW,qlc@4/fp@0,0:devctl (44 Drive(s))
6. (c14) (fp13) /devices/pci@9,2000/pci@2/SUNW,qlc@5/fp@0,0:devctl (20
Drive(s))
7. (c6) (ifp0) /devices/pci@f,2000/SUNW,ifp@2:devctl (22 Drive(s))

Enter comma or space delimited list of loops, [a,#,<q>]:
```

FIGURE 9-5 Loop Selection Display - Loop Integrity Test

Type one of the following responses:

Response	Description
a	Select all loops for testing.
#	Enter the numbers of the desired loops. Insert a space or comma between numbers.
q	Exit this menu.

lbf Parameters

The m option enables you to modify the default values of the parameters used during testing. If you select this option, the test displays the available parameters in the lbf Parameter Selection Menu shown in FIGURE 9-6. The parameters are described in TABLE 9-2.

```
lbf Parameter Selection Menu
----------------------------
Options                          Value
==========================       ============================
[c] Compare Flag                 OFF
[k] Transfer Size                64
[n] Number of Passes             1000

[d] Restore Default Values
[q] Quit

Select an item to edit:
```

FIGURE 9-6 lbf Parameter Selection Menu

TABLE 9-2 lbf Parameters

Parameter	Description
c	Toggle the compare flag On and Off.
k	Select the transfer size. The default is 64 Kbytes.
n	Select the number of passes to run. The default is 1000 passes.
d	Restore the parameters to their default values.
q	Exits this menu.

After you quit the lbf Parameter Selection Menu, the program redisplays the test options menu. The Value field is changed to User Defined if you modified the default parameter values. Refer to the lbf man page for additional information about lbf parameters

lbf Patterns

The p option enables you to modify the default values of the patterns used during testing. If you select this option, the test displays a menu of pattern selections as shown in FIGURE 9-7. The pattern selections are described in TABLE 9-3. Different data patterns stress the hardware in various areas. Running loop tests with varying patterns helps reproduce intermittent FC-AL hardware problems. When a particular pattern is known to fail, continue testing with just the failed pattern or patterns. When failing patterns are unknown or when testing a new installation, it is better to test with all patterns.

```
Select Patterns
---------------
[1] Test With All Patterns
[2] Test With Failed Patterns From Logs
[3] Test With Patterns From A File
[4] Enter A List Of Patterns


[q] = Quit

Please select patterns to test [<1 - 4> , q]:
```

FIGURE 9-7 lbf Pattern Selection Menu

TABLE 9-3 lbf Pattern Selections

Selection	Description
1	Use the default of testing with all patterns.
2	Use the patterns that failed and were logged during testing.
3	Enter the name of a file containing the patterns.
4	Enter patterns for testing.
q	Exits this menu.

After you quit the pattern selection menu, the program redisplays the test options menu. The `Value` field is changed to `User Defined` if you modified the default pattern values.

Using Failed Patterns

If you specify using the failed patterns from logs, the program displays the patterns it locates as shown in FIGURE 9-8 and enables you to save the patterns to a file.

```
Select Patterns
---------------
[1] Test With All Patterns
[2] Test With Failed Patterns From Logs
[3] Test With Patterns From A File
[4] Enter A List Of Patterns


[q] = Quit

Please select patterns to test [<1 - 4> , q]: 2

Patterns
--------

f8f8f8f8
f7f7f7f7
f6f6f6f6
f5f5f5f5
f4f4f4f4
    .
    .
    .
49494949
48484848
47474747

xxx failed patterns found.

Use These Patterns [<y>, n, q]: y
Enter filename to save patterns to [</var/opt/STORtools/logs/diags/patterns>]:

xxx patterns total.
```

FIGURE 9-8 Failed Pattern Display

xxx specifies the number of failed patterns located in the logs.

Using Patterns From a Specific File

If you select using patterns from a file, the program prompts for the file name as shown in FIGURE 9-9.

```
Select Patterns
---------------
[1] Test With All Patterns
[2] Test With Failed Patterns From Logs
[3] Test With Patterns From A File
[4] Enter A List Of Patterns


[q] = Quit

Please select patterns to test [<1 - 4> , q]: 3
Enter filename to read patterns from [</var/opt/STORtools/logs/diags/patterns>]:
```

FIGURE 9-9 Pattern File Selection

If the program is unable to locate the specified file, it displays the following type of message:

```
File /var/opt/STORtools/logs/diags/patterns Not Found
```

Using a List of Patterns

If you specify using an entered list of patterns, the program prompts for the patterns. The following figures contain examples.

```
Select Patterns
---------------
[1] Test With All Patterns
[2] Test With Failed Patterns From Logs
[3] Test With Patterns From A File
[4] Enter A List Of Patterns


[q] = Quit

Please select patterns to test [<1 - 4> , q]: 4
Enter Patterns
--------------

All patterns are hexadecimal and up to 8 characters in length
Example: 7effdd32
Enter a hexadecimal value or q for ‘quit’.
1) 12121212
2) q

12121212

1 patterns entered.

Use These Patterns [<y>, n, q]:
```

FIGURE 9-10 Entering a List of Patterns

```
Select Patterns
---------------
[1] Test With All Patterns
[2] Test With Failed Patterns From Logs
[3] Test With Patterns From A File
[4] Enter A List Of Patterns


[q] = Quit

Please select patterns to test [<1 - 4> , q]: 4
Enter Patterns
--------------

All patterns are hexadecimal and up to 8 characters in length
Example: 7effdd32
Enter a hexadecimal value or q for ‘quit’.
1) 45
2) q

45454545

1 patterns entered.

Use These Patterns [<y>, n, q]:
```

FIGURE 9-11 Entering a Repeating Pattern

Notice that you only need to type the first two characters of a repeating pattern.

Loop Integrity Test Execution Example

An example of Loop Integrity Test execution is shown in FIGURE 9-12

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Loop Integrity Test (light load)
--------------------------------


Options                          Value
=======================          =======================
[l] Loop(s) under test           c2 c1
[m] Select lbf Parameters        Default Parameters
[p] Select lbf Patterns          All Patterns

[r] Run

[q] Quit


Enter Selection: r

Running the following tests:
(c2) /devices/sbus@3,0/SUNW,socal@d,1000:0     lbf only
(c1) /devices/sbus@3,0/SUNW,socal@d,1000:1     lbf only

Start Time: Tue Jun 8 13:09:39 EDT 1999
 Printing to logfile : /var/opt/STORtools/logs/diags/t_seqrl.7884.c2.7917
 Monitor /var/adm/messages for any disk errors.
 Printing to logfile : /var/opt/STORtools/logs/diags/t_seqrl.7884.c1.7923
 Monitor /var/adm/messages for any disk errors.
................................................................................
................................................................................
................................................................................
................................................................................
................................................................................
............
       Loop Test Summary
       =================
LOOP: (c2) (sf0) /devices/sbus@3,0/SUNW,socal@d,10000:0
LOOP: (c1) (sf1) /devices/sbus@3,0/SUNW,socal@d,10000:1

  ****** Test Passed ******
  ****** Test Passed ******
  ****** Test Passed ******

Finish Time: Tue Jun 8 13:45:09 EDT 1999

Hit any key to continue ...
```

FIGURE 9-12 Loop Integrity Test Example

Disk Read Loop Test (heavy load)

Use selection 2 on the Diagnostics Menu to run the Disk Read Loop Test. This test uses the `lbf` diagnostic and sequential read I/O to the disks to further stress the fiber loops. Some failures appear only under heavy I/O load. The test uses the disk exerciser (`dex32`) utility as the load generator.

Note – Although this test is data safe and will not overwrite any disk data, it will affect performance. Running this test on FC-AL storage arrays that are currently in use is *not* recommended.

Once selected, the Disk Read Loop Test displays its options as shown in FIGURE 9-13 for Sun StorEdge A5*x*00 arrays or FIGURE 9-14 for Sun StorEdge T300 disk trays. The options are described in TABLE 9-4.

```
WARNING: This test has heavy system performance impact.
It should not be run on storage arrays currently in use. Continue? [y, <n>]: y



StorTools Storage Management  Version x.x
StorEdge on host hostname
Disk Read Loop Test (heavy load)
--------------------------------


Options                          Value
=======================          =======================
[l] Loop(s) under test           c2 c1
[b] Select lbf Parameters        Default Parameters
[p] Select lbf Patterns          All Patterns

[r] Run

[q] Quit


Enter Selection:
```

FIGURE 9-13 Disk Read Loop Test (heavy load) Menu - Sun StorEdge A5*x*00 Arrays

```
WARNING: This test has heavy system performance impact.
It should not be run on storage arrays currently in use. Continue?
[y, <n>]: y



StorTools Storage Management  Version x.x
StorEdge on host hostname
Disk Read Loop Test (heavy load)
------------------------------


Options                          Value
=======================          ======================
[m] Dual Port Mode               primary
[l] Loop(s) under test           c0 c1
[b] Select lbf Parameters        Default Parameters
[p] Select lbf Patterns          All Patterns

[r] Run

[q] Quit


Enter Selection:
```

FIGURE 9-14 Disk Read Loop Test (heavy load) Menu - Sun StorEdge T300 Disk Trays

TABLE 9-4 Disk Read Loop Test Options

Option	Description
m	Toggles between primary and alternate modes. The default is primary. This option is only applicable to Sun StorEdge T300 disk trays.
l	Displays a list of the loops available for testing. By default, the program tests all loops. The Value field displays the loop numbers.
b	Displays the lbf Parameter Selection Menu which enables you to modify the default parameter values. The Value field displays either Default Parameters or User Defined.

TABLE 9-4 Disk Read Loop Test Options *(Continued)*

Option	Description
p	Enables you to select the patterns used for testing. The Value field displays either All Patterns or User Defined.
r	Starts test execution.
q	Exits this menu and returns to the previous menu.

Loop Selection

Use the l option to display the loops available for testing and to select a specific loop. The test defaults to testing all loops. If you select option l, the program displays the available loops.

```
Loops Available for Testing
---------------------------
1. (c2) (sf1) /devices/sbus@3,0/SUNW,socal@d,10000/sf@1,0:devctl (2 Drive(s))
2. (c11) (sf3) /devices/sbus@3,0/SUNW,socal@0,0/sf@1,0:devctl (2 Drive(s))
3. (c3) (sf5) /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0:devctl (11 Drive(s))
4. (c13) (fp11) /devices/pci@8,2000/pci@2/SUNW,qlc@5/fp@0,0:devctl (2 Drive(s))
5. (c7) (fp12) /devices/pci@9,2000/pci@2/SUNW,qlc@4/fp@0,0:devctl (44 Drive(s))
6. (c14) (fp13) /devices/pci@9,2000/pci@2/SUNW,qlc@5/fp@0,0:devctl (20
Drive(s))
7. (c6) (ifp0) /devices/pci@f,2000/SUNW,ifp@2:devctl (22 Drive(s))

Enter comma or space delimited list of loops, [a,#,<q>]:
```

FIGURE 9-15 Loop Selection Display - Disk Read Loop Test

Type one of the following responses:

Response	Description
a	Select all loops for testing.
#	Enter the numbers of the desired loops. Insert a space or comma between numbers.
q	Exit this menu.

lbf Parameters

The b option enables you to modify the default values of the parameters used during testing. If you select this option, the test displays the available parameters in the lbf Parameter Selection Menu shown in FIGURE 9-6. The parameters are described in TABLE 9-2.

After you quit the lbf Parameter Selection Menu, the program redisplays the test options menu. The Value field is changed to User Defined if you modified the default parameter values.

lbf Patterns

The p option enables you to modify the default values of the patterns used during testing. If you select this option, the test displays a menu of pattern selections as shown in FIGURE 9-7. The pattern selections are described in TABLE 9-3.

After you quit the pattern selection menu, the program redisplays the test options menu. The Value field is changed to User Defined if you modified the default pattern values.

Using Failed Patterns

If you specify using the failed patterns from logs, the program displays the patterns it locates as shown in FIGURE 9-8 and enables you to save the patterns to a file.

Using Patterns From a Specific File

If you select using patterns from a file, the program prompts for the file name as shown in FIGURE 9-9.

If the program cannot locate the specified file, this type of message is displayed:

```
File /var/opt/STORtools/logs/diags/patterns Not Found
```

Using a List of Patterns

If you specify using an entered list of patterns, the program prompts for the patterns. Examples are shown in FIGURE 9-10 and FIGURE 9-11.

Notice that you only need to type the first two characters of a repeating pattern.

Host Adapter Test

Use selection 3 on the Diagnostics Menu to run the Host Adapter Test. This test diagnoses the host bus adapter by performing `lbf` loop tests both externally to online loops and internally to offline ports. Offline ports are tested by enabling an internal loop back function.

Note – The Host Bus Adapter test should only be run on ports which have I/O disabled.

PCI Host Bus Adaptors with the 2100 series ASIC's do not run a loopback test as part of the Host Bus Adapter Test. This functionality is not available with the 2100 series boards.

FIGURE 9-16 illustrates the execution of the Host Adapter Test.

```
StorTools Storage Management    Version    x.x
StorEdge on host hostname
Menu: Diagnostics
-----------------

  .
  .
 [3] Host Adaptor Test
  .
  .

 [q] Quit

Select an operation to perform: 3



StorTools Storage Management    Version    x.x
StorEdge on host hostname
Host Adapter Test
-----------------

(Continued on Following Page)
```

FIGURE 9-16 Host Adapter Test Example

```
Online FC Adapter Ports
-----------------------
 [1]     (c1) (sf1)      /devices/sbus@3,0/SUNW,socal@d,10000/sf@1,0:devctl
 [2]     (c2) (fp1)      /devices/pci@9,2000/pci@2/SUNW,qlc@4/fp@0,0:devctl
 [3]     (c3) (fp2)      /devices/pci@9,2000/pci@2/SUNW,qlc@5/fp@0,0:devctl
 [4]     (c4) (ifp0)     /devices/pci@f,2000/SUNW,ifp@2:devctl

Offline FC Adapter Ports
------------------------
 [5]    (OFFLINE PORT)   /devices/sbus@3,0/SUNW,socal@d,10000/sf@0,0:devctl

 [a] = Test All Ports
 [l] = Show this list again


Please select port[s] to test [<1 - 15> , a, list(1,2...), q ]: 6

        ****** Testing ONLINE Port:
/devices/pci@9,2000/pci@2/SUNW,qlc@5/fp@0,0:devctl ******

Printing to logfile:  /var/opt/STORtools/logs/diags/
ha_port_test.7803.7819.fp13


 ******  Test Summary  ******

(c14) (fp13) /devices/pci@9,2000/pci@2/SUNW,qlc@5/fp@0,0:devctl :       PASS


 ****** Test Passed ******
```

Disk Load Generator / Exerciser

Use selection 4 on the Diagnostics Menu to run the Disk Load Generator / Exerciser. This test uses `dex32` as a disk load generator to stress test the disks and FC-AL loop. You can choose either random or sequential I / O with either 1 Kbyte or 128 Kbyte transfer sizes. The run time is user selectable. Use the `iostat` command to monitor performance. Any disks errors encountered are reported in the `/var/adm/messages` file. The exerciser prompts you to select the disks to test. This enables you to control the load generated on a loop, unlike the Disk Read Loop Test, which test all disks for maximum load and stress.

Note – This test may affect performance depending on the number of disks selected. It should be run with caution on FC-AL storage arrays that are currently in use.

Once selected, the Disk Load Generator / Exerciser displays a Disk Exerciser Menu containing a list of options. The Disk Load Generator / Exerciser menu for Sun StorEdge A5*x*00 arrays is shown in FIGURE 9-17. The options are described in TABLE 9-5.

```
StorTools Storage Management    Version    x.x
StorEdge on host hostname
Menu: Diagnostics
-----------------

  .
  .
 [4] Disk Load Generator / Exerciser
  .
  .

 [q] Quit

Select an operation to perform: 4


StorTools Storage Management    Version    x.x
StorEdge on host hostname
Menu: Disk Exerciser (Online Components Only)
---------------------------------------------

Options                                 Value
=======================                 ====================
[c] Test Mode                           Read Only
[f] File|Raw                            raw
[m] T300 Dual Port Mode                 primary
[s] Select Drives                       c2 c11 c3 c13 c7 c14 c6
[t] Test Type                           Sequential I/O Test
[u] Run Time                            60 Minutes

[r] Run
[p] Processes Management
[q] Quit

Enter Selection:
```

FIGURE 9-17 Disk Load Generator/Exerciser Menu (Sun StorEdge T300 Disk Trays and Sun StorEdge A5*x*00 Arrays)

TABLE 9-5 Disk Load Generator/Exerciser Options

Option	Description
[c] Test Mode	Toggle the test mode between Read Only and Write and Read. The default is Read Only.
[f] File|Raw	Toggles between target modes. You can select either the disk's raw device or a file. The default is Raw. Use the s option to select the specific drives or LUNs.
[m] Dual Port Mode	Toggles between primary and alternate modes. The default is primary. This option is only applicable to Sun StorEdge T300 disk tray.
[s] Select Drives|LUNs	Select a controller to test all drives or select specific drives on a controller.
[t] Select Test Type	Toggle between the test types. The default is the Sequential I/O Test.
[u] Run Time	Select the dex32 execution time. The default is 60 minutes.
[r] Run	Run the Disk Load Generator/Exerciser.
[p] Processes Management	Display a list of process management options which enables you to show or kill processes.
[q] Quit	Exit this menu.

Selecting the Test Mode

Use the c option to select the test mode. You can select either Read Only or Write and Read. The default mode is Read Only. The Write and Read mode is not selectable when testing to a raw device.

Selecting the Target (File | Raw)

Use the f option to select the target mode. You can run dex32 to a raw device or to a file. The default is to a raw device. Run dex32 to a file when you can not test to raw disks. For example, if you have Veritas and logical volumes. This option toggles between raw device and a file. If you select raw device testing, option d displays the available controllers. Either select a specific drive on a specific controller or select all devices.

Note – To use File mode, you must have a mounted file system. Refer to `mount`(1M) command for instructions.

Selecting a File

If you select the `c` option to change from `Read Only` to `Write and Read`, the program automatically prompts for a file name. The pathname entered must begin with a mount point from the storage units to be tested. An example follows:

```
StorTools Storage Management    Version    x.x
StorEdge on host hostname
Menu: Disk Exerciser (Online Components Only)
-------------------------------------------

Options                              Value
======================               ====================
[c] Test Mode                        Read Only
[f] File|Raw                         raw
[m] T300 Dual Port Mode              primary
[s] Select Drives                    c2 c11 c3 c13 c7 c14 c6
[t] Test Type                        Sequential I/O Test
[u] Run Time                         60 Minutes

[r] Run
[p] Processes Management
[q] Quit

Enter Selection: c
Current Test Mode: Write and Read

Enter file name with one of the following mount points:
c3: /foo              (/dev/dsk/c3t22d0s0):  248658 blocks    67516 files


Enter the full pathname or <q>: /foo/test_file
File size must be a number followed by g, m or k
Enter File Size <8g>: 1m
Delete the file after the test completes? (<y>, n): n

(Continued on Following Page)
```

FIGURE 9-18 Selecting a File Example

```
StorTools Storage Management    Version    x.x
StorEdge on host hostname
Menu: Disk Exerciser (Online Components Only)
-----------------------------------------

Options                                 Value
======================                  ====================
[c] Test Mode                           Write and Read
[f] File|Raw                            file (not deleted)
[m] T300 Dual Port Mode                 primary
[s] Select File                         /foo/test_file (1m)
[t] Test Type                           Memory Mapped Sequential I/O Test
[u] Run Time                            60 Minutes

[r] Run
[p] Processes Management
[q] Quit

Enter Selection: r


Start the following dex tests:

    Memory Mapped Sequential I/O Test /foo/test_file rw 60m

Would you like to run these tests [<y>, n, q]:y
Log file is /var/opt/STORtools/logs/diags/dex.c3.8791

Press <return> for previous menu ...



StorTools Storage Management    Version    STORtools 3.3 Alpha 3.1 03/21/00
StorEdge on host diag250.Central.Sun.COM.
Menu: Disk Exerciser (Online Components Only)
-----------------------------------------

Options                                 Value
======================                  ====================
[c] Test Mode                           Write and Read
[f] File|Raw                            file (not deleted)
[m] T300 Dual Port Mode                 primary

(Continued on Following Page)
```

```
[s] Select File                         /foo/test_file (1m)
[t] Test Type                           Memory Mapped Sequential I/O Test
[u] Run Time                            60 Minutes

[r] Run
[p] Processes Management
[q] Quit

Enter Selection: r

Start the following dex tests:

    Memory Mapped Sequential I/O Test /foo/test_file rw 60m

Would you like to run these tests [<y>, n, q]:y
Log file is /var/opt/STORtools/logs/diags/dex.c3.8791

Press <return> for previous menu ...

StorTools Storage Management    Version    STORtools 3.3 Alpha 3.1 03/21/00
StorEdge on host diag250.Central.Sun.COM.
Menu: Disk Exerciser (Online Components Only)
-------------------------------------------

Options                                 Value
=======================                 ====================
[c] Test Mode                           Write and Read
[f] File|Raw                            file (not deleted)
[m] T300 Dual Port Mode                 primary
[s] Select File                         /foo/test_file (1m)
[t] Test Type                           Memory Mapped Sequential I/O Test
[u] Run Time                            60 Minutes

[r] Run
[p] Processes Management
[q] Quit

Enter Selection: p
```

(Continued on Following Page)

```
dex Process Management
----------------------

[s] Show all processes
[k] Kill all processes
[c] Kill processes by controller

[q] Quit

Enter Choice: s


Currently running processes by file (Parent processes only):

File Name [/foo/test_file]
------------------------------
 F S      UID   PID  PPID  C PRI NI     ADDR     SZ    WCHAN    STIME TTY
T
IME CMD
 8 S     root  8861     1  0  51 20        ?    150        ? 11:04:38 pts/5
0
:00 /var/opt/STORtools/bin/dex32 -v -MI

Total: 1 test(s) running
]
Press <return> for previous menu ...
```

If you select option `f` to select a file while `Read Only` mode is enabled, the program prompts for an existing file name. This file must exist on the storage units to be tested. An example follows.

Managing Processes

Use the p option to monitor or kill processes. If you select p, the following list of process management options is displayed. The options are described in TABLE 9-6.

```
Dex Process Management
----------------------
[s] Show all processes
[k] Kill all processes
[c] Kill processes by controller

[q] Quit

Enter Choice:
```

TABLE 9-6 dex32 Process Management Options

Option	Description
[s] Show all processes	Show all active processes.
[k] Kill all processes	Kill all active processes.
[c] Kill processes by controller	Kill all active processes on a specific controller.
[q] Quit	Exit this menu.

FRU Isolation Tool

Use selection 5 on the Diagnostics Menu to run the FRU Isolation Tool (`filtr`(1M)) on Sun StorEdge A5*x*00 arrays and Sun StorEdge T300 disk trays. Run this test after a failing loop has been identified with the Loop Integrity Test. `Filtr` attempts to isolate backplanes and disks that are causing loop failures.

Note – This test is not intended to identify disks with data read/write generated errors, but will identify disks with FC-AL interface problems. Disk read/write errors should be identified using the standard RAID software and `/var/adm/messages` indicators.

The FRU Isolation Tool does not support PCI configurations using the FC100 PCI adapter.

After loop selection you are prompted for `lbf` pattern and `filtr` run options. Pattern options enable you to use one of the following:

- Loop Integrity Test log failing patterns for faster fault isolation
- A user specified pattern file
- A full pass using all possible patterns
- Patterns from a previous run of `filtr`

Using the Loop Integrity Test failed patterns is optimal. You must select the following:

- Either the Binary or Regular search method. The Regular mode is the original POE method of isolating failures. Binary mode uses a division of two approach to isolate the failure. Binary mode also enables you to use disk I/O loading to help bring out intermittent errors.
- Either Automatic or Manual mode. Manual mode provides steps to follow for troubleshooting the loop. Typically, you use Manual mode to troubleshoot GBICs, cables, hubs, and IBs. Automatic mode tests the backplanes and disks on the loop.

In Binary mode, you are prompted for disk loading. Disk loading can bring out intermittent loop failures that lbf testing alone will not bring out.

In both modes, you are prompted for retesting on soft errors. If the error is very reproducible, turn off retesting.

When errors are encountered the failing patterns are used with software bypass commands to isolate the failing component. If the test fails with all backplanes bypassed it will enter the *manual* mode of operation to assist in the isolation of bad IBs, GBICs, host adapters, hubs, or cables. Refer to the `filtr` man page and Chapter 12 for additional information.

This test takes disks off the loop. If the arrays under test have an alternate path that enables the test path to be idled you can run this test on the unused loop of in use arrays, see the Volume Manager Path Management option below.

Note – Under no other circumstances should this test be run on arrays that are currently in use.

Single path arrays must be idle before running this test. Mirrored arrays can be made idle by either detaching (SEVM 2.x) or offlining (SDS 4.x) the mirror half.

A full pass can take over 90 minutes depending on the loop configuration and number of errors encountered. Failures that are easy to reproduce take about 7 minutes per array to isolate, meaning a single array run time is 7 minutes. A 4 array loop takes approximately 28 minutes.

Array FRU Isolation Tool Automatic Mode

FIGURE 9-19 shows the execution of the FRU Isolation Tool (`filtr`) in Automatic mode with the Regular mode selected.

FIGURE 9-19 shows the execution of the FRU Isolation Tool (`filtr`) in Automatic mode with the Binary mode selected.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Diagnostics
-----------------
.
.
.
Select an operation to perform: 5

StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: FRU Isolation Tool (filtr)
---------------------------------

Select a Loop to test:

 [1] (c3) (socal0:Port 0) (sf0) (/devices/sbus@1f,0/SUNW,socal@2,0:0) (27
Drives)
 [2] (c1) (socal1:Port 0) (sf2) (/devices/sbus@1f,0/SUNW,socal@3,0:0) (27
Drives)

 [q] Quit

Enter Choice: 1
Testing loop: /devices/sbus@1f,0/SUNW,socal@2,0:0
This test may take a few minutes.


Alert:  Older version of luxadm. Using luxdiag for bypassing/enabling.

WARNING:
 This test will be taking devices off and on the fibre loop.
 Devices on this path /devices/sbus@1f,0/SUNW,socal@2,0:0
 will not be accessible while running this test.

(Continued on Following Page)
```

FIGURE 9-19 Sun StorEdge A5x00 Array FRU Isolation Tool (`filtr`) Example (Automatic, Binary Mode)

```
 Do NOT run this test with arrays that are currently in use
 unless the loop has be queisced or disabled. Loops can be
 queisced or disabled by either stopping all I/O access to
 the arrays or by using the Volume Manager Path Management
 dmp path disable function if available. Reference the User
 Guide for more information.

ALSO:
 Please make sure all of the enclosure backplanes are enabled
 for the loop you are testing.
 If they are not the building of the list of arrays and
 backplanes will be flawed and results cannot be accurate.

 Do you want to continue? [y, <n>]: y

 filtr patterns options:
 [1]    Use failed patterns from previous loop test logs (if any)
 [2]    Use recovered patterns from previous filtr test logs (-r)
 [3]    Use a file containing user specified patterns (-f)
 [4]    Go find failing patterns (Full PHASE I)

 [q]    Quit

 Select an operation to perform  [<1>, 2, 3, 4, q]: 2


 filtr run options:


 Binary or regular search for bad backplanes and drives? [<r>, b, q]: b

 Automatic or manual mode?  [<a>, m, q]:

 Run disk I/O in conjunction with lbf? [<n>, y, q]: y

(Continued on Following Page)
```

Note – Pattern option 1 is displayed only if there were `lbf` failures while running the Loop Integrity Test or Disk Read Loop Test. Pattern option 2 is displayed only if there are patterns saved from a previous run of `filtr`.

The disk I/O selection is displayed only when binary mode is selected.

```
 Do re-testing on loop failure to see if soft error? [<y>, n]: n
      ******** Binary mode is on
      ******** Disk Stress loading is on
      ******** Retesting is off

filtr log output is saved in /var/opt/STORtools/logs/filtr/filtlog.c3.17038

Retrieving ses paths
..

Getting box names from ses paths
......

Appropriate IB FW level found for bypass testing (FW V1.07 Minimum).
  Testing begins.
 Box  Loop  Backplanes to test:
 ---  ----  ----------
[cbox] [a] [front]
[cbox] [a] [rear]
[dbox] [a] [front]
[dbox] [a] [rear]

Creating list of drives and their names.
.................................

 *
 * PHASE I * Find failing patterns
 *
 Do you want filtr to continue and use these patterns or quit?
/devices/sbus@1f,0/SUNW,socal@2,0:0
aa55aa55
dfdfdfdf
5f5f5f5f
5c5c5c5c


 [1] use the patterns above.
 [q] quit

 Select option [<1>, q]: 1

(Continued on Following Page)
```

```
 * PHASE II * Attempt to isolate FRU with failing/default patterns.
 *
Entering Loop testing for /devices/sbus@1f,0/SUNW,socal@2,0:0
Tue May 11 06:54:07 PDT 1999

Skipping enabling of all backplanes. You've done this? Right?
If NOT type control-c and enable all drives and backplanes and restart this.

Testing with all backplanes enabled using dex I/O.

If this fails we will continue testing
to find failing drives and backplanes.

starting dex on [ cbox,f3 cbox,r0 cbox,r4 dbox,f1 dbox,f6 dbox,r3]
lbf testing pattern [aa55aa55]
.....
lbf status: PASS
.starting dex on [ cbox,f3 cbox,r0 cbox,r4 dbox,f1 dbox,f6 dbox,r3]
lbf testing pattern [dfdfdfdf]
.....
lbf status: PASS
starting dex on [ cbox,f3 cbox,r0 cbox,r4 dbox,f1 dbox,f6 dbox,r3]
lbf testing pattern [5f5f5f5f]
..
lbf status: FAIL
Test with all backplanes enabled failed.
Further testing required. We will try to isolate failing backplanes/drives.
First we will bypass all backplanes.
bypassing cbox front backplane
bypassing cbox rear backplane
bypassing dbox front backplane
bypassing dbox rear backplane
Bypassing of backplanes complete.
 ## Failures found for A5000 [cbox] while both backplanes enabled:

******TEST_SINGLE_BACKPLANE for box = cbox backplane = front
 Start test with front backplane in enclosure "cbox" enabled.

Starting LBF patterns on Single Backplane:
starting dex on [ cbox,f0 cbox,f1 cbox,f2 cbox,f3 cbox,f4 cbox,f5 cbox,f6]
lbf testing pattern [aa55aa55]
.......................................
lbf status: PASS
```

(Continued on Following Page)

```
.starting dex on [ cbox,f0 cbox,f1 cbox,f2 cbox,f3 cbox,f4 cbox,f5 cbox,f6]
lbf testing pattern [dfdfdfdf]
..
lbf status: FAIL
 ***** Test with front backplane in enclosure “cbox” FAILS!
        (A LOOP)
.Testing with drives:
Enabled = cbox,f1 cbox,f3 cbox,f5
Bypassed = cbox,f0 cbox,f2 cbox,f4 cbox,f6

starting dex on [ cbox,f1 cbox,f3 cbox,f5]
lbf testing pattern [aa55aa55]
..........
lbf status: PASS
.starting dex on [ cbox,f1 cbox,f3 cbox,f5]
lbf testing pattern [dfdfdfdf]
.
lbf status: FAIL
result: FAIL
Enabled = cbox,f0 cbox,f2 cbox,f4 cbox,f6
Bypassed = cbox,f1 cbox,f3 cbox,f5

starting dex on [ cbox,f0 cbox,f2 cbox,f4 cbox,f6]
lbf testing pattern [aa55aa55]
..........
lbf status: PASS
.starting dex on [cbox,f0 cbox,f2 cbox,f4 cbox,f6]
lbf testing pattern [dfdfdfdf]
.
lbf status: FAIL
******TEST_SINGLE_BACKPLANE for box = cbox backplane = rear
Start test with rear backplane in enclosure “cbox” enabled.

Starting LBF patterns on Single Backplane:
starting dex on [ cbox,r0 cbox,r1 cbox,r2 cbox,r3 cbox,r4 cbox,r5 cbox,r6]
lbf testing pattern [aa55aa55]
.............................................................
lbf status: PASS
.starting dex on [ cbox,r0 cbox,r1 cbox,r2 cbox,r3 cbox,r4 cbox,r5 cbox,r6]
lbf testing pattern [dfdfdfdf]
.............................................................
lbf status: PASS
```

(Continued on Following Page)

```
.starting dex on [ cbox,r0 cbox,r1 cbox,r2 cbox,r3 cbox,r4 cbox,r5 cbox,r6]
lbf testing pattern [5f5f5f5f]
.............................................................
lbf status: PASS
.starting dex on [ cbox,r0 cbox,r1 cbox,r2 cbox,r3 cbox,r4 cbox,r5 cbox,r6]
lbf testing pattern [5c5c5c5c]
.............................................................
lbf status: PASS
.
 Test with rear backplane in enclosure “cbox” PASSES

Errors detected on single backplane on Box [cbox].
Tue May 11 07:26:26 PDT 1999
Time elapsed in minutes: 32

 Want to run a manual test to further isolate the
possible failure? [y, <n>]:
 No backplanes to enable
 No drives to enable
Time elapsed in minutes: 49
Exiting Loop testing for /devices/sbus@1f,0/SUNW,socal@2,0:0
 Tue May 11 07:43:32 PDT 1999
*****************************************************
*****************************************************
*****************************************************
RESULTS OF TESTING /devices/sbus@1f,0/SUNW,socal@2,0:0

No individual drive errors.
Multiple drive errors.

Backplane Errors:

 front backplane in enclosure “cbox” FAILS!

[cbox front] backplane failed. This was determined by testing failures while
[cbos,f0 cbox,f2 cbox,f4 cbox,f6] enabled and [cbox,f1 cbox,f3 cbox,f5] bypassed
and then the reverse
[cbox,f1 cbox,f3 cbox,f5] enabled and [cbox,f0 cbox,f2 cbox,f4 cbox,f6]
bypassed.
This is more than one point of drive failure and therefore indicates a backplane
 problem
Errors detected on single backplane on Box [cbox].
```

(Continued on Following Page)

```
******************************************************
******************************************************
******************************************************

>>> /var/opt/STORtools/logs/filtr/filtlog.c3.17038 contains filtr output <<<

Remember to reenable the c3 path for Volume Manager if disabled.

Press <return> for previous menu ...
```

FRU Isolation Tool Manual Mode

FIGURE 9-20 shows the execution of the FRU Isolation Tool (`filtr`) in manual mode with the Regular option selected.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Diagnostics
-----------------
.
.
.
Select an operation to perform: 5

StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: FRU Isolation Tool (filtr)
--------------------------------

Select a Loop to test:

 [1] (c3) (socal0:Port 0) (sf0) (/devices/sbus@1f,0/SUNW,socal@2,0:0) (27
Drives)
 [2] (c1) (socal1:Port 0) (sf2) (/devices/sbus@1f,0/SUNW,socal@3,0:0) (27
Drives)

 [q] Quit

Enter Choice: 1
Testing loop: /devices/sbus@1f,0/SUNW,socal@2,0:0
This test may take a few minutes.


Alert:  Older version of luxadm. Using luxdiag for bypassing/enabling.

WARNING:
 This test will be taking devices off and on the fibre loop.
 Devices on this path /devices/sbus@1f,0/SUNW,socal@2,0:0
 will not be accessible while running this test.

(Continued on Following Page)
```

FIGURE 9-20 FRU Isolation Tool (`filtr`) Example (Manual, Regular Mode)

```
 Do NOT run this test with arrays that are currently in use
 unless the loop has be queisced or disabled. Loops can be
 queisced or disabled by either stopping all I/O access to
 the arrays or by using the Volume Manager Path Management
 dmp path disable function if available. Reference the User
 Guide for more information.

ALSO:
 Please make sure all of the enclosure backplanes are enabled
 for the loop you are testing.
 If they are not the building of the list of arrays and
 backplanes will be flawed and results cannot be accurate.

 Do you want to continue? [y, <n>]: y

 filtr patterns options:
 [2]    Use recovered patterns from previous filtr test logs (-r)
 [3]    Use a file containing user specified patterns (-f)
 [4]    Go find failing patterns (Full PHASE I)

 [q]    Quit

 Select an operation to perform  [<1>, 2, 3, 4, q]: 2

filtr run options:

 Binary or regular search for bad backplanes and drives? [<r>, b, q]:
Search mode is non-binary

 Automatic or manual mode?  [<a>, m, q]: m


 Do re-testing on loop failure to see if soft error? [<y>, n]:
      ******** Manual mode
      ******** Retesting is off

filtr log output is saved in /var/opt/STORtools/logs/filtr/filtrlog.c3.18468

Retrieving ses paths
..

Getting box names from ses paths
............

(Continued on Following Page)
```

```
Appropriate IB FW level found for bypass testing (FW V1.07 Minimum).
  Testing begins.
Box  Loop  Backplanes to test:
---  ----  ----------
[cbox] [a] [front]
[cbox] [a] [rear]
[dbox] [a] [front]
[dbox] [a] [rear]
*
* PHASE I * Find failing patterns
*
Do you want filtr to continue and use these patterns or quit?
/devices/sbus@1f,0/SUNW,socal@2,0:0
aa55aa55
7b7b7b7b

[1] use the patterns above.
[q] quit

Select option [<1>, q]:
*
* Phase II * Going into Manual mode testing
*
 Creating list of drives and their names.
.................................
Wed May 12 11:53:45 PDT 1999

The following is a suggested procedure for Manual Testing using the
Loop Integrity Test (LIT). Reference the STORtools User Guide for more
information on loop troubleshooting.

1). Attach loopback cable to Host Adapter GBIC. Test. PASS - goto step 2.
    FAIL - replace the GBIC. Test. PASS - goto step 8.
       FAIL - replace Host Adapter. Test. PASS - goto step 8.
          FAIL - possible bad replacement part, Loop back cable or I/O card.

2) If a hub is used remove all array GBICs. Test.
   PASS (or hub not used) - goto step 3.
   FAIL - replace hub GBIC. Test. PASS - goto step 8.
      FAIL - replace cable. Test. PASS - goto step 8.
         FAIL - replace hub. Test. goto step 8.
            FAIL - possible bad replacement part or host adapter GBIC.
```

(Continued on Following Page)

```
3). For a single array proceed to step 4, else locate problem array by
    connecting one array to the loop at a time and retesting. When test
    fails on an array proceed with step 4 for that array. If multiple
    arrays fail repeat step 4 for each array.

4). If a hub is used attach a loop back cable to the array hub GBIC. Test.
    PASS (or hub not used) - goto step 5.
    FAIL - replace GBIC. Test. PASS - goto step 8.
       FAIL - possible bad hub port or other GBIC.

5). Reconnect array to the loop. Bypass both backplanes. Test.
    PASS - goto step 6.
    FAIL - replace array GBIC. Test. PASS - goto step 8.
       FAIL - replace array IB. Test. PASS - goto step 8.
          FAIL - replace cable. Test. PASS - goto step 8.
            FAIL - possible bad replacement part or other GBIC.

6). Enable the front backplane. Test. PASS - goto step 7.
    FAIL - for each disk on the backplane do the following:
       Bypass disk. Test. FAIL - enable disk, continue to next disk.
       PASS - enable disk, replace disk. Test. PASS - goto step 8.
          FAIL - possible bad backplane, replacement disk, IB or GBIC.

      If test fails for all or multiple disks, replace backplane. Test.
      PASS - goto step 8,
      FAIL - possible bad IB, GBIC or Interconnect Assembly.

7). Enable the rear backplane. Test.
    FAIL - repeat the following for each disk on the backplane:
      Bypass disk. Test. FAIL - enable disk, continue to next disk.
      PASS - enable disk, replace disk. Test. PASS - goto step 8.
        FAIL - possible bad backplane, replacement disk, IB or GBIC.

      If test fails for all disks, replace backplane. Test.
      PASS - goto step 8.
      FAIL - possible bad IB, GBIC or Interconnect Assembly.

    If problem can only be reproduced when both backplanes are
    enable. Enable both backplanes but enable only the minimum disk
    configuration (14 slot min config is f3, f6, r0, r3, r6. 22 slot
    min config is f0, f5, f10, r0, r3, r6, r10). Test.
```

(Continued on Following Page)

```
    PASS - enable each disk until test fails then replace failing disk.
    FAIL - possible problem cause is one of the min config disks, or any
           other loop hardware (backplanes, IB, GBICs, Interconnect Assembly).
8). Reconnect and enable all hardware. Test.
    FAIL - goto step 1.
    PASS - exit.

When the loop and arrays are passing the basic Loop Integrity Test. It is
recommended that you further verify the loop integrity using the Disk
Read Loop Test as some failures can only be produced under heavy load.
Reference the User Guide for more information.




 Path under test = /devices/sbus@1f,0/SUNW,socal@2,0:0

1) Test (LIT with failing patterns              4) Bypass Element(s)
2) Display Manual Test procedure                5) Enable Element(s)
3) Force LIP on loop                            6) Toggle Dex/IO to on.
q) Exit
 Enter choice [1, 2, 3, 4, 5, 6 q]:
```

FIGURE 9-21 shows the execution of the FRU Isolation Tool (`filtr`) in manual mode with the Binary option selected.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Diagnostics
-----------------
.
.
.
Select an operation to perform: 5

StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: FRU Isolation Tool (filtr)
--------------------------------

Select a Loop to test:

 [1] (c3) (socal0:Port 0) (sf0) (/devices/sbus@1f,0/SUNW,socal@2,0:0) (27
Drives)
 [2] (c1) (socal1:Port 0) (sf2) (/devices/sbus@1f,0/SUNW,socal@3,0:0) (27
Drives)

 [q] Quit

Enter Choice: 1
Testing loop: /devices/sbus@1f,0/SUNW,socal@2,0:0
This test may take a few minutes.


Alert:  Older version of luxadm. Using luxdiag for bypassing/enabling.

WARNING:
 This test will be taking devices off and on the fibre loop.
 Devices on this path /devices/sbus@1f,0/SUNW,socal@2,0:0
 will not be accessible while running this test.

(Continued on Following Page)
```

FIGURE 9-21 FRU Isolation Tool (`filtr`) Example (Manual, Binary Mode)

```
 Do NOT run this test with arrays that are currently in use
 unless the loop has be queisced or disabled. Loops can be
 queisced or disabled by either stopping all I/O access to
 the arrays or by using the Volume Manager Path Management
 dmp path disable function if available. Reference the User
 Guide for more information.

ALSO:
 Please make sure all of the enclosure backplanes are enabled
 for the loop you are testing.
 If they are not the building of the list of arrays and
 backplanes will be flawed and results cannot be accurate.

 Do you want to continue? [y, <n>]: y

 filtr patterns options:
 [2]    Use recovered patterns from previous filtr test logs (-r)
 [3]    Use a file containing user specified patterns (-f)
 [4]    Go find failing patterns (Full PHASE I)

 [q]    Quit

 Select an operation to perform  [<1>, 2, 3, 4, q]: 2


filtr run options:

 Binary or regular search for bad backplanes and drives? [<r>, b, q]: b

 Automatic or manual mode?  [<a>, m, q]: m


Run disk I/O in conjunction with lbf? [<n>, y, q]: y

 Do re-testing on loop failure to see if soft error? [<y>, n]:
      ******** Binary mode is on
      ******** Disk stress loading is on
      ******** Manual mode

filtr log output is saved in /var/opt/STORtools/logs/filtr/filtrlog.c3.15851

Retrieving ses paths
..
(Continued on Following Page)
```

```
Getting box names from ses paths
............

Appropriate IB FW level found for bypass testing (FW V1.07 Minimum).
  Testing begins.
Box  Loop  Backplanes to test:
---  ----  ----------
[cbox] [a] [front]
[cbox] [a] [rear]
[dbox] [a] [front]
[dbox] [a] [rear]

*
* PHASE I * Find failing patterns
*
Do you want filtr to continue and use these patterns or quit?
/devices/sbus@1f,0/SUNW,socal@2,0:0
aa55aa55
7b7b7b7b

[1] use the patterns above.
[q] quit

Select option [<1>, q]: 1

*
* Phase II * Going into Manual mode testing
*

 Creating list of drives and their names.
..............................
Wed May 12 11:06:36 PDT 1999




The following is a suggested procedure for Manual Testing using the
Disk Read Loop Test (DRLT). Reference the STORtools User Guide for more
information on loop troubleshooting.
```

(Continued on Following Page)

```
Multiple Array Configuration
----------------------------
1). For a single array proceed to step 3, else locate problem array by
    connecting one array to the loop at a time and retesting. When test
    fails on an array proceed with step 3 for that array. If multiple
    arrays fail, repeat step 3 for each array.

   If all arrays fail goto step 2.

2). When all arrays fail independently the problem cause is probably
    in a GBIC, host adapter, cable or hub (if used). Leave one array
    connected and replace the following hardware until the test passes.
       Host adapter to hub (if used) GBICs.
       Hub (if used) to array GBICs.
       Hub and or Cable/s.
       Array IB.
       Host adapter.

  Test PASS - goto step 7.
  Test FAIL - possible bad replacement parts, or array failure. Repeat
              step 2 with alternate array.

Single Array Configuration
--------------------------
3). Bypass the front backplane. Test. PASS goto step 4.
    FAIL - enable front backplane, bypass rear backplane. Test.
       PASS - goto step 6.
       FAIL - both backplanes failing indicates possible problem
              cause is not in the backplane and disks, goto step 5.

4). Enable the front backplane and disable the rear backplane. Test.
    PASS - goto step 5.
    FAIL - goto step 6.

5). When both backplanes either pass or fail independently the problem
    cause may not be in the backplanes and disks or there may be multiple
    problems.

    For a single array configuration replace the following hardware until the
    test passes.
       Host Adapter GBIC.
       Array GBIC.
```

(Continued on Following Page)

```
       Cable.
       Array IB.
       Host adapter.
       Array Interconnect Assembly.

    For a multiple array configuration replace the following until the
    test passes (note that the host adapter/GBIC and hub/GBIC have
    already been tested).
       Array to hub GBICs.
       Cable.
       Array IB.
       Hub (could be a bad port on the hub).
       Array Interconnect Assembly.

    If test continues to fail there may be multiple problems in
    the backplanes and or disks. Try testing with only the minimum
    configuration of disks enabled (14 slot min config is f3, f6,
    r0, r3, r3. 22 slot min config is f0, f5, f10, r0, r3, r6, r10).
    If test continues to fail possible problem cause is one of the
    min config disks, or any other loop hardware (backplanes, IB, GBICs,
    Interconnect Assembly).

6). When the Test passes with one backplane bypassed, that backplane
    contains the problem. To further diagnose enable the suspect
    backplane and do the following for each disk:
      Bypass disk. Test. FAIL - enable disk, continue to next disk.
      PASS - enable disk and replace. Test. PASS - goto step 7.
         FAIL - possible bad backplane, replacement disk, IB or GBIC.

      If test fails for all disks, replace backplane. Test.
      PASS - goto step 7.
      FAIL - possible bad IB, GBIC or Interconnect Assembly.

7). Reconnect and enable all hardware elements. Test. PASS - exit.
    FAIL - goto step 1.


 Path under test = /devices/sbus@1f,0/SUNW,socal@2,0:0

1) Test (LIT with failing patterns with dex)      4) Bypass Element(s)
2) Display Manual Test procedure                  5) Enable Element(s)
3) Force LIP on loop                              6) Toggle Dex/IO to off.
q) Exit
 Enter choice [1, 2, 3, 4, 5, 6 q]:
```

StorEdgeDr (sedr)

The Sun StorEdge T300 disk tray has built-in diagnostic capabilities for its internal components, but does not provide diagnostic support for the loop media or the host bus adapter (HBA). The `sedr`(1M) command (StorEdgeDr) diagnoses the HBA and loop media and then runs the disk exerciser (`dex32`(1M)) on the Sun StorEdge T300 disk tray LUNs. If there is a failure of the Sun StorEdge T300 disk trays, `sedr` relies on the units to reporting the error via to`/var/adm/messages.t300`.

StorEdge Dr. covers diagnostics from a system level. For Sun StorEdge A5x00 arrays and Sun StorEdge T300 disk trays, StorEdge Dr. starts by testing the Host Bus Adapter. Then the fiber connection is tested using Loop Integrity Test and Finally The Entire subsystem is tested using `dex32`. If failures are found then `filtr` is invoked automatically for FRU isolation.

Note – Execution of `sedr` assumes that the Sun StorEdge T300 disk tray error log is forwarded to `/var/adm/messages.t300`. See Chapter 8 for the procedure for monitoring Sun StorEdge T300 disk tray messages.

If any failure of the HBA is detected during the HBA test performed by `sedr`, the HBA should be replaced.

If any failure is detected by the loop media test, the loop media components should be verified and/or replaced. The loop media components include: the GBICs, MIA (Media Interface Adaptor), Fibre Channel cables, and hubs or switches. The diagnostic tool `lbf` (loop back frame) is used to verify the loop media. If a loop media failure is detected by `sedr`, `filtr` manual mode for the Sun StorEdge T300 disk tray is invoked. See page 36 for additional information about `filtr` manual mode. On PCI QLogic 2100 FC-ALs a quick `dex32` test is used to test connectivity. Obviously, the T300 storage must be functioning and the ability of `sedr` to definitively isolate the failing FRU to a loop media component on the PCI QLogic 2100 FC-ALs is limited.

The last test performed by `sedr` is the disk exerciser (`dex32`). After completion of `dex32`, the Sun StorEdge T300 disk tray error log and the system log are scanned. If no errors are detected in the logs and the `dex32` completion status is okay, the Sun StorEdge T300 disk tray units are functional. If an error is detected by a scan of the logs, `sedr` will prompt the user to view the logs. If a scan of `/var/adm/messages.t300` detects an error, the error message should identify the failing Sun StorEdge T300 disk tray FRU. If a scan of `/var/adm/messages` detects an error, the error message should point to the cause of failure. In most cases this should be a loop media or HBA failure. If a `dex32` error is detected without any error in `/var/adm/messages.t300` or `/var/adm/messages`, the `dex32` error should point to the failing FRU.

An example of sedr execution in verbose mode with an unlabeled LUN is shown in FIGURE 9-22.

```
StorTools Storage Management    Version    STORtools 3.3 Alpha 3.1 03/21/00
StorEdge on host diag250.Central.Sun.COM.
Menu: Diagnostics
-----------------

 [1] Loop Integrity Test (light load)
 [2] Disk Read Loop Test (heavy load)
 [3] Host Adaptor Test
 [4] Disk Load Generator / Exerciser
 [5] FRU Isolation Tool (filtr )
 [6] Log File Manager
 [7] Display Last Loop Test Summary
 [8] StorEdgeDr (sedr)


 [q] Quit

Select an operation to perform: 8



StorTools Storage Management    Version    STORtools 3.3 Alpha 3.1 03/21/00
StorEdge on host diag250.Central.Sun.COM.
Menu: StorEdgeDr
----------------

 [1] Start StorEdgeDr
 [2] StorEdgeDr Log Manager

 [q] Quit

Select an operation to perform: 1



Debug Created
CAUTION: DO NOT run this test while other loop diagnostics
         or I/O are running on the loop to be tested.

(Continued on Following Page)
```

FIGURE 9-22 Sun StorEdge A5x00 Array FRU Isolation Tool (sedr) Example

```
Loops Available for Testing
---------------------------
1. (c2) (sf1) /devices/sbus@3,0/SUNW,socal@d,10000/sf@1,0:devctl (2 Drive(s))
2. (c11) (sf3) /devices/sbus@3,0/SUNW,socal@0,0/sf@1,0:devctl (2 Drive(s))
3. (c3) (sf5) /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0:devctl (11 Drive(s))
4. (c13) (fp11) /devices/pci@8,2000/pci@2/SUNW,qlc@5/fp@0,0:devctl (2 Drive(s))
5. (c7) (fp12) /devices/pci@9,2000/pci@2/SUNW,qlc@4/fp@0,0:devctl (44 Drive(s))
6. (c14) (fp13) /devices/pci@9,2000/pci@2/SUNW,qlc@5/fp@0,0:devctl (20
Drive(s))
7. (c6) (ifp0) /devices/pci@f,2000/SUNW,ifp@2:devctl (22 Drive(s))

Enter comma or space delimited list of loops, [a,#,<q>]: 3



StorTools Storage Management    Version    STORtools 3.3 Alpha 3.1 03/21/00
StorEdge on host diag250.Central.Sun.COM.
Menu: StorEdgeDr
----------------

Options                         Value
============================    ====================
[p] Port(s) under test:
                     (c3) /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0:devctl

[c] Data Path Pass Count         1000 pass(es)
[d] dex Duration                 10 minute(s)
[h] HBA test                     skip
[v] Verbose                      verbose

[r] Run

[q] Quit

Enter Selection [<r>,p,c,d,h,o,v,q]: d
Please enter run-time in minutes [between 1 and 1440, <10>]: 2
Options                         Value
============================    ====================
[p] Port(s) under test:
                     (c3) /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0:devctl

(Continued on Following Page)
```

```
[c] Data Path Pass Count         1000 pass(es)
[d] dex Duration                 2 minute(s)
[h] HBA test                     skip
[v] Verbose                      verbose

[r] Run

[q] Quit

Enter Selection [<r>,p,c,d,h,o,v,q]: r


BEGIN LOOP TEST

INFO : start of Data Path test(lbf) from sedr
..

INFO : end of Data Path test(lbf) test from sedr
INFO : Data Path test(lbf) from sedr finished

Scanning message logs for errors.
No errors detected in message logs.

Data Path test(lbf) Summary

LOOP: (c3) /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0:devctl    PASS
 ****** Test Passed ******
END OF LOOP TEST

START STORAGE TEST

INFO : start of Storage test(dex) ro test from sedr
............................
    Monitor physmem with vmstat to prevent memory starvation
    Monitor /var/adm/messages for disk problems and warnings

********* READ TEST *******

Transfer size= 128 KB
Range= 8 GB
Error limit= 1000
```

(Continued on Following Page)

```
Sequential Read Test for 2 min.
Pass 0, Errors 0, Elapsed time= 2:10 min.

Testing passed


********* END TEST *********

INFO : end of Storage test(dex) ro test from sedr
INFO : Storage test(dex) ro test from sedr finished

Scanning message logs for errors.
No errors detected in message logs.

Storage test(dex) Summary

LOOP: (c3) /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0:devctl    PASS
 ****** Test Passed ******


END OF STORAGE TEST

Press return to continue.....
```

An example of sedr execution in verbose mode with an unlabeled LUN is shown in FIGURE 9-23.

```
StorTools Storage Management    Version    STORtools 3.3 Alpha 3.1 03/21/00
StorEdge on host diag250.Central.Sun.COM.
Menu: StorEdgeDr
----------------




Options                          Value
==========================     ====================
[p] Port(s) under test:
                     (c3) /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0:devctl

[c] Data Path Pass Count         1000 pass(es)
[d] dex Duration                 2 minute(s)
[h] HBA test                     skip
[v] Verbose                      verbose

[r] Run

[q] Quit

Enter Selection [<r>,p,c,d,h,o,v,q]: p

Loops Available for Testing
---------------------------
1. (c2) (sf1) /devices/sbus@3,0/SUNW,socal@d,10000/sf@1,0:devctl (2 Drive(s))
2. (c11) (sf3) /devices/sbus@3,0/SUNW,socal@0,0/sf@1,0:devctl (2 Drive(s))
3. (c3) (sf5) /devices/sbus@a,0/SUNW,socal@d,10000/sf@1,0:devctl (11 Drive(s))
4. (c13) (fp11) /devices/pci@8,2000/pci@2/SUNW,qlc@5/fp@0,0:devctl (2 Drive(s))
5. (c7) (fp12) /devices/pci@9,2000/pci@2/SUNW,qlc@4/fp@0,0:devctl (44 Drive(s))
6. (c14) (fp13) /devices/pci@9,2000/pci@2/SUNW,qlc@5/fp@0,0:devctl (20
Drive(s))
7. (c6) (ifp0) /devices/pci@f,2000/SUNW,ifp@2:devctl (22 Drive(s))

Enter comma or space delimited list of loops, [a,#,<q>]: 1

(Continued on Following Page)
```

FIGURE 9-23 Sun StorEdge T300 Disk Tray FRU Isolation Tool (sedr) Example

```
Options                          Value
============================     ====================
[p] Port(s) under test:
                     (c2) /devices/sbus@3,0/SUNW,socal@d,10000/sf@1,0:devctl

[m] Dual Port Mode(T300 STORAGE) primary
[c] Data Path Pass Count         1000 pass(es)
[d] dex Duration                 2 minute(s)
[h] HBA test                     skip
[v] Verbose                      verbose

[r] Run

[q] Quit

Enter Selection [<r>,p,m,c,d,h,o,v,q]: r

BEGIN LOOP TEST

INFO : start of Data Path test(lbf) from sedr

FAIL=43  Pat=0xd4d4d4d4   Cnt=68    /devices/sbus@3,0/SUNW,socal@d,10000:1

FAIL=43  Pat=0xd4d4d4d4   Cnt=68    /devices/sbus@3,0/SUNW,socal@d,10000:1
FAIL=43  Pat=0xd4d4d4d4   Cnt=69    /devices/sbus@3,0/SUNW,socal@d,10000:1
FAIL=43  Pat=0xd4d4d4d4   Cnt=70    /devices/sbus@3,0/SUNW,socal@d,10000:1
FAIL=43  Pat=0xd4d4d4d4   Cnt=71    /devices/sbus@3,0/SUNW,socal@d,10000:1
FAIL=43  Pat=0xd4d4d4d4   Cnt=72    /devices/sbus@3,0/SUNW,socal@d,10000:1
PASS    Pat=0xd4d4d4d4   Cnt=100   /devices/sbus@3,0/SUNW,socal@d,10000:1
PASS    Pat=0xd3d3d3d3   Cnt=100   /devices/sbus@3,0/SUNW,socal@d,10000:1

INFO : end of Data Path test(lbf) test from sedr
INFO : Data Path test(lbf) from sedr finished

Scanning message logs for errors.
No errors detected in message logs.

Data Path test(lbf) Summary

LOOP: (c2) /devices/sbus@3,0/SUNW,socal@d,10000/sf@1,0:devctl   ++++ FAIL ++++
 ****** Test FAILED ******
```

(Continued on Following Page)

```
 Test status: -1

A scan of the systems logs did not detect any errors.
Problem most likely a data path problem.

  FC-AL connect to the T300 failed.
  Check GBIC connections. Make sure that the bail is in the correct postion.
  Check MIA connection. If all are secure, replace one item at a time starting
  with a single GBIC. Re-run the test.  If replacing the GBICs does not
  correct the problem, change the MIA and re-start the test. If replacing
  the MIA does not correct the problem, replace the FC-AL cable and re-test.
  If the problem persists try replacing either the T300 FC-AL
  board or the FC-AL HBA adapter. During each re-test always make sure the
  the error reported is consistent before changing a new part. For instance,
  if changing the GBIC consistently produces a 5A's pattern failure and the
  original GBIC consistantly produced a 7E's pattern failure, both GBICs may
  be faulty.

filtr is the best method for isolating data path FRUs.
Invoke filtr on /devices/sbus@3,0/SUNW,socal@d,10000/sf@1,0:devctl [ <y>, n ]?
y

WARNING:
 This test will be taking devices off and on the fibre loop.
 Devices on this path /devices/sbus@3,0/SUNW,socal@d,10000:1
 will not be accessible while running this test.

 Do NOT run this test with arrays that are currently in use
 unless the loop has be quiesced or disabled. Loops can be
 quiesced or disabled by either stopping all I/O access to
 the arrays or by using the Volume Manager Path Management
 dmp path disable function if available. Reference the User
 Guide for more information.

ALSO:
 Please make sure all of the enclosure backplanes are enabled
 for the loop you are testing.
 If they are not enabled the building of the list of arrays and
 backplanes will be flawed and results cannot be accurate.

 Are you sure you want to continue? [y, <n>]: y
```

(Continued on Following Page)

```
 Generating loop map

 ****************************
 * Found a T300 on this loop *
 ****************************


 /devices/sbus@3,0/SUNW,socal@d,10000:1 has a T300 on it:  Running filtr in
T300 mode

 filtr patterns options:
 [1]    Use failed patterns from previous loop test logs (if any)
 [2]    Use recovered patterns from previous filtr test logs (-r)
 [3]    Use a file containing user specified patterns (-f)
 [4]    Go find failing patterns (Full PHASE I)

 [q]    Quit

 Select an operation to perform  [<1>, 2, 3, 4, q]: 1

 Automatic or manual mode?  [<a>, m, q]:

 Do re-testing on loop failure to see if soft error?  [<n>, y]:
      ******** Disk stress loading is off
      ******** Testing a T300
      ******** Retesting is off

filtr log output is saved in /var/opt/STORtools/logs/filtr/filtlog.c2.13567

 *
 * PHASE I * Find failing patterns
 *
"sedr" found the following patterns:
 (from /var/opt/STORtools/logs/sedr/sedr.log.9543.str.lbf.c2)

.....................................................................
d4d4d4d4
d4d4d4d4
d4d4d4d4
d4d4d4d4
d4d4d4d4
```

(Continued on Following Page)

```
 Do you want filtr to continue and use these patterns or quit?

 [1] use the patterns above.
 [q] quit

 Select option [<1>, q]: 1

 *
 * PHASE II * Attempt to isolate FRU with failing/default patterns.
 *

Entering Loop testing for /devices/sbus@3,0/SUNW,socal@d,10000:1
Wed Mar 22 11:43:15 MST 2000
Testing T300 on path = /devices/sbus@3,0/SUNW,socal@d,10000:1

lbf testing pattern [d4d4d4d4] (iterations = 8192)
.
lbf status: PASS
.lbf testing pattern [d4d4d4d4] (iterations = 8192)
.
lbf status: PASS
.lbf testing pattern [d4d4d4d4] (iterations = 8192)
.
lbf status: PASS
.lbf testing pattern [d4d4d4d4] (iterations = 8192)
.
lbf status: PASS
.lbf testing pattern [d4d4d4d4] (iterations = 8192)
.
lbf status: PASS
.Test passes.
No further testing required. Cleaning up and exiting.
Time elapsed in minutes: 0
Exiting Loop testing for /devices/sbus@3,0/SUNW,socal@d,10000:1:
 Wed Mar 22 11:43:48 MST 2000
```

(Continued on Following Page)

```
 ****************************************************
 ****************************************************
 ****************************************************

 RESULTS OF TESTING /devices/sbus@3,0/SUNW,socal@d,10000:1


  T300 pass!


 ****************************************************
 ****************************************************
 ****************************************************
```

(Continued on Following Page)

Log File Manager

Use selection 6 on the Diagnostics Menu to examine and purge the diagnostic log files. Logs can be examined for the Loop Integrity Test, Disk Exercisers, and FRU Isolation Tool tests. Loop Test log displays will be either the entire test run (full log) or failures only. Logs are organized by controller number.

Display Last Loop Test Summary

Use selection 7 on the Diagnostics Menu for a quick summary of the last Loop Integrity Test run. This is useful on very large multiple loop systems to identify loops with errors.

Volume Manager Path Management

Selection 9 on the Diagnostics Menu appears only in the environments where Volume Manager is installed.

The Volume Manager Path Management option enables you to software disable a specific volume manager Dynamic Multi-Pathing (DMP) path to an array or arrays. On VM 2.6, the path is specified using its controller number (c#) and will be disabled only if an alternate DMP path is available. On VM 2.6, the path is specified using its controller device path. StorTools does not support VM 3.0.2. Use the VM command line interface instead.

Note – This option enables online troubleshooting of arrays that are currently in use.

The path to the suspect loop can be disabled, which idles all I/O to the loop and safely enables the use of the FRU Isolation Tool and/or manual Process of Elimination (POE) techniques to isolate loop failures.

The example in FIGURE 9-24 shows the execution of the Volume Manager 3.0.2 Path Management utility.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Diagnostics
-----------------
 .
 .
 .
 [9] Volume Manager Path Management
 .
 .
 .
Select an operation to perform: 9
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: VM Path Management Utility
--------------------------------
This function allows you to disable a specific volume
manager path to the array(s), or (re)activate
all disabled paths.

 [1] Activate All Paths
 [2] Disable Path

 [?] Help
 [q] Quit

Select an operation to perform: 2

Loops Available for Testing
--------------------------
1. (c1) (sf1) /devices/sbus@3,0/SUNW,socal@d,10000:1 (2 Drive(s)) : 1 Pri, 1 Alt
2. (c3) (sf0) /devices/sbus@3,0/SUNW,socal@d,10000:0 (2 Drive(s)) : 1 Pri, 1 Alt

Enter comma or space delimited list of loops, [a,#,q]: 1
Please wait ...

vxvm:vxdmpadm: ERROR: Attempt to fail last active path of a device.

Press <return> for previous menu ...
```

FIGURE 9-24 Volume Manager Path Management Utility Example

Note – The example in FIGURE 9-24 shows an unsuccessful attempt to disable the last active path to an array subsystem. The `Disable Path` function checks for an active alternate path and will not perform the disable if an alternate path is not available. This is a safety feature to prevent the accidental disabling of a last active path.

Before disabling a path verify the alternate path for proper operation with an error free run of the Loop Integrity Test.

CHAPTER 10

Verifying the Installation

Selection 7 (`Installation Verification`) on the `stormenu` Main Menu uses either the `dex` I/O load generator and the `lbf` loop diagnostic (SBus systems) or the `dex` I/O load generator (PCI Bus systems) to perform extended stress testing of the fiber loop and disk drives. Default run times for these tests are 6 hours although longer and shorter times may be specified. The tests may be run in either the foreground for monitoring or the background allowing menu exit, then reentry, and status checking at a later time.

All message and error information generated during the test runs are saved in log files, which can be examined using the `Log File Manager` selection on the Installation Verification Menu.

This chapter contains the following topics:

Installation Verification Menu

Once selected from the Main Menu, `Installation Verification` displays the Installation Verification Menu as shown in FIGURE 10-1.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Main
----------
 .
 .
 .
 [7] Installation Verification
 .
 .
 .
Select an operation to perform: 7
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Installation Verification
------------------------------

 [1] Start Exerciser
 [2] Check Exerciser Status
 [3] Stop Exerciser
 [4] Log File Manager

 [q] Quit

Select an operation to perform:
```

FIGURE 10-1 Installation Verification Menu

Starting the Exerciser

When you select option `1` (`Start Exerciser`) from the Installation Verification Menu, the Installation Verification Test displays the available options as shown in FIGURE 10-2. The options are described in TABLE 10-1.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Installation Verification
-------------------------------

 [1] Start Exerciser
 [2] Check Exerciser Status
 [3] Stop Exerciser
 [4] Log File Manager

 [q] Quit

Select an operation to perform: 1

StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Installation Verification Test
-----------------------------------

CAUTION: Do NOT run this test while other loop diagnostics
        or I/O are running on the loop to be tested.


Valid Options                                Value
=====================                        ========================
[m] Dual Port Mode                           primary
[l] Loop(s) under test                       c0 c1
[t] Test Duration                            360 (minutes)
[w] Test Environment                         Foreground
[p] Program                                  seq_dex

[r] Run

[q] Quit

Enter Selection:
```

FIGURE 10-2 Installation Verification Test Options

Note – The `m` option (`Dual Port Mode`) is only applicable to Sun StorEdge T300 disk trays.

TABLE 10-1 Installation Verification Test Options

Option	Description
[m] Dual Port Mode	Toggles between primary and alternate modes. The default is primary. This option is only applicable to Sun StorEdge T300 disk trays.
[l] Loops(s) under test	Displays a menu of the available loops. The default is to test all available loops.
[t] Test Duration	Enables you to change the test runtime. The default is 360 minutes.
[w] Test Environment	Toggles between background and foreground. The default is to run the test in the background.
[p] Program	Toggles between ran_dex and seq_dex. The default is seq_dex.
[r] Run	Starts the Installation Verification Test.
[q] Quit	Exits this menu.

Selecting a Loop for Testing

When you select option l (Loop(s) under test) from the Installation Verification Test menu, the program displays a list of available loops. An example for a Sun StorEdge A5*x*00 array is shown in FIGURE 10-3 and an example for a Sun StorEdge T300 disk tray is shown in FIGURE 10-3.

```
Loops Available for Testing.
----------------------------
1. (c1) (ifp2) /devices/pci@1f,4000/SUNW,ifp@5,0:0 (4 Drives)
2. (c2) (ifp1) /devices/pci@1f,4000/SUNW,ifp@4,0:0 (10 Drives)

Enter comma or space delimited list of loops, [a,#,<q>]:
```

FIGURE 10-3 Loop Selection Display - Installation Verification Test

Type a to test all loops, a list of desired loops, or q to exit the menu. Use either a comma or space between entries.

Changing the Test Execution Time

When you select option `t` (`Test Duration`) from the Installation Verification Test menu, the program issues the following prompt:

```
Please enter run-time in minutes [between 1 and 1440, <360>]:
```

Press the Enter key to select the default run-time of 360 minutes or type the desired time between 1 and 1440 minutes.

Note – For Sun StorEdge T300 disk tray series storage, the execution time is divided equally between the Primary and Alternate paths. The Primary path is used for the first half off Installation Verification. The Secondary path is used thereafter.

Selecting the Test Environment

When you select option `w` (`Test Environment`) from the Installation Verification Test menu, the program toggles between running the test in the `Background` and running the test in the `Foreground`.

Selecting the Program

When you select option `p` (`Program`) from the Installation Verification Test menu, the program toggles between the `ran_dex` test and the `seq_dex` test. Both tests perform one Sequential I/O operation per pass across 8 Gbytes of the device media. The number of passes is determined by the test execution time. Each I/O operation is read only and uses a 128 Kbyte (`seq_dex`) or 1 Kbyte (`ran_dex`) transfer size.

Running the Test

Select option `r` (`Run`) from the Installation Verification Test menu to start test execution. An example is shown in FIGURE 10-4.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Installation Verification Test
------------------------------------

CAUTION: Do NOT run this test while other loop diagnostics
        or I/O are running on the loop to be tested.


Valid Options                                Value
=====================                        ========================
[m] Dual Port Mode                           primary
[l] Loop(s) under test                       c0 c1
[t] Test Duration                            360 (minutes)
[w] Test Environment                         Foreground
[p] Program                                  seq_dex

[r] Run

[q] Quit

Enter Selection: r

INFO : start of lbf test from /var/opt/STORtools/bin/run.ivm
INFO : start of dex ro test from /var/opt/STORtools/bin/run.ivm


Hit any key to continue.....
```

FIGURE 10-4 Installation Verification Test Example

Log File Manager

Use selection 4 (`Log File Manager`) on the Installation Verification menu to access message logs containing messages related to Installation Verification testing and to remove old message log files. The Log File Manager menu is shown in FIGURE 10-5.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Installation Verification
------------------------------

 [1] Start Exerciser
 [2] Check Exerciser Status
 [3] Stop Exerciser
 [4] Log File Manager

 [q] Quit

Select an operation to perform: 4
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Installation Verification
------------------------------

 [1] Storage Messages Summary
 [2] Fibre Loop Test - Full Logs
 [3] Fibre Loop Test - Failures only
 [4] Disk Exerciser Logs
 [5] Remove Old Log Files

 [q] Quit

Select an operation to perform:
```

FIGURE 10-5 Log File Manager Menu Selections

FIGURE 10-6 shows an example of checking the Disk Exerciser log and FIGURE 10-7 shows an example of removing old log files.

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Installation Verification
-------------------------------

 [1] Start Exerciser
 [2] Check Exerciser Status
 [3] Stop Exerciser
 [4] Log File Manager

 [q] Quit

Select an operation to perform: 4
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Installation Verification
-------------------------------

 [1] Storage Messages Summary
 [2] Fibre Loop Test - Full Logs
 [3] Fibre Loop Test - Failures only
 [4] Disk Exerciser Logs
 [5] Remove Old Log Files

 [q] Quit

Select an operation to perform: 4

StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Installation Verification
-------------------------------

Checking Latest Disk Exerciser Log:
Press <return> to view /var/opt/STORtools/logs/ivm/run.ivm.log.16562.str.dex.0
    Monitor physmem with vmstat to prevent memory starvation
    Monitor /var/adm/messages for disk problems and warnings

********* READ TEST ********
Transfer size= 128 KB
Range= 8 GB
Sequential Read Test for 2 min.
/var/opt/STORtools/bin/dex32: exiting on signal 15: Terminated
```

FIGURE 10-6 Examining Disk Exerciser Logs

```
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Installation Verification
-------------------------------

 [1] Start Exerciser
 [2] Check Exerciser Status
 [3] Stop Exerciser
 [4] Log File Manager

 [q] Quit

Select an operation to perform: 4
StorTools Storage Management  Version x.x
StorEdge on host hostname
Menu: Installation Verification
-------------------------------

 [1] Storage Messages Summary
 [2] Fibre Loop Test - Full Logs
 [3] Fibre Loop Test - Failures only
 [4] Disk Exerciser Logs
 [5] Remove Old Log Files

 [q] Quit

Select an operation to perform: 5

Would you like to remove all old log files? [<y>, n]:

Press <return> for previous menu ...
```

FIGURE 10-7 Removing Old Log Files

CHAPTER 11

Command-Line Utilities

In addition to the operations available from the `stormenu` Main Menu, the StorTools diagnostic package includes command-line utilities for advanced operations. This chapter contains the following topics:

Configuration Utilities

You can use the utility programs listed in TABLE 11-1 to perform configuration related operations.

TABLE 11-1 Configuration Utilities

Program	Description
`disklist`	Displays all disks with SD# and path. (See the `disklist(1M)` man page.)
`disk_inquiry`	Displays vendor, product ID, firmware rev, and serial number for each disk. (See the `disk_inquiry`(1M) man page.
`luxdiag`	Similar to `luxadm` but uses a bottom up query to prevent hangs on bad loops. Can also be used to issue diagnostic commands to the host adapter and array. (See the `luxdiag(1M)` man page.)

TABLE 11-1 Configuration Utilities *(Continued)*

Program	Description
`storstat`	Checks software/firmware revisions, disk placement, and enclosure status. (See the `storstat(1M)` man page.)
`storconfig`	Creates a golden configuration document and checks the current configuration status. (See the `storconfig(1M)` man page.)

`rawdump`
`sfdmp`
`araydmp`
	Displays the configuration in various *raw* or technically detailed displays. (See the `rawdump(1M)` man page for information about the `rawdump` program.)

Diagnostic Utilities

The diagnostic utility programs are listed in TABLE 11-2.

TABLE 11-2 Diagnostic Utilities

Program	Description
`initcheck`	Performs a quick check of FC-AL loops and storage arrays without using the `luxadm` probe command, which can hang on error.
`lbf` `mpat_lbf`	Loop Back Frame. Tests an FC-AL loop by sending frames back to the host adapter and checking for errors. (See the `lbf(1M)` man page for information about the `lbf` utility.)
`ha_port_test`	Host adapter specific test using `lbf` with internal loop backs.
`filtr`	Fibre Interface Loop Tester. Tests an FC-AL loop and isolates failing FRUs using software bypass of loop backplanes and disks. (See the `filtr(1M)` man page.)
`sedr`	The `sedr` command diagnoses the host bus adapter (HBA) and loop media. It then runs the disk exerciser (`dex32`(1M)) on the Sun StorEdge T300 disk tray logical unit numbers (LUNs).
`mess_sum`	Creates a summary of Sun StorEdge A5*x*00 array messages in `/var/adm/messages`.

Exercisers

dex32 is a high-throughput disk exerciser. Refer to the dex32(1M) man page for additional information about the dex32 program. The following are scripts used for calling dex32:

- ran_dex
- seq_dex
- file_dex

Configuration Utilities Examples

The following figures show examples of configuration utility execution:

- disklist - FIGURE 11-1
- disk_inquiry - FIGURE 11-2
- storstat - FIGURE 11-3

```
# disklist
c0t0d0   sd0    /sbus@1f,0/SUNW,fas@e,8800000/sd@0,0
c2t32d0  ssd23  /sbus@1f,0/SUNW,socal@2,0/sf@0,0/ssd@w210000203707b868,0
c2t33d0  ssd21  /sbus@1f,0/SUNW,socal@2,0/sf@0,0/ssd@w210000203707ba82,0
c2t34d0  ssd16  /sbus@1f,0/SUNW,socal@2,0/sf@0,0/ssd@w210000203707b6da,0
c2t35d0  ssd13  /sbus@1f,0/SUNW,socal@2,0/sf@0,0/ssd@w210000203707b294,0
c2t37d0  ssd20  /sbus@1f,0/SUNW,socal@2,0/sf@0,0/ssd@w210000203707b842,0
c2t38d0  ssd19  /sbus@1f,0/SUNW,socal@2,0/sf@0,0/ssd@w210000203707ba40,0
c2t48d0  ssd15  /sbus@1f,0/SUNW,socal@2,0/sf@0,0/ssd@w210000203707aea0,0
c2t49d0  ssd12  /sbus@1f,0/SUNW,socal@2,0/sf@0,0/ssd@w210000203707b9cc,0
c2t50d0  ssd22  /sbus@1f,0/SUNW,socal@2,0/sf@0,0/ssd@w210000203707b12e,0
c2t51d0  ssd18  /sbus@1f,0/SUNW,socal@2,0/sf@0,0/ssd@w210000203707096d,0
c2t53d0  ssd17  /sbus@1f,0/SUNW,socal@2,0/sf@0,0/ssd@w210000203707bdd4,0
c2t54d0  ssd14  /sbus@1f,0/SUNW,socal@2,0/sf@0,0/ssd@w210000203707b3b9,0
```

FIGURE 11-1 disklist Example

```
# disk_inquiry
AVAILABLE SCSI DEVICES:

                Vendor          Product         Rev     Serial Number

 c0t10d0        IBM         DNES30917SUN9.0G     SAD0    99361CD207
 c0t11d0        IBM         DNES30917SUN9.0G     SAD0    99361CE936
 c2t1d0         SUN         T300                 0100    0000037810
 c2t1d1         SUN         T300                 0100    0000037811
 c3t16d0        SEAGATE     ST39103FCSUN9.0G     034A    9944672524
 c3t17d0        SEAGATE     ST39103FCSUN9.0G     034A    9944674652
 c3t18d0        SEAGATE     ST39103FCSUN9.0G     034A    9944675098
 c3t19d0        SEAGATE     ST39103FCSUN9.0G     034A    9945680948
 c3t20d0        SEAGATE     ST39103FCSUN9.0G     034A    9945678817
 c3t21d0        SEAGATE     ST39103FCSUN9.0G     034A    9944673435
 c3t22d0        SEAGATE     ST39103FCSUN9.0G     034A    9944674417
 c3t23d0        SEAGATE     ST39103FCSUN9.0G     034A    9944673562
 c3t24d0        SEAGATE     ST39103FCSUN9.0G     034A    9945672434
 c3t25d0        SEAGATE     ST39103FCSUN9.0G     034A    9945679006
 c3t26d0        SEAGATE     ST39103FCSUN9.0G     034A    9944675356
 c11t1d0        SUN         T300                 0100    0000026410
 c11t1d1        SUN         T300                 0100    0000026411
 c13t2d0        SUN         T300                 0100    0000037810
 c13t2d1        SUN         T300                 0100    0000037811
#
```

FIGURE 11-2 `disk_inquiry` Example

```
# storstat -v -all
Data File : /var/opt/STORtools/bin/config-matrix

        5.8 Patch Matrix

        Firmware Requirements:
        HA SOCAL FCODE : 1.11
        HA IFP FCODE   : 1.6
        HA QLC FCODE   : 1.7
        5000 IB FW     : 1.09
        5200 IB FW     : 1.09
        ST19171FC      : 7D
        ST39102FC      : 0728
        ST118273F      : F454
        T300 FW        : 0100

        Solstice Disk Suite  Patch Matrix: 5.8

PATCH CHECK: OS 5.8

        PASS

PATCH CHECK VERITAS :

        Veritas not installed

PATCH CHECK SOLSTICE DISK SUITE :

        SDS not installed

SYSTEM QUERY:
        luxadm probe
        luxadm display on 3 enclosures

T300 FW CHECK :
         c2t1d0         SUN        T300                0100    0000037810
         c2t1d1         SUN        T300                0100    0000037811
         c11t1d0        SUN        T300                0100    0000026410
         c11t1d1        SUN        T300                0100    0000026411
         c13t2d0        SUN        T300                0100    0000037810
         c13t2d1        SUN        T300                0100    0000037811

        PASS

(Continued on Following Page)
```

FIGURE 11-3 storstat Example

```
DISK FW CHECK :

        PASS

IB FW CHECK :
        Enclosure a5k1 : expected 1.09 : found 1.09

PASS

CHECK FOR SOCAL FCODE VERSION 1.11
            version: '@(#) FCode 1.11 97/12/07'
            version: '@(#) FCode 1.11 97/12/07'

        PASS

CHECK FOR IFP FCODE VERSION 1.6
            version: 'FC100/P FC-AL Host Adapter Driver: 1.6 99/06/01'
        PASS

CHECK FOR QLC FCODE VERSION 1.7
                version: 'ISP2200 FC-AL Host Adapter Driver: 1.7 00/03/05'
                version: 'ISP2200 FC-AL Host Adapter Driver: 1.7 00/03/05'

        PASS

FAN CHECK :
        Checking enclosure b
        Fans (0 in front, 1 in rear)
                0 O.K.(rev.-04) 1 O.K.(rev.-00)
        Fan 0 status = O.K.(rev.-04)
        Fan 1 status = O.K.(rev.-00)
        Count of O.K. fans = 2
        PASS

        Checking enclosure a5k1
        Fans (0 in front, 1 in rear)
                0 O.K.(rev.-04) 1 O.K.(rev.-00)
        Fan 0 status = O.K.(rev.-04)
        Fan 1 status = O.K.(rev.-00)
        Count of O.K. fans = 2
        PASS

        Checking enclosure e
        Fans (0 in front, 1 in rear)
```

(Continued on Following Page)

```
 0 O.K.(rev.-04) 1 O.K.(rev.-00)
        Fan 0 status = O.K.(rev.-04)
        Fan 1 status = O.K.(rev.-00)
        Count of O.K. fans = 2
        PASS

        PASS

CHECK DISK PLACEMENT :

        Checking enclosure a5k1
        SLOT   FRONT DISKS       (Node WWN)          REAR DISKS        (Node
WWN)
        0      On (O.K.)         200000203733afbd    On (O.K.)
200000203733acd4
        1      On (O.K.)         200000203733b023    On (O.K.)
200000203733b2a2
        2      On (O.K.)         200000203733b162    On (O.K.)
200000203733af2e
        3      On (O.K.)         200000203733afeb    On (O.K.)
200000203733af34
        4      On (O.K.)         200000203733af67    On (O.K.)
200000203733aeec
        5      On (O.K.)         200000203733b0b1    On (O.K.)
200000203733b2bc
        6      On (O.K.)         200000203733aa36    On (O.K.)
200000203733b21e
        7      On (O.K.)         200000203733af58    On (O.K.)
200000203733aac5
        8      On (O.K.)         200000203733af60    On (O.K.)
200000203733b19e
        9      On (O.K.)         200000203733b1aa    On (O.K.)
200000203733b244
        10     On (O.K.)         200000203733b0ef    On (O.K.)
200000203733ab59
        PASS

        PASS

POWER SUPPLIES :

        Checking enclosure b
        Power Supplies (0,2 in front, 1 in rear)
                0 O.K.(rev.-02) 1 O.K.(rev.-02) 2 O.K.(rev.-02)
```

(Continued on Following Page)

```
 Power supply 0 status = O.K.(rev.-02)
        Power supply 1 status = O.K.(rev.-02)
        Power supply 2 status = O.K.(rev.-02)
        Count of O.K. power supplies = 3
        PASS

        Checking enclosure a5k1
        Power Supplies (0,2 in front, 1 in rear)
                0 O.K.(rev.-02) 1 O.K.(rev.-02) 2 O.K.(rev.-02)
        Power supply 0 status = O.K.(rev.-02)
        Power supply 1 status = O.K.(rev.-02)
        Power supply 2 status = O.K.(rev.-02)
        Count of O.K. power supplies = 3
        PASS

        Checking enclosure e
        Power Supplies (0,2 in front, 1 in rear)
                0 O.K.(rev.-02) 1 O.K.(rev.-02) 2 O.K.(rev.-02)
        Power supply 0 status = O.K.(rev.-02)
        Power supply 1 status = O.K.(rev.-02)
        Power supply 2 status = O.K.(rev.-02)
        Count of O.K. power supplies = 3
        PASS

        PASS

CHECK DISK STATUS :


        Checking enclosure a5k1
        SLOT   FRONT DISKS       (Node WWN)          REAR DISKS        (Node
WWN)
        0      On (O.K.)         200000203733afbd    On (O.K.)
200000203733acd4
        1      On (O.K.)         200000203733b023    On (O.K.)
200000203733b2a2
        2      On (O.K.)         200000203733b162    On (O.K.)
200000203733af2e
        3      On (O.K.)         200000203733afeb    On (O.K.)
200000203733af34
        4      On (O.K.)         200000203733af67    On (O.K.)
200000203733aeec
        5      On (O.K.)         200000203733b0b1    On (O.K.)
```

(Continued on Following Page)

```
200000203733b2bc
        6      On (O.K.)         200000203733aa36    On (O.K.)
200000203733b21e
        7      On (O.K.)         200000203733af58    On (O.K.)
200000203733aac5
        8      On (O.K.)         200000203733af60    On (O.K.)
200000203733b19e
        9      On (O.K.)         200000203733b1aa    On (O.K.)
200000203733b244
        10     On (O.K.)         200000203733b0ef    On (O.K.)
200000203733ab59
        PASS

    PASS

By default, revisions are verified using the most recent "StorTools-StorEdge
Software/Firmware/Hardware Revision Matrix" available.
Always run with the official version of this matrix!

Reference: http://sunsolve.Sun.COM
Select "site map"
Select "SSA/A5K/T300 Matrix"

If the current StorTools Matrix is not up-to-date, load
the latest StorTools patch or version.
Reference the Release Notes for more information.

storstat result (Rev. 2.00 02/03/2000) : PASS
#
```

Diagnostic Utilities Examples

The following figures show examples of diagnostic utility execution:

- `initcheck` - FIGURE 11-4
- `lbf` - FIGURE 11-5

```
# initcheck
---- Discovered: /devices/sbus@1f,0/SUNW,socal@2,0:0 ... ----
        (c1) (sf0)  (socal0:Port 0)
.........................(26 drives)

---- Discovered: /devices/sbus@1f,0/SUNW,socal@2,0:1 ... ----
        (c2) (sf1)  (socal0:Port 1)
.........................(26 drives)

PASS
#
```

FIGURE 11-4 `initcheck` Example

```
# lbf
Usage:  lbf [-x <xfer size, bytes>|-k <xfer size, kbytes>] [-n <number of
passes>] [-t <test pattern>] [-c (compare on)] [-v (verbose mode) | -q
(quiet mode) | -o (report throughput)] [-a (all patterns)] [-i (ignore
error)] <device>
#
# lbf -k 64 -t 7e7e7e7e -n 9000 /devices/sbus@1f,0/SUNW,socal@0,0:0
PASS   Pat=0x7e7e7e7e   Cnt=9000  /devices/sbus@1f,0/SUNW,socal@0,0:0
# lbf -k 64 -n 9000 /devices/sbus@1f,0/SUNW,socal@0,0:1
FAIL=42  Pat=0xaa55aa55   Cnt=0     /devices/sbus@1f,0/SUNW,socal@0,0:1
# lbf -k 64 -a -n 10 /devices/sbus@6,0/SUNW,socal@d,10000:1
PASS    Pat=0xaa55aa55   Cnt=10    /devices/sbus@6,0/SUNW,socal@d,10000:1
PASS    Pat=0x00ff00ff   Cnt=10    /devices/sbus@6,0/SUNW,socal@d,10000:1
PASS    Pat=0xffffffff   Cnt=10    /devices/sbus@6,0/SUNW,socal@d,10000:1
.
.
.
#
```

FIGURE 11-5 `lbf` Examples

Note – Refer to the `lbf(1M)` man page for `lbf FAIL` code descriptions. The `FAIL` code 42 shown in FIGURE 11-5 was produced by running `lbf` on a host adapter port with no GBIC connected (Failed to get the Fibre Channel Loop Map).

Exerciser Example

FIGURE 11-6 shows an example of the Disk Exerciser read test.

```
# seq_dex
Usage: /opt/STORtools/bin/seq_dex <controller number> <rw|ro>
<runtime in mins>
# seq_dex c1 ro 5
Monitor physmem with vmstat to prevent memory starvation
Monitor /var/adm/messages for disk problems and warnings

********* READ TEST *******
Transfer size= 128 KB
Range= 8 GB
Sequential Read Test for 2 min.
Transfer size= 512 Bytes
Range= 200 MB
Sequential Read Test for 2 min.
Pass 0, Errors 0, Elapsed time= 2:10 min.


Pass 0, Errors 0, Elapsed time= 2:10 min.
#
```

FIGURE 11-6 Disk Exerciser Example

CHAPTER 12

Troubleshooting Sun StorEdge A5*x*00 Arrays

This chapter contains specific information about using the StorTools diagnostic package to troubleshoot Sun StorEdge A5*x*00 array FC-AL loops. You should read and understand the diagnostic tests and deployment described in Chapter 9 before using the procedures in this chapter. This chapter contains the following topics:

General Troubleshooting Procedure

Follow these steps when troubleshooting failing loops:

1. Identify the suspect loop
2. Test and reproduce the failure
3. Diagnose the failure

Identifying the Suspect Loop

You can proactively detect failing loops by monitoring the messages file for excessive errors. This can be automated with the Storage Monitor `crontab` function provided in the StorTools package. Refer to Chapter 8 for storage monitoring information. FIGURE 12-1 shows an example of an email message from the Storage Monitor.

```
To: brad.derolf@Central.Sun.COM
From: STORtools@diag1.East.Sun.COM
Subject: STORtools:mess_alert: ERROR message

Host information: SunOS diag1 5.6 Generic_105181-14 sun4u sparc SUNW,Ultra-2

The following log entries indicate FC-AL related problems.
Please take appropriate action.

STORtools Storage Management     Version x.x
SBUS A5K Series Storage on host diag1.
ERROR: sf0 has received 10 sf CRC WARNING messages
ERROR: socal0: port 0 has received 24 socal OFFLINE messages
ERROR: ssd0 has received 27 WARNING messages
```

FIGURE 12-1 Sample Storage Monitor Email Message

The example in FIGURE 12-1 shows that `socal0: port 0` is receiving loop offlines or LIPs (Loop Initialization Processes). These offline conditions may be normal. The loop performs a LIP for configuration and recovery purposes. However, 10 or more of these in a 24 hour period warrants further investigation (see FIN I0465-1 for more information). Run the Loop Integrity Test to ensure that the loop is healthy.

To run the Loop Integrity Test, first identify the controller number (`c` number) of the suspect loop. The best way to determine the controller number is to choose the `Display Configuration` selection from the `stormenu` Main Menu, and then select the `Configuration Summary` option from the Display Configuration Menu. The various configuration display options are described in Chapter 6. The example in FIGURE 12-2 shows the output of a Configuration Summary display. Notice that `port 0` on `socal0` is `sf0` or `c3`.

```
socal0      /devices/sbus@1f,0/SUNW,socal@2,0:0
      sf0   Port 0  Controller c3    27 Drive(s)
            Enclosure cbox  Loop A
            Enclosure dbox  Loop A
```

FIGURE 12-2 Configuration Summary Display Example

Testing and Reproducing the Failure

Once you identify the suspect loop, run the Loop Integrity Test to verify that a hardware problem exists and reproduce the failure. If the Loop Integrity Test passes without errors, the failures may be very intermittent and/or load-related.

For load-related errors, use the Disk Read Loop Test to attempt to reproduce the failure.

Caution – The Disk Read Loop test severely affects performance by using all available loop bandwidth. Do not run this test on arrays that are currently in use.

A more granular method of loop loading can be done using the Disk Load Generator/Exerciser and selecting only a few disks to read. You can then measure the load using `iostat` and rerun the Loop Integrity Test. Use caution with this test method by monitoring the load and application impact to arrays that are in use. The Disk Load Generator/Exerciser is described in Chapter 9.

Diagnosing the Failure

Once the failure is reproducible, diagnose to isolate the cause. Always use a Process of Elimination (POE) technique to diagnose a failure. There are two environments and two methods for implementing POE. They are:

- Diagnosis environment
- Diagnosis methods

Diagnosis Environments

There are two diagnosis environments to consider when isolating a failure:

- In use arrays
- Idle arrays

In Use Arrays

The only time to diagnose arrays that are in use is when the failure occurs only on one loop and another good alternate loop is available that can be used for all disk I/O. You must use the Loop Integrity Test to verify that the alternate loop is good before failing the suspect path. When disk I/O is being handled with the Dynamic Multi-Pathing (DMP) feature of Volume Manager you can fail one path and redirect all disk I/O to the remaining good path. The path can be failed by either physically disconnecting the fiber cable (this is not recommended), or using the `Path Disable` function of the Volume Manager Path Management Menu, if available. The Volume Manager Path Management Menu is described in Chapter 10.

Idle Arrays

You can perform online loop troubleshooting to arrays that are single connected, such as in HA, PDB, or Cluster environments, which do not support DMP. First, stop all I/O to the array. The safest way to stop I/O to an array is to detach the mirror half of all volumes using the array. This is the same procedure used for array hardware failure and service situations. Storage configurations that are not mirrored across arrays or do not need to perform a mirror resync should stop any applications using the array, and then dismount the array volumes. If applications cannot be stopped, you must perform diagnosis in single user mode.

Note – It is critical to ensure that the arrays are completely idle before beginning diagnosis. Once the arrays are idle, use the `Force Path Disable` function to fail the loop and ensure that no Volume Manager access is attempted. You access the Volume Manager Path Management options through the `Run Diagnostics` selection on the Main Menu.

Once the path is failed, verify application and system operation. If problems are detected, the path can be reenabled quickly by using the `Activate All Paths` function to restore operation.

Diagnosis Methods

There are two diagnosis methods for isolating a failure:

- Automated POE
- Manual POE

Automated POE

The FRU Isolation Tool provides an automated or assisted method of troubleshooting the suspect loop. The two execution options are: **Automatic** and **Manual**.

Automatic: used to isolate bad disks and backplanes. Run this option first. Select either **Binary** or **Regular** mode on startup.

- **Binary**: this mode uses divisions of two to search for bad components. For example, if you have four Sun StorEdge A5*x*00 arrays (a, b, c, and d), a and b are checked first. If no problems are found, c and d are then tested. (A cross check is also performed. Any error that occurs during the cross check indicates more than one point of failure and is treated as a fatal error. These errors indicate problems caused by hardware other than backplanes or drives.) If a failure occurs while testing a pair of arrays, each array is then tested individually. The backplanes in the failing array are tested separately, followed by the disks. The disks on the failing backplane are divided into two groups; odd and even. Testing continues until the failing disk is isolated.

  Binary mode is faster than Regular mode, but not as detail oriented. In cases where disk I/O is required to bring out the failures, you must use Binary mode. After answering the startup questions, you can leave Binary mode running and walk away.

  The following Binary mode options are provided:

  - **Turning off retesting on `lbf` failures:** this option can be used to speed up the testing process. When retesting is enabled, the test is checking to determine if a “soft” error caused the problem. This can add up to three times the testing time since every time there is an error, two additional tests are performed. You should turn off retesting when you are confident that the error can be reproduced. This option is also available in Regular mode.
  - **Adding in disk I/O automatically**: this is started just before lbf testing and is useful for locating errors that occur only under load conditions. The disk I/O is started only on the components under test. If more than one backplane of disks is tested, the I/O is started over a cross section of the disks on these backplanes. Care has been taken not to overload the system, but to create enough I/O to cause these errors. In some cases you may want to target the I/O to a specific Sun StorEdge A5*x*00 arrays. This can be done in Manual mode.

- **Regular**: this is the same as previous versions of the FRU Isolation Tool. This mode is exhaustive in its search for bad hardware and is recommended when Binary mode produces ambiguous results. It is a little slower than Binary mode due to its completeness. In cases where disk I/O is required to bring out the failures, you must use Binary mode.

Manual: for assisted isolation of bad host adapters, GBICs, hubs, cables, and IBs. The manual mode is entered automatically after an automatic run with no disk or backplane failures.

Manual POE

You can use this method of isolation when failures are very intermittent and difficult to reproduce. (You may now automatically test with disk I/O by using the Binary mode of the FRU Isolation Tool.) You may also choose a manual method for faster isolation of Loop Integrity Test failures. After reproducing the failure with the Loop Integrity Test, Disk Read Loop Test, or a combination of the Disk Exerciser and Loop Integrity Test, try to identify a problem array. The best way to isolate a problem array is to test the arrays individually while using the GBIC connections to physically remove and insert the arrays on the loop. Once you isolate a problem array, you can use the bypass functions of the Front Panel Module (FPM) to test the individual backplanes and disks, and further isolate the problem. If errors occur on all arrays, the problem may be in the host adapter, a GBIC, cable, or hub. Further diagnosis requires replacement of the suspect parts. Refer to the troubleshooting flowcharts for step by step instructions.

Loop Troubleshooting Flowcharts

This section contains troubleshooting flowcharts that you can use as guides for isolating loop problems. The flowcharts cover the operations listed in TABLE 12-1.

TABLE 12-1 Troubleshooting Flowcharts

Figure	Troubleshooting Operation
12-3	Running the Loop Integrity Test
12-4	Using Disk I/O and Manual POE
12-5	Using Manual POE to Diagnose a Single Array
12-6	Using FRU Replacement for Manual POE
12-7	Idling the Arrays
12-8	Idling a Loop
12-9	Using the FRU Isolation Tool for Automated and Assisted POE

Note – Refer to Appendix A for Front Panel Module (FPM) bypass examples.

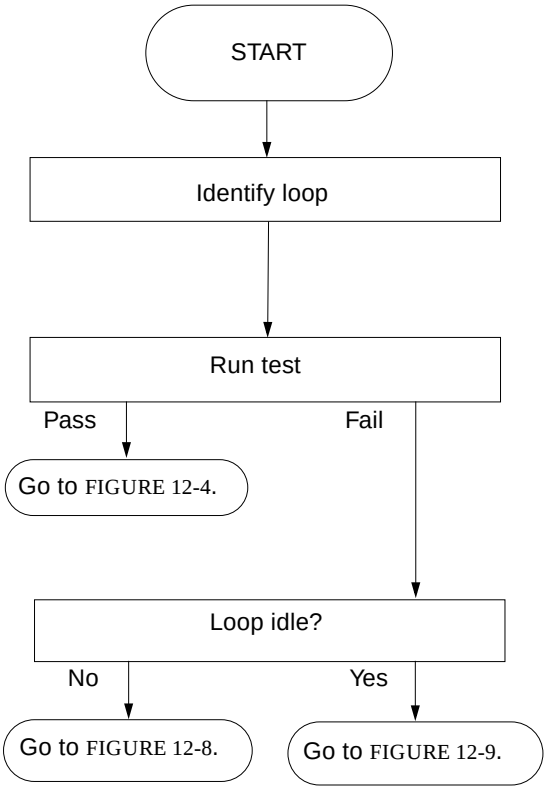


FIGURE 12-3 Running the Loop Integrity Test

Identify loop — Use Storage Monitor messages and status checking to identify suspect loops. Use Display Configuration options to map the loop `socal`, `sf`, and c numbers plus any connected arrays. Also identify all VM volumes, Solstice DiskSuite™ metadevices, and applications using the affected arrays.

Run test — The Loop Integrity Test affects performance by 10% and takes about 30 minutes for a full pass. Use Control-C to halt the test after a few errors have been detected.

If no errors are detected, the problem maybe load related. Continue testing using disk I/O. (See FIGURE 12-4.)

Loop idle? — Ensure that the problem loop is idle before starting diagnosis.

If the loop is not idle, stop all I/O or idle the loop. (See FIGURE 12-8.)

Once the loop is idle, start diagnosis using the FRU Isolation Tool. (See FIGURE 12-9.)

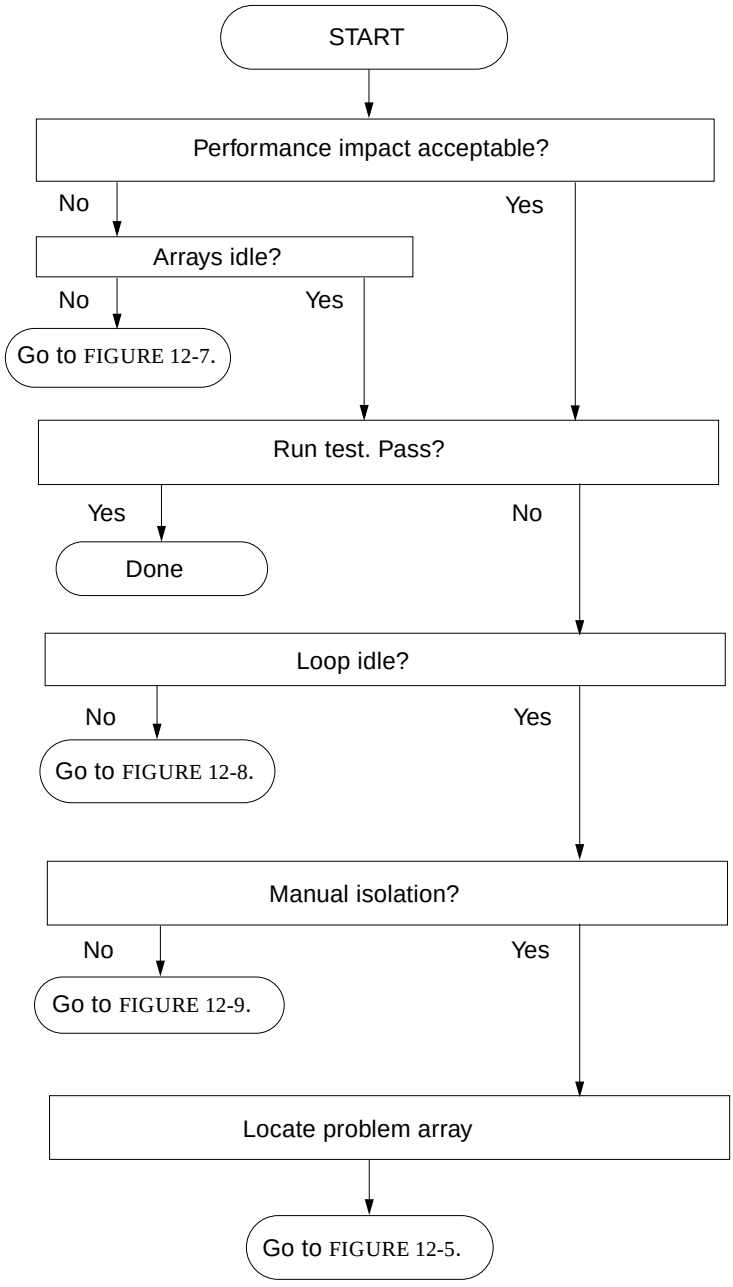


FIGURE 12-4 Manual POE Using Disk I/O

Performance impact acceptable? — Further testing requires load generating using disk I/O. Since disk I/O is read only, it is data safe but can greatly affect performance. Running these tests to arrays that are in use is not recommended unless this performance impact is acceptable.

Arrays idle? — When array performance must not be disrupted, you must halt activity on the arrays before further testing. Use the flowchart in FIGURE 12-7 to idle the arrays.

Run test. Pass? — A full pass of the Disk Read Loop Test takes approximately 9 hours. Only run the test long enough to reproduce a failure. For example, if the error occurred once an hour run the test for twice that period, or 2 hours. If no errors occur, consider the loop good. If failures continue during application use, contact support for further assistance.

Loop idle? — Once you have reproduced the failure, you can begin POE diagnosis. This must be done on an idle loop. If the loop is active, use the flowchart in FIGURE 12-8 to stop all I/O or idle the loop.

Manual isolation? — Problem isolation can be done either manually or automatically with the FRU Isolation Tool's Binary mode with disk I/O. Use the flowchart in FIGURE 12-9 for automatic isolation.

Locate problem array — You can manually test the arrays individually by disconnecting all but one array and rerunning the test for each array. If errors occur in multiple arrays the problem may not be array related, or there may be multiple problems. First diagnose a single array until the test passes, and then continue testing the remaining arrays. Use the flowchart in FIGURE 12-5 to diagnose a single array.

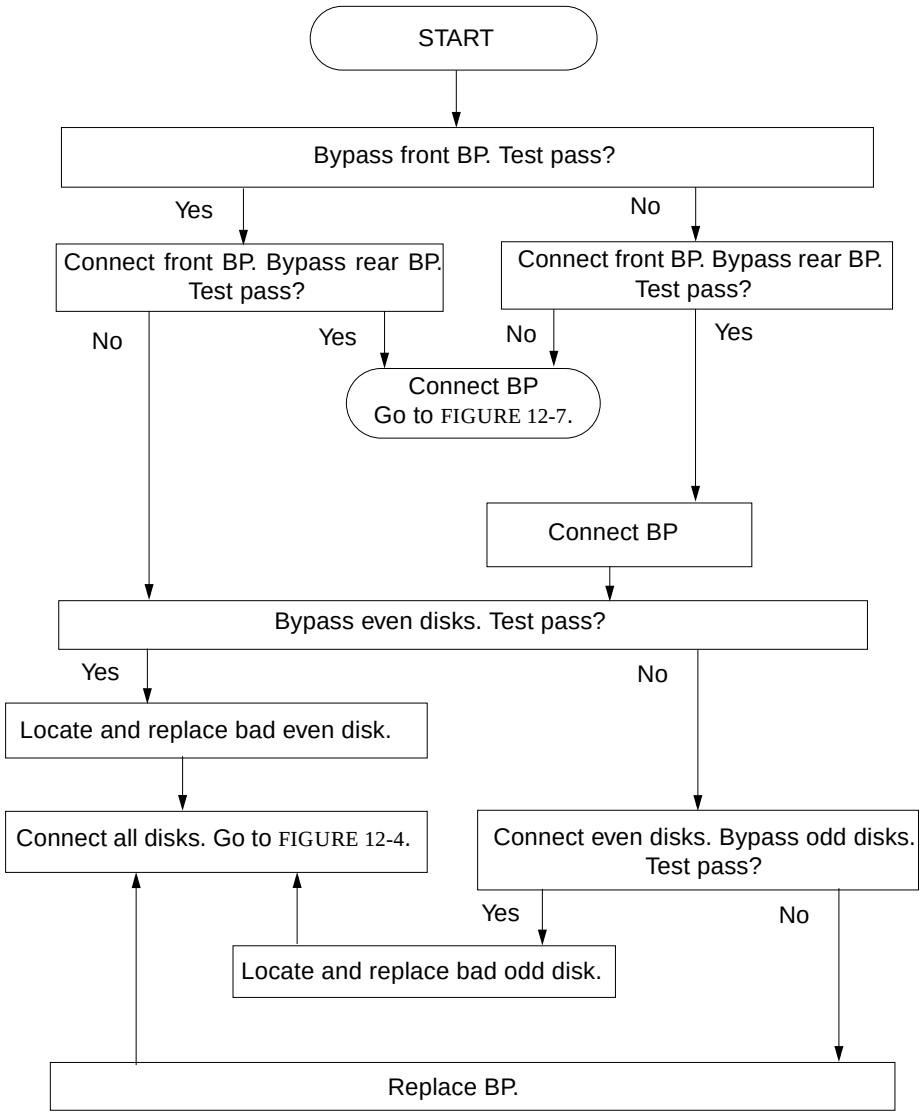


FIGURE 12-5 Using Manual POE to Diagnose a Single Array

Bypass front BP. Test pass? — Continue diagnosing the problem array by testing the front and rear disks separately to determine if a bad backplane (BP) or disk is causing the errors. Use the Front Panel Module (FPM) to bypass backplanes.

Connect front BP. Bypass rear BP. Test pass? — If the rear backplane tests good, the problem may be in the front backplane.

If the test fails you still need to test the other backplane.

Connect BP. Go to FIGURE 12-7 — If both backplanes either pass or fail independently the problem is probably not backplane or disk related. Use the flowchart in FIGURE 12-7 to further diagnose the problem.

Bypass even disks. Test pass? — The problem is in a backplane. Next, bypass disks to determine if a disk is causing the problem. Bypass all even numbered disks first.

Locate and replace bad even disk — If the odd numbered disks pass, the problem is probably in an even numbered disk. Connect the even disks one at a time and retest. When the failure returns, the last disk connected is bad. Replace the disk and retest.

Connect even disks. Bypass odd disks. Test pass? — If the odd disks fail, bypass the odd disks and test the even disks.

Locate and replace bad odd disk — If the even disks pass, connect the odd disks one at a time and retest. When the failure returns, the last disk connected is bad. Replace the disk and retest.

Replace BP — If the backplane fails with all disks, it is probably bad. Replace the backplane and retest.

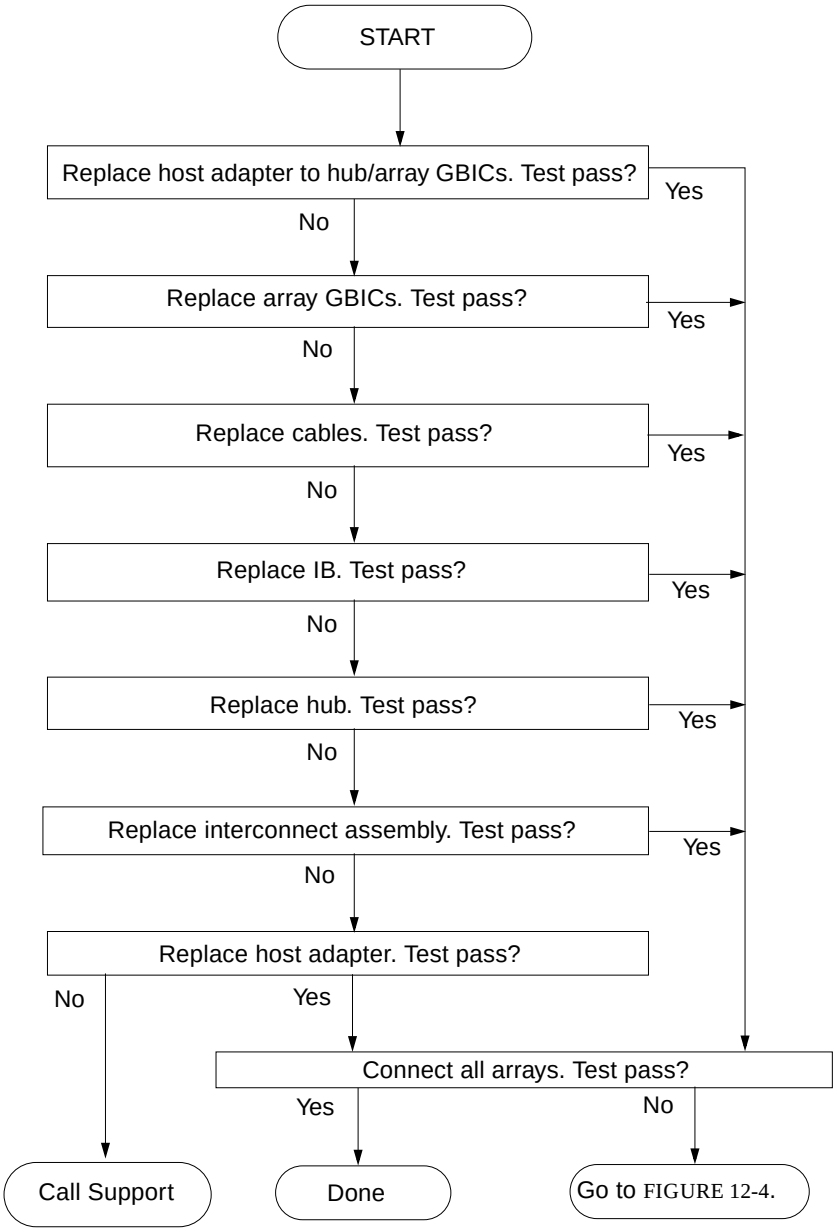


FIGURE 12-6 Using FRU Replacement With Manual POE

START — When array errors occur to both backplanes, the failure is probably not caused by the disks or backplanes. Further isolation requires FRU replacement and retest. Leave only one array connected throughout this process. Replace the FRUs in the order listed in FIGURE 12-6.

Replace host adapter. Test pass? — The host adapter is replaced last because replacement usually involves system downtime.

Connect all arrays. Test pass? — After the failing FRU is replaced and the test passes, connect any other loop arrays and retest. After a full error free pass, reactivate any idled arrays and verify operation.

Call Support — If the test still fails after replacing all hardware, call support.

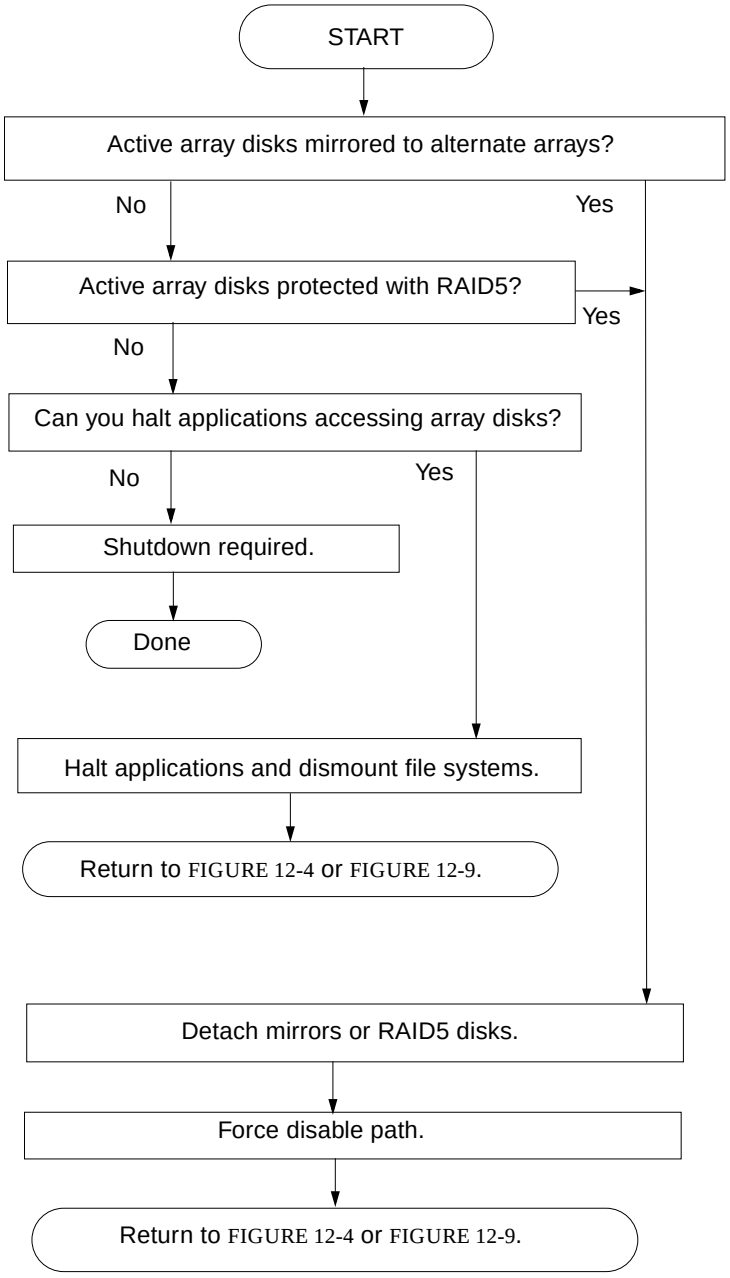


FIGURE 12-7 Idling the Arrays

Active array disks mirrored to alternate arrays? — To idle the arrays you need to identify and halt all I/O access to any array disks. If the array disks are mirrored to an alternate array that is attached to a different loop, you can detach the problem array's mirrors and continue running applications on the other array's mirror.

Active array disks protected with RAID5? — If RAID5 is implemented such that each disk of the stripe is installed in different arrays on separate loops, you can also fail the suspect array and continue to access the RAID5 stripe in degraded mode.

Can you halt applications accessing array disks? — If applications accessing the array disks cannot be halted to stop the array I/O, you cannot diagnose the loop online.

Shutdown required — You must shut the system down and diagnose in single user mode.

Halt applications and dismount file systems — Halt any applications using the array disks and unmount any file systems. Use `iostat` or another tool to ensure that the disks are idle.

Detach mirrors or RAID5 disks — Detach any array mirrors or fail the RAID5 array disks. Refer to the RAID management documentation for software procedures.

Force disable path — You can now force disable the idle loop path to ensure that no further RAID software access is attempted. Either use the `stormenu` VM Path Management function, if available, or physically pull the cable. You can also use force path disable with caution to force detachment of mirrors and RAID5 disks. This simulates a hard path failure.

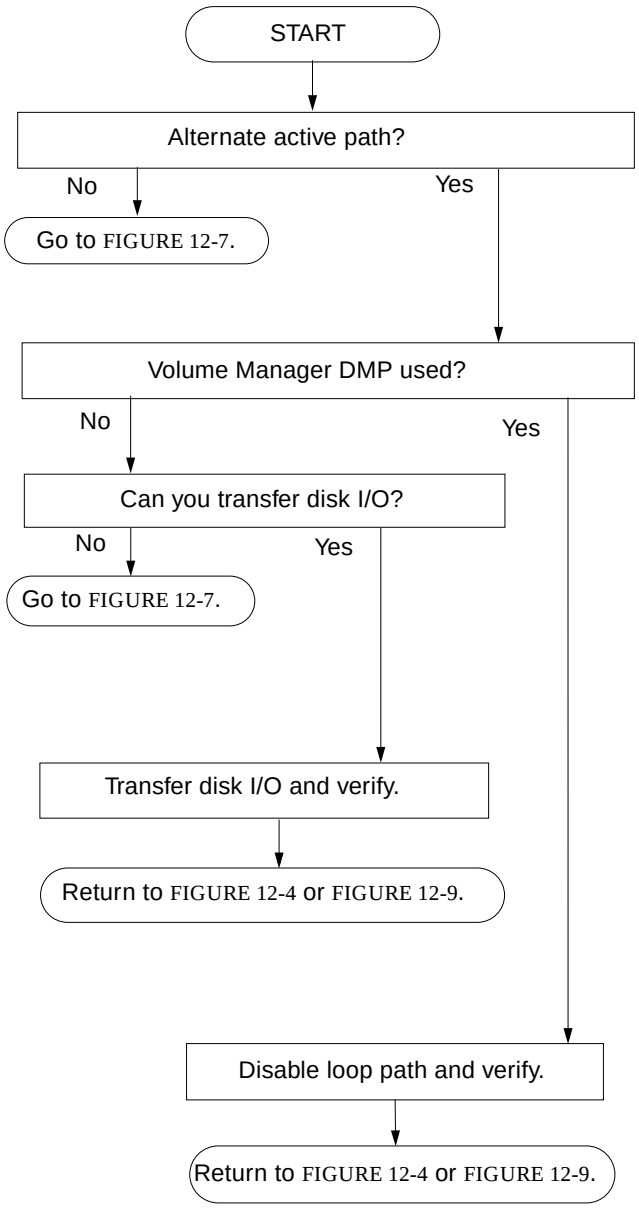


FIGURE 12-8 Idling a Loop

Alternative active path? — To idle the loops you need an alternate active path that can take over the array disk I/O from the suspect loop. This is easily done when you use the Volume Manager DMP software and the Volume Manager Path Management function of `stormenu` is available.

Go to FIGURE 12-7 — Without a good alternate path, you cannot idle the loop. To diagnose the problem in this case, you must idle all arrays on the loop, using the flowchart in FIGURE 12-7.

Volume Manager DMP used? — If Volume Manager is present, use it to disable the loop path.

Can you transfer disk I/O? — Other software such as AP may be used to transfer disk I/O to an alternate path.

Go to FIGURE 12-7 — With no alternate pathing software, you cannot idle the loop. Use the flowchart in FIGURE 12-7 to idle all arrays on the loop.

Transfer disk I/O and verify — Before transferring I/O and disabling the suspect loop, you must verify that the alternate loop is error free. Run the Loop Integrity Test to verify the alternate loop. If errors occur on both loops the arrays must be idle before beginning diagnosis. Use the flowchart in FIGURE 12-7 to idle the arrays.

After transferring I/O, use `iostat` or another command to verify that the loop is idle. Also verify that applications are working on the alternate loop.

Return to FIGURE 12-4 **or** FIGURE 12-9 — Return to the troubleshooting flowchart that sent you to idle the loop.

Disable loop path and verify — If the VM Path Management feature of `stormenu` is available, use the Disable Path option. If this is not available, you may cautiously disable the path by physically pulling the cable and enabling VM to detect a failure and disable.

After transferring I/O, use `iostat` or another command to verify that the loop is idle. Also verify that applications are working on the alternate loop.

Return to FIGURE 12-4 **or** FIGURE 12-9 — Return to the troubleshooting flowchart that sent you to idle the loop.

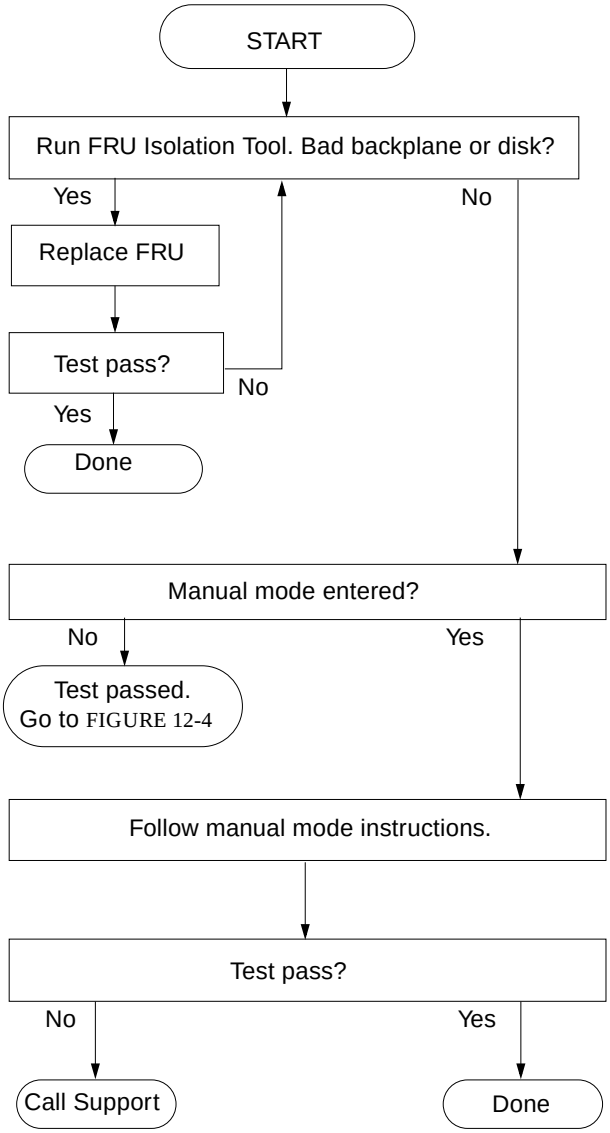


FIGURE 12-9 Using the FRU Isolation Tool for Automated and Assisted POE

Run FRU Isolation Tool — The FRU Isolation Tool test is a convenient method for performing POE problem isolation. When failures are easily reproduced, the run time is approximately 7 minutes per array on the loop (a 4 array loop takes about 28 minutes; 15-16 minutes in Binary mode). The tool is most effective for troubleshooting backplanes (BP) and disks.

Replace FRU — Replace the faulty FRU.

Test pass? — If the problem is not in a BP or disk, the test enters *manual mode* with instructions to assist with manual POE. If the test passed, testing is completed.

Note – Binary mode speeds up testing by breaking down the search for bad components into divisions of two. Disk I/O loading is an option under Binary mode. Using manual mode with disk I/O initiated in another window is not necessary. (See "Diagnosis Methods" on page 12-5.)

Manual mode entered? — Manual mode is entered when the test fails with all BPs bypassed or when the "all backplanes enabled" test fails in Binary mode with disk I/O enabled. This indicates a failure in the Host adapter, GBIC, cable, hub, or array IB.

Test passed — If manual mode is not entered, go to the flowchart in FIGURE 12-4.

Follow manual mode instructions — Follow the manual mode instructions to isolate the failing FRU.

Test pass? — If no errors are detected, the problem may be intermittent. Try to reproduce the failures by running the FRU Isolation Tool in Binary mode with the disk I/O option enabled, or use manual isolation with disk I/O and the flowchart in FIGURE 12-6.

Done — After replacing the failing FRU and retesting with no errors, reactivate the idled loop or arrays and verify operation.

CHAPTER 13

Troubleshooting Sun StorEdge T300 Disk Trays

This chapter contains information about using the StorTools diagnostic package to troubleshoot un StorEdge T300 disk trays and their associated FC-AL loops. You must read and understand the diagnostic tests and deployment described in Chapter 9 before using the procedures in this chapter. You must also read and understand the Sun StorEdge T300 Disk Tray Operations manual before attempting to troubleshoot a Sun StorEdge T300 disk tray. This chapter contains the following topics:

General Troubleshooting Procedure

Follow these steps when troubleshooting failing loops:

1. Identify the suspect loop
2. Test and reproduce the failure using `sedr`
3. Identify a suspect FRU or set of suspect FRUs
4. Replace a single suspect FRU
5. Test the revision of the replacement
6. Test the replacement against the reproducible failure
7. Run the full test (`filtr -sedr`)

Identifying a Suspect Loop

You may detect a failing loop by monitoring the file `/var/adm/messages` for FC-AL errors. This can be done manually by running the `mess_sum` script provided in the StorTools diagnostic package or automatically by setting up a StorTools `mess_alert crontab` entry as described in Chapter 8. If a failing loop is detected, run `sedr` against the suspect loop as described in Chapter 9.

Identifying a Suspect Sun StorEdge Disk Tray

You may detect a failing Sun StorEdge T300 disk tray unit by monitoring the file `/var/adm/messages.t300` for failing FRU messages. This maybe done manually by running the `mess_sum` script provided in the StorTools diagnostic package or automatically by setting up a StorTools `mess_alert crontab` entry as described in Chapter 8. If error messages are present in the Sun StorEdge T300 disk tray log file, the failing FRU is identified in the warning message.

Testing and Reproducing the Failure

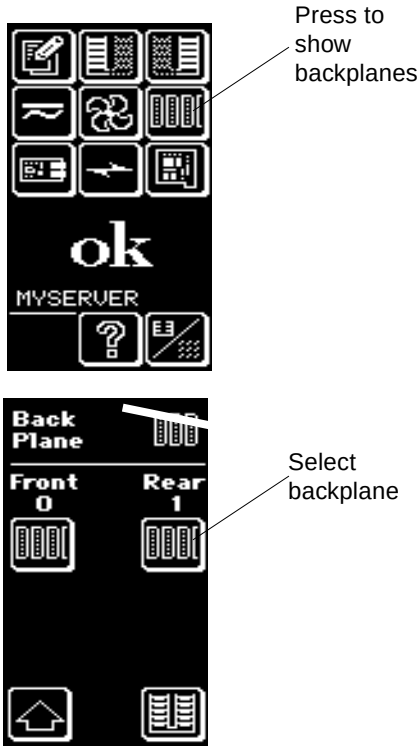
Once you identify the suspect loop, run `sedr` as described in Chapter 9 to verify that a hardware problem exists and reproduce the failure. Then follow the software assisted POE provided by `filtr -sedr`.

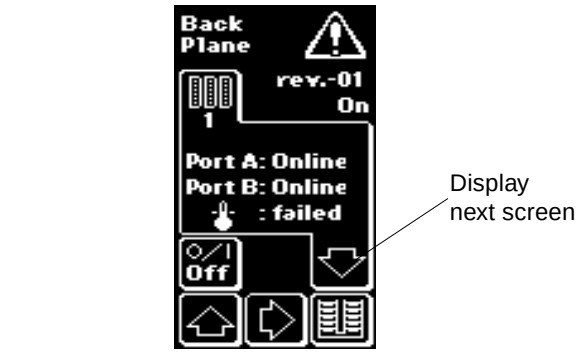
APPENDIX **A**

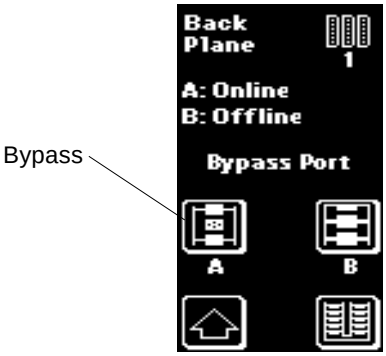
Sun StorEdge A5*x*00 Array Front Panel Module Bypass Examples

This appendix contains Front Panel Module (FPM) bypass examples for bypassing the backplane port and the disk port on a Sun StorEdge A5*x*00 array.

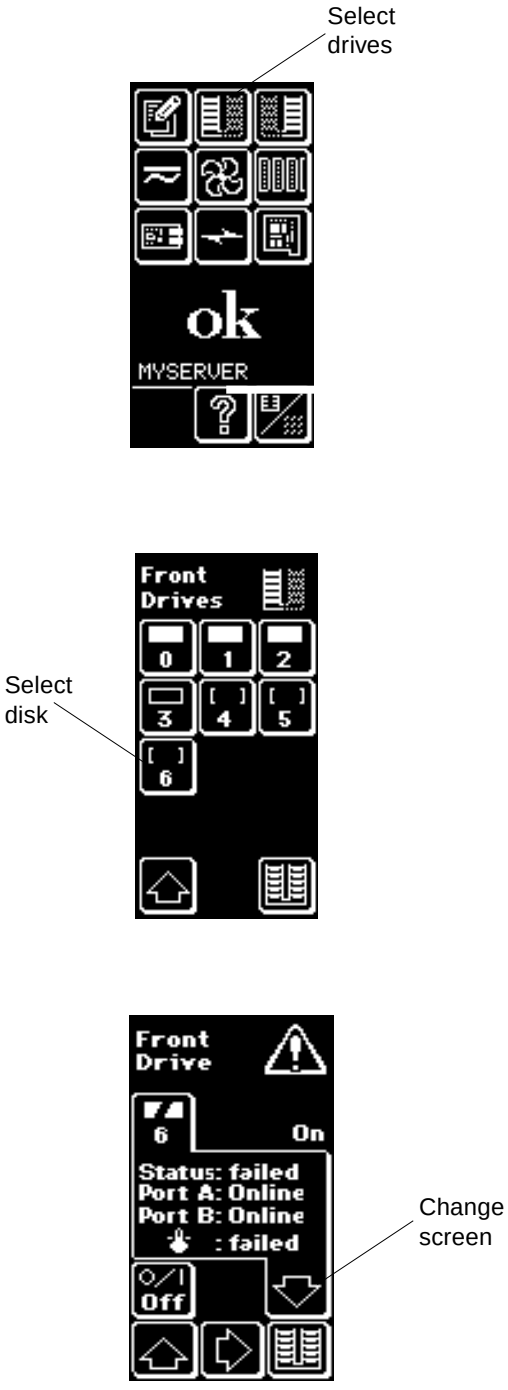
Bypassing the Backplane Port

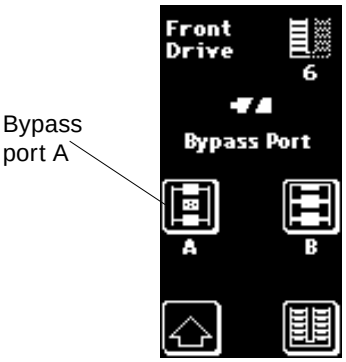



Back
Plane
rev.-01
On
1
Port A: Online
Port B: Online
: failed
Off
Display
next screen


Back
Plane
1
A: Online
B: Offline
Bypass Port
A
B
Bypass

Bypassing the Disk Port




Front
Drive
6
Bypass Port
A
B
Bypass
port A

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