DataDirect Networks

SAN DataDirector

Installation Procedures

for CreoScitex



Rev. A

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About this Manual

This manual details the SAN DataDirector (SDD) installation and configuration procedures for CreoScitex installations.

The features and functions of the SAN DataDirector are fully documented in the *DataDirect Networks SAN DataDirector User Guide*.

This manual is structured as follows:

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1 List of Products

1. List of configurations:

- Configuration 1:
  SDD with single HSTD (2 host ports, 640 MB cache)
  20 × 36 GB drive modules, 2 LUNs
  PN: SDDE20×36CSA for US and SDDE20×36CSE for Europe
- Configuration 2:
  SDD with dual HSTD (4 host ports, 2×640 MB cache)
  20 × 36 GB drive modules, 4 LUNs
  PN: SDDM20×36CSA for US and SDDM20×36CSE for Europe
- Configuration 3:
  SDD with dual HSTD (4 host ports, 2×640 MB cache)
  20 × 73 GB drive modules, 4 LUNs
  PN: SDDM20×73CSA for US and SDDM20×73CSE for Europe
- Configuration 4:
  SDD with dual HSTD (8 host ports, 2×1.28 GB cache)
  56 × 73 GB drive modules, 8 LUNs
  PN SDDM56×73CSA for US and SDDM56×73CSE for Europe

2. Upgrade Options

- Pack of 9 × 36 GB drive modules (SDDUG9×36CS)
- Pack of 9 × 73 GB drive modules (SDDUG9×73CS)
- Additional Port for Single SAN directION (PORT-100S-CS)
- Two Additional Ports for Dual SAN directION (PORT-200D-CS)
- SDD Cache Upgrade 640MB (SDDUGCH64CS)
- SDD Cache Upgrade 1.28GB (SDDUGCH128CS)
- SDD Optical Conversion Kit, 30 meters (SDDOPT30CS)
- SDD Optical Conversion Kit, 100 meters (SDDOPT100CS)

2 Product Contents and Specifications

The SAN DataDirector (SDD) systems for CreoScitex contain the following:

1. Rack cabinet with:
   - Power Distribution Units (PDU)
   - 10/100 baseT 5-port Ethernet switch
2. SAN DataDirector with:
   - single or dual HSTD (High Speed Traffic Director)
   - four power supplies with power cords
   - fan unit with two cooling fans
   - Accessory box containing:
     - One High Density Modular Interface (HDMI) cable for connecting the HSTD to drive enclosures (two for dual HSTD configuration)
     - RS-232 and Ethernet cables for monitoring and configuration
     - Cover panel and rack-mounting hardware
     - SAN DataDirector User Guide
3. Five SF-4012 enclosures with:
   - twelve-slot drive chassis
   - two power supplies with power cords
   - two I/O modules
   - one ESI/Ops panel module with service keys
   - blank slot covers
   - drive modules - all drive modules currently contain 36GB or 73GB drives, labeled by slot number

4. Accessories:
   - DB9-to-DB9 Fibre Channel copper cables (for host connections)
   - CreoScitex SAN DataDirector CD-ROM
     - AIX4.2.1 (contains drivers, lvm updates and stanza for CSDD and EV800FC for AIX 4.2.1)
     - AIX4.3.3 (contains drivers and stanza for CSDD and EV800FC for AIX 4.3.3)
     - Emulex_firmware (contains Emulex firmware and manual)
     - Netscape (contains Netscape Navigator for AIX, can be used to browse the 1U Monitoring PC)
     - SDD_doc (CSDD documentation including PDF of full SDD User Guide and Installation Procedure for CreoScitex)
     - SDD_firmware (contains firmware for CSDD)
     - vnc (contains Virtual Network Computing program files)
   - this CreoScitex SAN DataDirector Installation Manual

5. 1U rack mount PC for service and support

6. Fibre Channel Host Bus Adapters (FC HBA)
   - For Configuration 1: 2 Fibre Channel HBAs
   - For Configurations 2 & 3: 4 Fibre Channel HBAs
   - For Configuration 4: 8 Fibre Channel HBAs

7. Option for MIA and optical cables

3 Installation Procedure (assuming factory pre-formatting)

3.1 Unpacking and Identifying Sets of Products

All the enclosures and drive modules will have been pre-installed in the rack at the factory. The HDMI cables and power cords are already connected.

1. Remove the carton and ALL protective material from the rack. Check for any physical damage that may have occurred during shipment.

2. Follow the instructions included in the carton to unpack the SDD. Check for any physical damage that may have occurred during shipment.

   At the back of the SDD, locate the serial number. The last four digits of the serial number are important—this will be used to identify matching enclosures and drive modules that have been pre-formatted for this SDD.

3. Each drive enclosure has a pre-format identification number at the back.

   For an enclosure with a label number of "03G4-AB" indicates that the unit should be used with the SDD which has a serial number ends in "03G4" and that it should be connected to Channels A and B of the SDD.

4. The drive modules are already installed in the enclosures.

   Each drive module has a pre-format identification number. This number shows the label number of the matching SDD along with the drive position (the last 4 digits of the serial number of the SDD followed by tier/channel number).

   For a drive with a pre-format number of "03G4-1A" indicates that the drive should be used in the enclosure with a label number of "03G4-A" and it is a member of Tier 1 on Channel A (detailed information is given in Section 3.4).

3.2 Preparing the Rack

Your rack cabinet is already assembled at the factory with the following items installed:

- Mounting brackets for SDD and Monitoring Computer
- 2 Power Distribution Units (PDU)
- Enclosures with drive modules installed and power cords connected and plugged into PDUs
- High Density Modular Interface cable(s) connected to enclosures and secured to rack frame with tie-wraps
- 10/100 baseT (Ethernet) 5-port switch

1. The rack is anchored to the wooden platform with two brackets. Remove the bolts from the brackets (Figure 1).

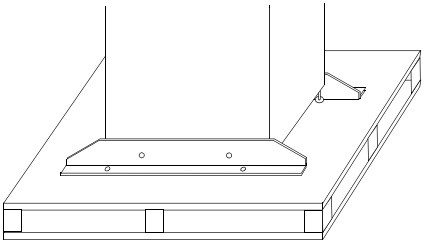


Figure 1. Remove Anchoring Brackets

2. Place the two brackets to the side so they make two ramps for the rack to be rolled off from the platform (Figure 2).

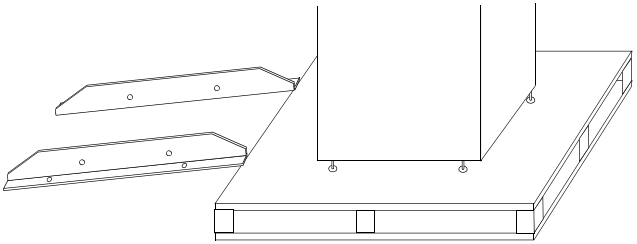
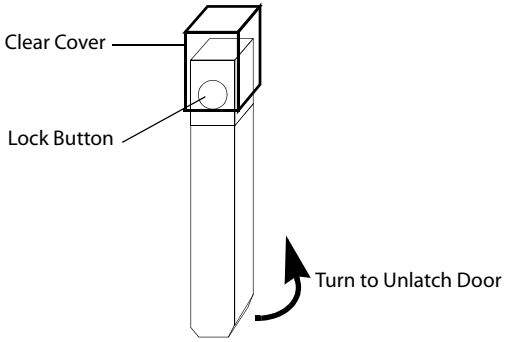


Figure 2. Rolling Rack Off from Platform

3. Carefully roll off the rack from the platform and move it to the desired location.

4. All the cable and power connectors are wrapped in foam and plastic to protect them from damage during shipment. Carefully unwrap and remove the material.

5. The two PDUs are mounted at the back of the rack. To open the door, slide up the clear cover, press the button to unlock which will release the handle, turn the handle to unlatch the door.



The chart below shows where the SDD, enclosures, and Monitoring Computer are placed inside the rack.

1U computer
SDD
Enclosure 1 (Ch A, B)
Enclosure 2 (Ch C, D)
Enclosure 3 (Ch E, F)
Enclosure 4 (Ch G, H)
Enclosure 5 (Ch P, S)

3.3 Installing the SDD

1. Using the pre-formatted label, locate the SDD that matches the serial numbers of the enclosures installed in the rack.

Here is an example assuming the SDD's serial number ends in 03G4. The following chart shows which enclosures should be used with the SDD.

1U computer
SDD: xxxxx03G4
SF-4012: 03G4-AB
SF-4012: 03G4-CD
SF-4012: 03G4-EF
SF-4012: 03G4-GH
SF-4012: 03G4-PS

2. To reduce the weight of the SAN DataDirector, it is best to remove the HSTDs, fan unit, and power supplies from the chassis.

- To remove the HSTD: swing down the latching handle at the front and pull the module out of the bay (Figure 3). Be prepared to support the weight of the module.

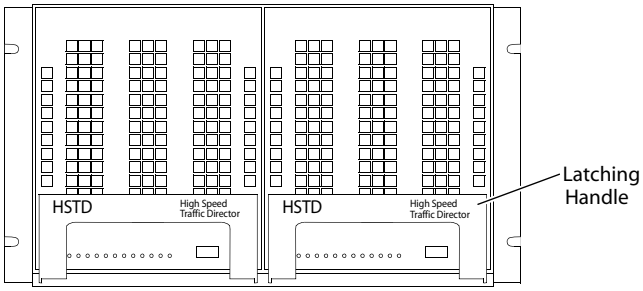


Figure 3. Latching Handle on HSTD

- To remove the fan unit: hold one of the handles with one hand, disengage the latch with your other hand (Figure 4), then swing down and lift up the unit, unplug the two fan power connectors (see Figure 5).

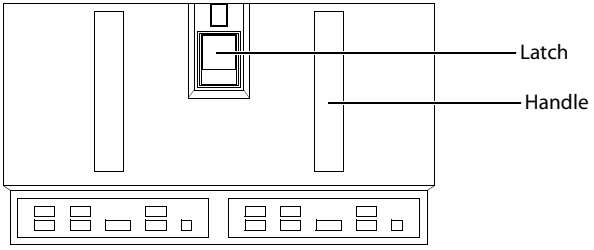


Figure 4. Latch on Fan Unit

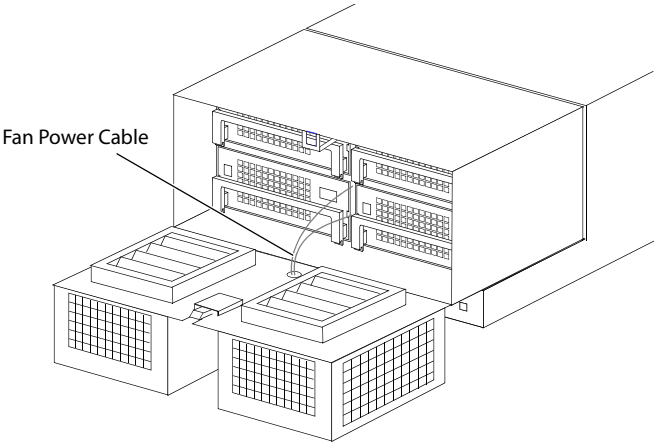


Figure 5. Fan Power Cable

- To remove a power supply: unplug the power cord, swing down the latching handle and pull the module out of the bay (Figure 6).

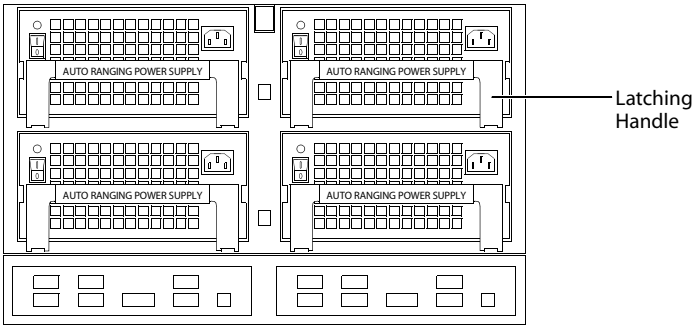


Figure 6. Latching Handle on Power Supply

3. Place the chassis on the two mounting brackets (use the second pair from the top) and push it into the cabinet until the front of the chassis is flush with the front of the brackets (Figure 7).

Secure the chassis to the rack frame by inserting the four standoffs (two on each side) through the holes in the flanges and into the rack frame.

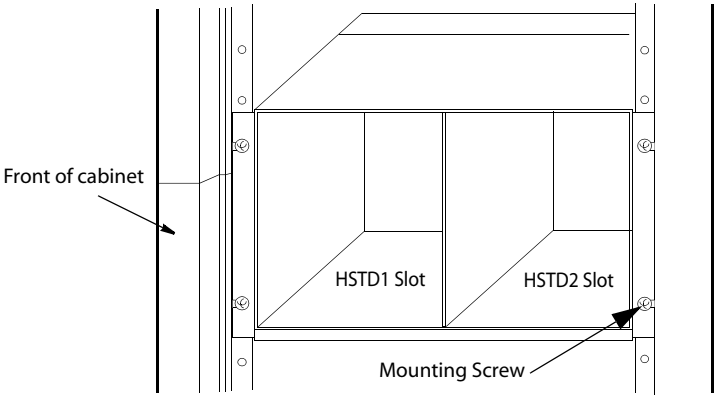


Figure 7. Mounting SAN DataDirector in the Rack

4. Replace the HSTD(s) in the front and the power supplies at the back. For single HSTD configuration, install the HSTD in the left slot (when viewed from front). The power supplies are fully interchangeable and can be installed in any order.

To install a module, swing down the latching handle and slide the module into the bay (Figure 8). The handle will engage with the slot on the bay "rim" and cam the module into position.

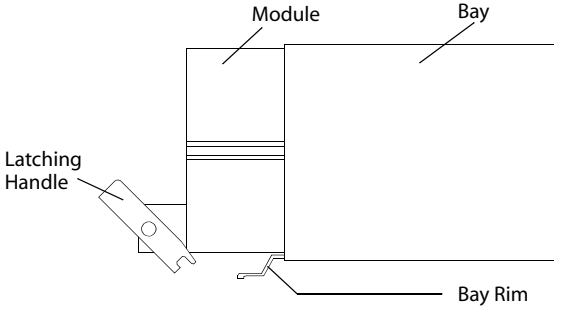


Figure 8. Inserting a Module (Side View)

Then push the handle until it locks (you feel a "click") (Figure 9).

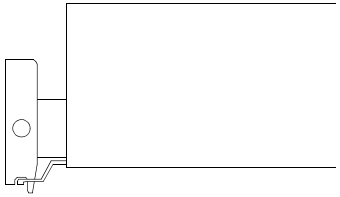


Figure 9. Latching Handle Engaged

5. Reconnect the power cords to the power supplies. Then turn on the power switch on **all** power supplies (Figure 10).

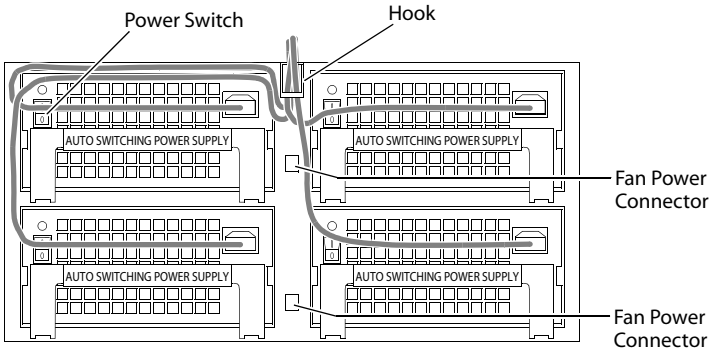


Figure 10. Arranging the Power Cords

6. Replace the fan unit.

Align the flanges at the bottom of the fan unit with the rim on the chassis. Connect the two fan power connectors—Plug #1 connects to the upper connector and Plug #2 connects to the lower connector (Figure 10).

7. Make sure the fan unit is centered with the chassis. Then swing up to close, putting the four power cords inside the notch (Figure 11). Check that the latch is engaged.

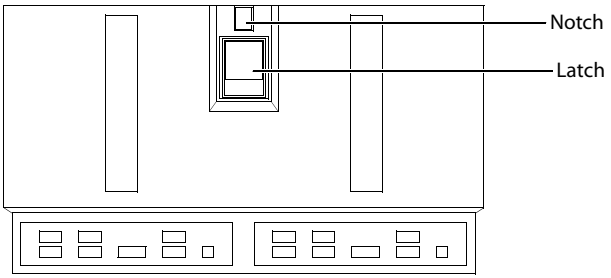


Figure 11. Notch and Latch on Fan Unit

8. Connect two of the power cords to the top two outlets on the left PDU, when viewing from back. Connect the other two power cords to the top two outlets on the right PDU.

9. Connect the 60-pin connector on the HDMI cable(s) to the Storage Portal connector(s) on the back of the SAN DataDirector (Figure 12). Use the HDMI cable secured to the right of the rack (when viewed from back) for HSTD 1.

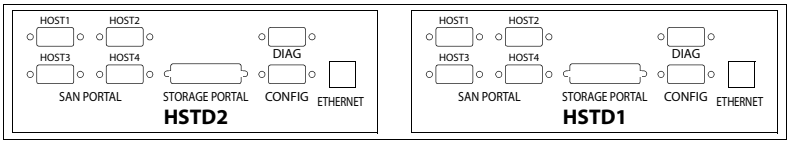


Figure 12. Storage Portal Connectors on SAN DataDirector

3.4 Checking Setup on Drive Enclosures

1. Verify that the two power supplies, ESI/Ops panel module, two I/O modules, and three blank modules are installed in the back on each enclosure (Figure 13).

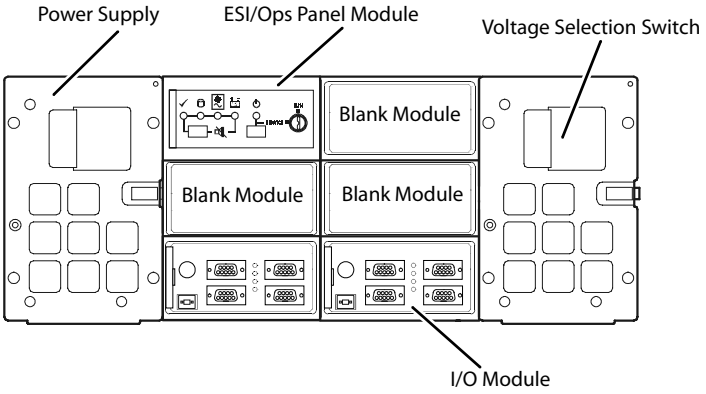


Figure 13. Module Locations on SF-4012 Enclosure

2. Set the voltage selection switch on all power supplies (115 or 230 volts) to conform to the AC voltage in your area.

3. The drive modules are already installed in the enclosures. You may want to check that the drives are in the correct slots.

   Here is an example assuming the enclosure's label number is 03G4-AB. The following chart shows which pre-format label would be correct for the slot when viewing from front of the enclosure. *Note that this example shows configuration for a fully populated enclosure. Empty drive slots will be occupied by slot covers if you are using fewer drives.*

   See Figures 31 on page 43 for drives on other channels.

03G4-6A	03G4-5A	03G4-6B	03G4-5B
03G4-4A	03G4-3A	03G4-4B	03G4-3B
03G4-2A	03G4-1A	03G4-2B	03G4-1B

Follow these steps to remove a drive module:

- Disengage the anti-tamper lock on the drive module (Figure 14). **Carefully** insert the lock key provided into the cutout in the handle trim and align it with the socket. Rotate the key through 90 degrees in a clockwise direction until the indicator aperture shows black. The indicator is red if lock is engaged.

Warning ! The lock can be easily broken. Rotate the key gently.

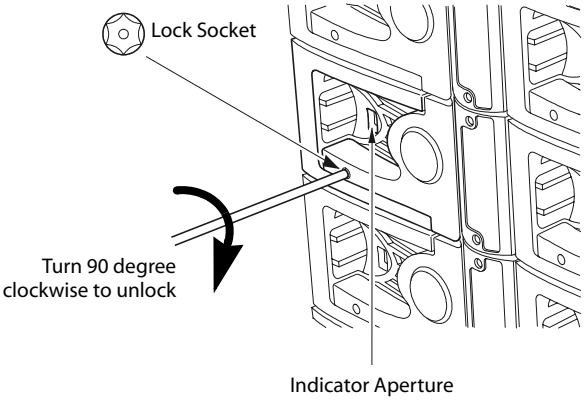


Figure 14. Disengaging the Anti-Tamper Lock

- Release the module handle by pressing on the small indentation area on the left of the module (Figure 15). Then slide the module out of the bay.

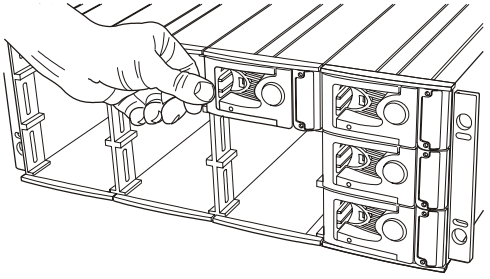


Figure 15. Releasing the Drive Module Handle

4. Check that the ID Range switches are set to "F" on all the I/O modules (Figure 16).

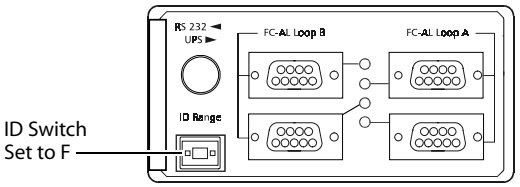


Figure 16. ID Switch on SF-4012 Enclosure I/O Module

5. Verify that all cables are securely connected and power cords are plugged in.

3.5 Installing the Monitoring Computer

Place the 1U computer on the mounting brackets and secure it to the rack using the screws provided.

There are two serial (RS-232) ports on the back of the computer which can be used to access the HSTDs. Please refer to Section 3.12 for more information.

3.6 Connecting a RS-232 Terminal to SDD

1. Using the standard serial cable provided, connect your RS-232 terminal to the Maintenance port at the front of HSTD1 (Figure 17).

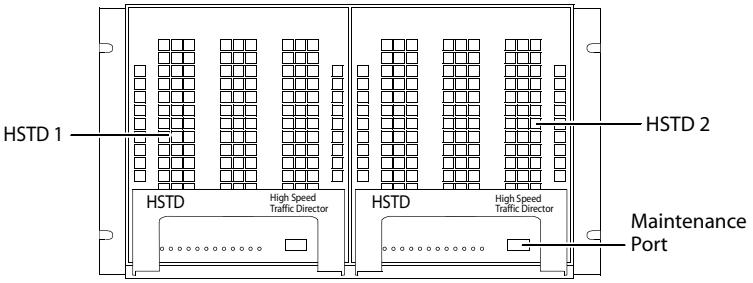


Figure 17. Maintenance Port on HSTDs

2. Then bring up your terminal window and use the following settings for your serial port:
   Bits per second: 115,200
   Data bits: 8
   Parity: None
   Stop bits: 1
   Flow control: None

3.7 Network Connections

1. There are two Ethernet ports on the SAN DataDirector, one for each of the HSTDs (Figure 18). Connect these ports to the 5-port Ethernet switch mounted in the rack using the cables provided.

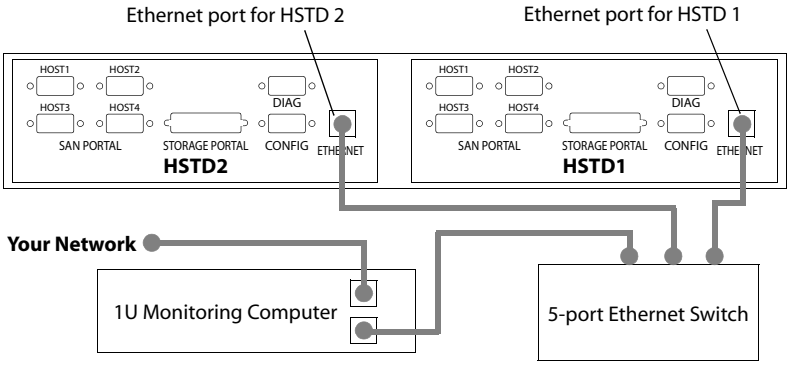


Figure 18. Network Connections between Monitoring Computer & HSTDs

2. There are also two Ethernet ports on the Monitoring Computer. Using the cables provided, connect the bottom Ethernet port of the 1U Monitoring Computer to the 5-port Ethernet switch. The top Ethernet port will connect to the backbone but only after you have obtained an available IP address.

3. Connect the Ethernet switch power cord/transformer, provided in the package, to one of the PDUs in the rack.

3.8 Powering Up the System

Check that all switches on the PDUs are turned OFF. Then connect the two PDUs to the UPS.

3.8.1 Enclosures

1. Turn on the bottom two switches on both PDUs to switch on power to all the enclosures (Figure 19).

   Note that the two power supplies on the same enclosure are connected to different PDUs to enhance the level of redundancy.

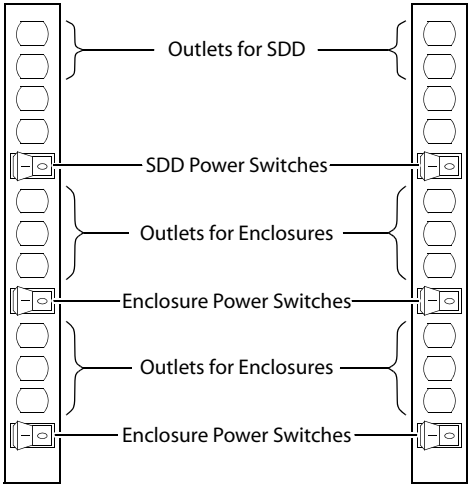


Figure 19. Power Switches on PDUs

2. On each enclosure, using the keys provided, set the Run/Service keyswitch on the Ops Panel to the RUN position (Figure 20). *Note that the Service mode should only be used when there is a power problem.*

3. The Power Supply/Cooling LED on the Ops Panel should be green when the enclosure power is activated.

4. Verify that all LEDs on the Ops panel are green which indicates that the enclosure is functioning correctly.

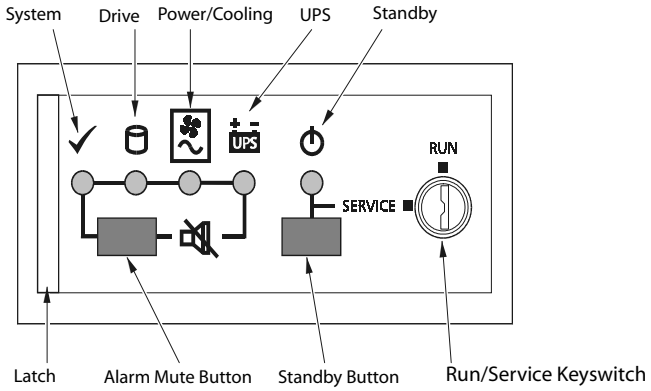


Figure 20. Ops Panel on Enclosures

5. The drive modules are spun up automatically. The upper LED on the front of the drive module turns green when the drive is ready.

3.8.2 SAN DataDirector

After all the drive enclosures are powered up and the drives are spun up and ready, turn on the top switch on both PDUs to switch on power to the SDD (Figure 19).

The SDD will go through a series of system diagnosis and the bootup sequence is displayed on your RS-232 terminal. Wait until the sequence is complete and the "HSTD 1:" prompt is displayed.

3.8.3 Monitoring Computer

Using the power cord provided, connect the computer to one of the PDUs in the rack. Turn on the computer.

3.9 Login in as Administrator

Only users with administrator rights are allowed to change the SAN DataDirector configuration.

At the "HSTD 1:" prompt, enter command:

`login admin`<Enter>

Then enter password:

`creoscitex`<Enter>

```
HSTD 1: login admin

Enter the password:

  Successful CLI session login.
       New owner         : admin.
       New security level: Administrative.
```

Please refer to the SAN DataDirector User Guide for information on how to change the administrator password.

3.10 Setting System Time & Date

The SAN DataDirector's system time and date are factory-configured for U.S. Pacific Standard Time. This needs to be changed if you are located in other time zones.

To change the system date to October 19, 2001, for example, type:

`date 10 19 2001`<Enter>

To change the system time to 2:15:32pm, for example, type:

`time 14:15:32`<Enter>

Changes are automatically applied to both HSTDs.

3.11 SDD Network Configuration

With your RS-232 terminal connected to HSTD 1, use the "network" command to display the current network configuration (Figure 21).

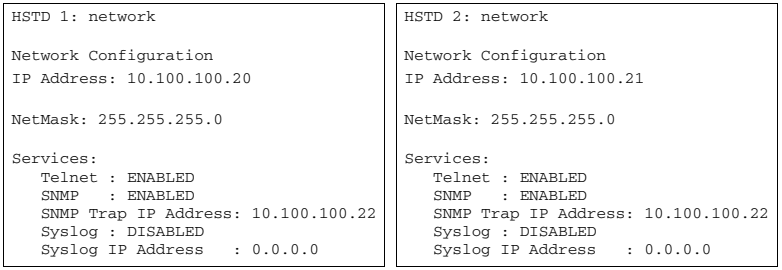


Figure 21. Network Configuration on HSTDs

1. Verify that "IP Address" is 10.100.100.20. If not, enter command:
   NETWORK IP=10.100.100.20<Enter>

2. Verify that "NetMask" is 255.255.255.0. If not, enter command:
   NETWORK NETMASK=255.255.255.0<Enter>

3. Verify that "Telnet" is enabled. If not, enter command:
   NETWORK TELNET=ON<Enter>

4. Check that "SNMP" is enabled. If not, enter command:
   NETWORK SNMP=ON<Enter>

5. Verify that "SNMP Trap IP Address" is 10.100.100.22. If not, enter command:
   NETWORK TRAPIP=10.100.100.22<Enter>

6. Check that "Syslog" is disabled. If not, enter command:
   NETWORK SYSLOG=OFF<Enter>

7. If HSTD 2 is installed, connect your RS-232 terminal to HSTD 2 and repeat Steps [1] to [6] above to verify its network configuration. IP address should be 10.100.100.21 in Step [1].

8. If you have changed any of the network settings, issue command "RESTART" (on both HSTDs) to power cycle the SDD for the changes to take effect.

9. Use the "ping" command to verify the network connections between the 1U computer and HSTDs.

   On HSTD 1: `NETWORK PING=10.100.100.22`
   `NETWORK PING=10.100.100.21` (for dual HSTD only)

   On HSTD 2: `NETWORK PING=10.100.100.20`
   `NETWORK PING=10.100.100.22`

3.12 Set Up on Monitoring Computer (directMONITOR)

The 1U Monitoring Computer contains two Ethernet ports. The top Ethernet port is used for connecting to the external network including the Timna Server. The bottom Ethernet port is configured for use in the SDD private network and connects to the 5-port Ethernet switch to which the HSTDs are connected.

The top port is factory-configured for TCP/IP with an address of 192.168.0.100, with a subnet mask of 255.255.255.0, and no gateway defined. This information is used in the first-time installation process to configure the backbone Ethernet port (top port) to the Ethernet network. It is recommended that the installation engineer be equipped with a laptop with an Ethernet port and a standard Ethernet cable which allows direct attachment between the two computers. In addition, a Java-enabled browser should be installed on this laptop.

The bottom port is configured with a default IP address of 10.100.100.22.

1. Obtaining an IP address from your Network Administrator.

   Obtain a static IP address and the netmask information from the Network Administrator. Make sure this address is not "automatic" DHCP configuration since you will need the address of the 1U Monitoring Computer to remain unchanged and known to you at all times. If you plan to configure the email notification option, it is necessary to obtain the IP address of the DNS server, the gateway address, the hostname of the SMTP email server, and an email account or address to send SMTP emails from (e.g. SDD1@department.company.com).

2. Using your installation laptop to login to the 1U Monitoring Computer.

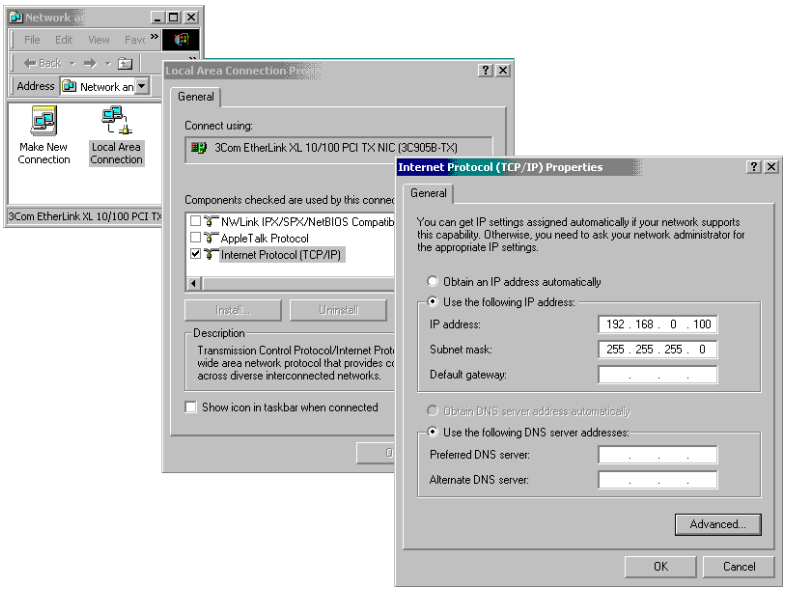
Connect the bottom port of the 1U Monitoring Computer to the SDD's rack-mounted 5-port Ethernet switch. Power on the 1U Monitoring Computer and the 5-port Ethernet switch. Configure the installation laptop Ethernet port's IP address to 10.100.100.100 and reboot the computer if prompted to do so. Using a standard Ethernet cable, connect the laptop to the 5-port Ethernet switch.

Launch a web browser on the laptop and point the browser's address to “http://10.100.100.22:5800”.

You will be prompted for a login password. Type “creoscitex” (all lowercase letters) and log in.

3. Changing the IP address of the 1U Monitoring Computer.

Once you have logged into the 1U Monitoring Computer, you can use your web browser to remote control the 1U Monitoring Computer. Double-click “My Computer” in the browser session, then double-click the Control Panel, and double-click the “Network and Dialup Connections” icon.



You will see icons for “Make New Connection” and two “Local Area Connection” icons. Right-click the first “Local Area Connection” icon and select “Properties”. Scroll down to and highlight Internet Protocol (TCP/IP) and click the “Properties” button. Verify that the IP address indicated is 192.168.0.100. If it is 10.100.100.22, then close this window and select the second “Local Area Connection” icon in the “Network and Dial-up connections” windows.

Change the IP address from 192.168.0.100 to the IP address provided by the network administrator. Change the Subnet mask to the mask provided by the administrator. If you will be using a gateway, set the gateway's IP address. If you will be using a DNS server, set the IP address of the DNS server in the same window. If you have an alternate DNS server, set it's IP address as well. Save the changes.

Use the Start Menu in the browser session to reboot the 1U Monitoring Computer (make sure you do not use the Start Menu on your laptop or else the wrong computer will be rebooted). This reboot will cause the browser remote control session to end.

Wait several minutes for the 1U Monitoring Computer to fully complete its boot process. Then point the browser to 10.100.100.22:5800 and log in using the same password “creoscitex”. Move the mouse over the VNC icon to make sure that it is also monitoring the newly configured IP address.

Note : *The bottom Ethernet port (SDD private network) connection to access the 1U Monitoring Computer is only used in this initial configuration process or in cases of network troubleshooting. Normally, the connection to the Ethernet backbone is done using the top Ethernet port on the 1U Monitoring Computer.*

4. Controlling the 1U Monitoring Computer using the CreoScitex Brisque and Timna server systems.

Connect the top port of the 1U Monitoring Computer to the same Ethernet backbone to which the Timna Server is attached.

The VNC Viewer is already installed on the Timna Server. This application is called “vncviewer” and is located in

/scitex/version/scripts/. A copy of the program is included on the CreoScitex SDD CD in an AIX subdirectory of the VNC directory.

To launch the application, enter one of the following commands:

```
vncviewer <1U computer's hostname>:0
vncviewer <1U computer's IP address>:0
```

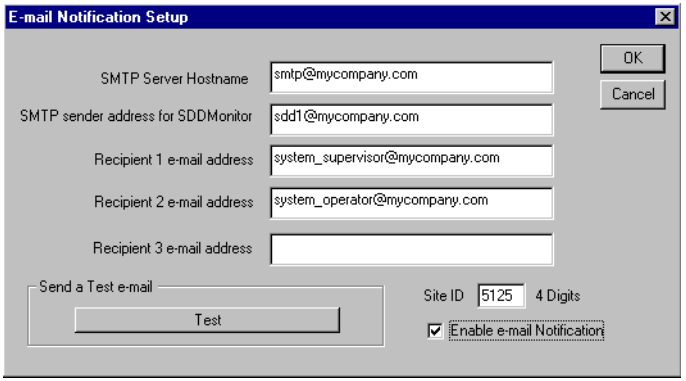
Then log in using the password "creoscitex".

When you type "vncviewer" without the parameters, the usage and options of the command are displayed.

```
# vncviewer
usage: vncviewer [<options>] <host>:<display#>
vncviewer [<options>] -listen [<display#>]
      <options> are:
[-display <display>] [-shared] [-viewonly] [-raw]
[-copyrect] [-rre] [-corre] [-hextile]
[-nocopyrect] [-norre] [-nocorre] [-nohextile]
[-bgr233] [-owncmap] [-truecolour] [-depth <d>]
[-geometry <geom>] [-noshm]
[-wmdecoration <width>x<height>]
[-passwd <passwd-file>] [-period <ms>]
[-region <x> <y> <width> <height>]
[-rawdelay <ms>] [-copyrectdelay <ms>] [-debug]
```

5. (Optional): Enabling e-mail notification.

If you wish to enable e-mail notification and have access to a company SMTP server, you may enter the server information in directMONITOR's Options->E-mail Setup menu.



Using the information provided by the network administrator, enter the hostname of the SMTP server you will be using to send outgoing notification messages (e.g. smtp.mycompany.com).

In the second field, enter the SMTP sender address for directMONITOR, which should be the email address given to the SDD by the email administrator and which will only be used to send messages, never to receive (e.g. sdd@mycompany.com).

In the third, fourth, and fifth fields, enter up to three email addresses of persons who should be notified of sdd status changes or error events.

The Site ID field should be entered as well. It is used to uniquely identify a particular site. Enter a unique number or 0000 if all recipients are only monitoring one SDD unit.

Click “Enable e-mail notification”. Click “OK” to save changes.

6. Accessing HSTDs via terminal sessions.

Connect the two serial (RS-232) ports on the back of the 1U Monitoring Computer to the Maintenance ports on the HSTDs (Figure 22). Use the right DB-9 port (when viewed from back) for HSTD 1 and the left port for HSTD 2 .

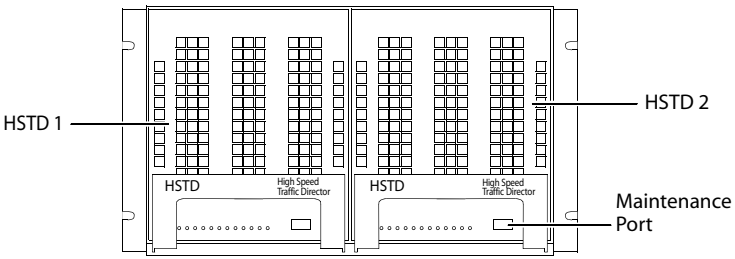


Figure 22. Maintenance Port on HSTDs

The 1U Monitoring Computer automatically opens RS-232 consoles to the HSTDs on bootup. The consoles are labeled HSTD1 and HSTD2. Using the VNC Viewer on the Timna Server, you may access these Hyperterminal sessions directly. Be sure to log in as “admin” with factory-installed admin password of “creoscitex”.

Note : *Do not install any additional software on the 1U Monitoring Computer which is a dedicated monitoring platform. At the time of this writing, PC Anywhere is the only authorized 3rd party software which can be installed on the 1U Monitoring Computer.*

3.12.1 directMONITOR Utility

directMONITOR provides SDD event tracking and notification via Ethernet. If an event occurred and SNMP messages are received, the directMONITOR window (Figure 23) pops up and notifies you with an audible alarm. To silence the alarm, you must click the "Silence Alarm" button in the window. The "Minimize" button minimizes the window. The "ClearLog" button can be used to erase all displayed messages.

Note : *Closing the application will disable the event notification function. Minimizing the program window is fine.*

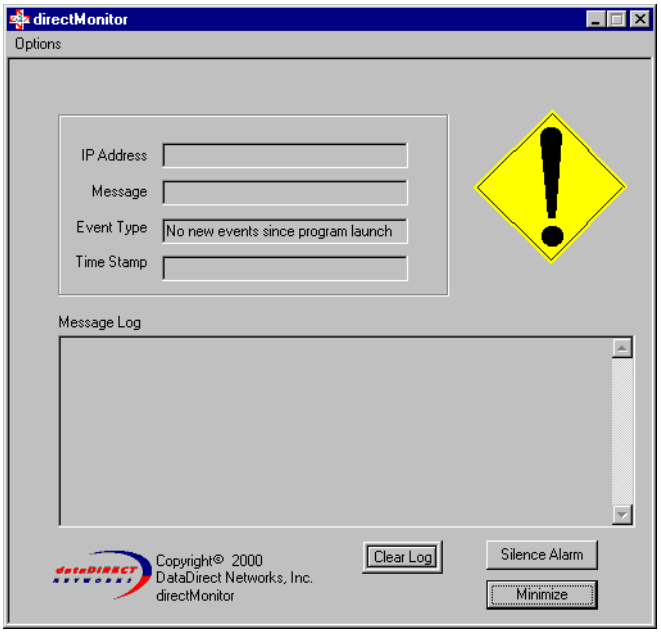


Figure 23. The directMONITOR Window

Displayed Information

The upper portion of the directMONITOR window displays the most recent event summary information. The “IP Address” field displays the IP address of the HSTD which reported the event. The “Message” and “Event Type” fields show the type of event reported. The “Time Stamp” field tells you the exact time and date when the event occurred.

The lower portion of the window displays the message log. Each message contains details of the event, including:

- IP address of the HSTD which reported the event
- time stamp, description, and probable cause of the event
- location of the failed device, if any, and affected components and LUNs

For dual HSTD configuration, events will be reported twice, once by each HSTD.

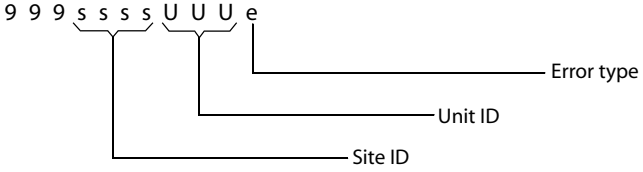
Pager Notification

directMONITOR includes a pager notification function which allows remote system administrators to be notified if a problem occurs on the SDD.

If enabled and a fault occurs, the function will dial the programmed telephone number(s) and report the fault via an eleven-digit code. The fault code will be displayed on the pager’s LCD panel as would a regular numeric message under normal paging operation.

Note : *A pager is not supplied by DataDirect Networks, Inc. and must be obtained through a third party source.*

The eleven-digit code takes the form of “`999ssssUUUe`” as described below:



Symbol	Message
ssss	4-digit Site ID programmed by user
UUU	Unit ID which is the last 3 digits of the IP address of the HSTD that reported the error
e	Type of error: 9 = testing 0 = reset or network error 1 = degraded mode (no data loss) e.g. redundant component / drive failure 2 = data loss or data is not available 3 = informational / event logged (not an error) e.g. format complete 4 = critical error e.g. HSTD removal

Follow these steps to program the pager numbers:

1. In the directMONITOR window, pull down the “Options” menu and select “Pager Setup”.

2. In the Pager Setup window (Figure 24), select the modem device.

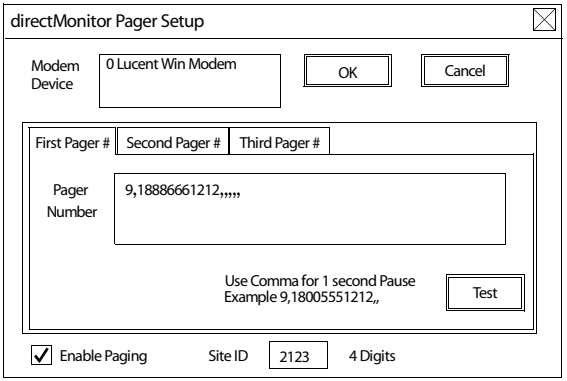


Figure 24. Pager Setup Window

3. You may enter up to three pager numbers. The “First Pager” number will be dialed first, then the second, and the third.

Type in the dialing sequence in the “Pager Number” box for each pager. Use “**,**” (comma) for an 1 second pause. directMONITOR

will send the numeric message as soon as the call is answered. Be sure to enter an appropriate number of pauses according to the call receiving feature of your pagers and cellular phones.

4. Check the "Enable Paging" box to enable the pager notification function.

5. Type in a 4-digit number for "Site ID" to identify your system.

6. After you have entered all the settings, click "OK" to save.

7. You may use the "Test" button to test the pager notification function.

   For the settings as shown in Figure 24 above, the pager should display the code "9992123UUU9" (where UUU is the unit ID which is the last 3 digits of the HSTD's IP address).

Note : *While Pager Notification is in progress, the directMONITOR window will not respond to any user attempts to click the "Silence Alarm" button. The notification only lasts for a short while. During this time, a caption appears in the Message Log to indicate pager notification is taking place. If additional event(s) occurs while pager notification is in progress, the corresponding paging events are suppressed and displayed in the directMONITOR window.*

3.12.2 Testing the Email Notification Function

To test that directMONITOR will properly alert you, it is recommended that you simulate an SDD failure by disconnecting a component such as a power supply (disconnect the AC connector from, say, Power Supply 1 of the SDD to the AC Power Distribution Unit. The SDD power cords are always connected in the top connectors of the rack).

Several seconds after the plug is removed, when the SDD has determined that the failure is unrecoverable, an SNMP trap will be sent from the HSTD(s) to the 1U Monitoring Computer. The directMONITOR program listens for these trap messages and will immediately start beeping. This beep alerts you of a failure. In addition, if you have configured the program to send e-mails, an email message will be sent to the recipient(s) in the program's recipient list.

When the 1U Monitoring Computer beeps, it is necessary to login via VNC Viewer on the Timna Server and click the “Silence Alarm” to stop the audible alarm. A new message in the top of the message window (Figure 23) will notify you of the type of event or events that have taken place. At this point you should rectify the problem by reconnecting the SDD power supply's power plug in this case.

The 1U Monitoring Computer will beep when any noteworthy event is reported, including disk failures as well as informational events such as a LUN format completion event.

3.12.3 WinVNC Re-installation

The VNC program has been installed on the directMONITOR computer at the factory. Perform the following procedure only if you need to re-install the software.

1. The VNC program files are included on the CreoScitex SDD CD, inside the “vnc” folder. Go into folder “winvnc” and run file “setup.exe”.

2. Follow the on-screen instructions and use all default settings. The destination folder will be “Program Files\ORL\VNC\”.

3. When the Installation Complete screen is displayed, click Finish.

4. Reboot the computer. The VNC program will be automatically started. The program icon is added to the task bar.



   If VNC is not started, go to Control Panel \ Services. Select “VNC Server” and click “Start”.

5. You will be prompted to set a default password. Click “OK” in the dialog box.

6. In the Default Local System Properties screen, type “creoscitex” in the Password box and leave the other options on their default settings. Click “OK”.

3.13 Checking the Array Parameters for Proper Operation

The SDD systems will have been pre-formatted at the factory. During installation, it is necessary to check that the parameters are properly setup, via the RS-232 terminal.

3.13.1 Disk Status

1. At the HSTD prompt, enter command:
   `tier<Enter>`

2. Verify that all your drives are healthy (Figure 25).

   The "Disk Status" column shows the status of each disk on the tier. A letter <ABCDEFGHPS> represents a healthy disk at that location. A space indicates that the disk is not present or detected. A period (.) denotes that the disk was failed by the system. "?" indicates that the disk has failed the diagnostics tests or is not configured correctly. The character "r" indicates that the disk at that location has failed and is being replaced by a spare drive.

   Figure 25 is an example for a system containing (20) 36GB drives, the display will be different for other configurations (see Section 4 for list of parameters).

```
HSTD 1: tier

                  Tier Configuration

                Capacity   Space Available
 Tier  Owner    (Mbytes)      (Mbytes)      Disk Status    Lun List
-------------------------------------------------------------------
   1     1       280020           0         ABCDEFGHPS     0 1
   2     2       280020           0         ABCDEFGHPS     2 3


Automatic disk rebuilding is Enabled
System rebuild extent: 32 Mbytes
System rebuild delay: 60

System Capacity 560040 Mbytes, 0 Mbytes available.
```

Figure 25. Tier Configuration Screen

3. Check that "Automatic disk rebuilding" is enabled.

   If not, enter command:
   `tier autorebuild=on<Enter>`

4. Verify that "System rebuild extent" is 32 MBytes.

   If not, enter command:
   `tier extent=32<Enter>`

5. Check that "System rebuild delay" is 60.

   If not, enter command:
   `tier delay=60<Enter>`

3.13.2 LUN Status

1. At the HSTD prompt, enter command:
   `lun<Enter>`

2. In the Logical Unit Status screen, check that all LUNs are "Ready".

```
HSTD 1: lun
                              Logical Unit Status
    LUN      Status     Capacity     Block    Owner    Tiers    Tier List
                        (Mbytes)     Size
-------------------------------------------------------------------------
     0       Ready      140006       512      1        1        1
     1       Ready      140006       512      1        1        1
     2       Ready      140006       512      2        1        2
     3       Ready      140006       512      2        1        2

            System Capacity 560024 Mbytes, 0 Mbytes available.
```

3. Then verify the other parameters (capacity, block size, owner, tiers, and tier list) for each LUN according to your configuration (see Section 4 for list of parameters).

3.13.3 Cache Settings

1. At the HSTD prompt, enter command:
cache<Enter>

```
HSTD 1: cache

                        Current Cache Settings

          Write      Maximum     MF     Prefetch    Read      Write
   LUN    Caching    Prefetch    Bit     Ceiling   Priority  Priority
-------------------------------------------------------------------------
     0     Enabled       16       On      65535      high      high
     1     Enabled       16       On      65535      high      high
     2     Enabled       16       On      65535      high      high
     3     Enabled       16       On      65535      high      high

                     1280.0 Mbytes of Cache Installed
                      (2048 Segments of 256 Kbytes)
```

Figure 26. Current Cache Settings Screen

2. Verify the following parameters for each LUN (Figure 26):
Write Caching: Enabled
Maximum Prefetch: 16
MF Bit: On
Prefetch Ceiling: 65535
Read Priority: high
Write Priority: high

3. Verify the amount of cache installed:
640.0MBytes for 640MB of cache
1280.0MBytes for 1.28GB of cache
2560.0MBytes for 2.56GB of cache

4. Check that the segment size is 256Kbytes.

If not, enter command:
cache size=256<Enter>

3.13.4 Other HSTD Settings

Zoning

Verify that no “anonymous” access is allowed to the system.

At the HSTD prompt, enter command:

`zoning<Enter>`

```
HSTD 1: zoning
                                    External LUN Mapping
 Port    World Wide Name   0  1  2  3  4  5  6  7  8  9  10 11 12 13 14 15
-------------------------------------------------------------------------------
   1     2100CB5CBA7F5F1F
   2     2200CB5CBA7F5F1F
   3     2300CB5CBA7F5F1F
   4     2400CB5CBA7F5F1F
```

Note: The WWN will vary depending on the HSTD.

Figure 27. LUN Zoning Screen

Check that the “External LUN Mapping” chart is empty (Figure 27). If not, select the host port and enter “n” for all 32 LUN’s to remove all anonymous access to the LUN’s.

Clear Log

On both HSTDs, enter command:

`log clear<Enter>`

Coherency (for systems with dual HSTD only)

At the HSTD prompt, enter command:

`dual coherency=on<Enter>`

3.14 Connecting to the CreoScitex Host Computers

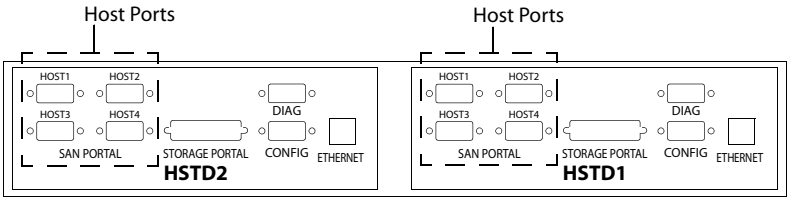
The Fibre Channel HBAs are pre-configured at the factory to match up with the SDD LUN permissions (users). The boxes containing the HBAs are labeled with the unit serial number and a host number. For example, 03G4-FC1 and 03G4-FC2.

1. Install the Fibre Channel HBAs into the CreoScitex host computer(s).

   Use the installation script on the SDD CreoScitex CD-ROM to install the correct Emulex AIX driver, the SDD Stanza, and the Large LVM update.

2. Shut down the host computers.

3. Locate the Fibre Channel cables in the accessory kit. Connect one end of each cable to the "HOST" ports on the back of the SDD.



The list below shows the various SDD configurations and the corresponding host ports to use:

- Single HSTD with 2 ports: use HOST1 and HOST2 on HSTD1
- Dual HSTD with 4 ports: use HOST1 & HOST2 on HSTD1, and HOST1 & HOST2 on HSTD2
- Dual HSTD with 8 ports: use all 4 host ports on both HSTDs

3.15 Setting Security Levels (User Authentication)

Each user connected to the SAN DataDirector is identified by its World Wide Name (WWN) and is given a unique user ID number. The SDD can store configuration for up to 128 users and the security settings apply to all host ports.

The HBAs will have preassigned LUNs in the SDD. Each host will have access to one LUN. The mapping will be as follows:

User Name	External LUN Mapping			
	0	1	2	3
03G4-fc1	0			
03G4-fc2		1		
03G4-fc3			2	
03G4-fc4				3

It is recommended to change the "user name" to represent the host name and FC card number in the CreoScitex host.

To change the user name:

1. Open a Telnet session to the HSTD and log in as admin. The password is creoscitex.

2. Type "`user audit=on`" and hit <Enter>.
   The SDD will report which users are connected.

3. Connect the FC cable, attached to a port on the SDD, to the first FC card (03G4-fc1 in our example). Make a note of which HSTD it is connected to and the port.

4. Power on the CreoScitex host computer containing the first FC card. During the boot-up process, when the FC card is activated, the SDD will show the login message for the FC card in question (since user auditing is enabled, all low-level FC login and logout events will be displayed).

5. At the Telnet console, type "`user edit`" and hit <Enter>. At the User Edit screen (Figure 28), type the number corresponding to the user name for this FC card and hit <Enter>. Then enter a new alias to match the host name and card number (for example Brisque1-1) for FC card 1 in machine Brisque1.

```
HSTD 1: user edit

 ID  User        Port    S_ID    World Wide Name    Login
-------------------------------------------------------------------------
  0   03G4-fc1     1       2     200000E08B00E867    THU MAY 17 13:04:32 2001


Enter a user ID or 's' to specify a world wide name or 'e' to escape.
0
Enter an alias name for the user up to 12 characters.
brisque1-1
Enter the new LUN zoning for user brisque1-1 200000E08B00E867.
Specify the internal LUN (0..31), or 'n' for none or 'e' to escape.

External LUN 0 is zoned to: e
```

Note: The WWN will vary depending on the FC card.

Figure 28. Changing the User Name

6. If you also want to change the LUN zoning setting, enter the new settings or press <e> to exit menu.

7. Repeat Steps [3] to [6] above to attach the other hosts and change the user names.

8. The "USER" command will display the current settings for each host (Figure 29). The External LUN Mapping chart indicates which internal LUNs the host will have access to and where the internal LUN will appear to the host computer.

```
HSTD 1: user
                                                External LUN Mapping
User          World Wide Name    0  1  2  3  4  5  6  7  8  9 10 11
-------------------------------------------------------------------------
0 brisque1-1  200000E08B00E867   0
1 brisque2-2  200000E08B007B68      1
2 brisque3-3  200000E08B007E68         2
3 brisque4-4  200000E08B007C68            3

   User auditing is enabled.
```

Figure 29. Current LUN Mapping Screen

3.16 Running scismit

On the CreoScitex hosts, run "scismit" and refer to CreoScitex Server Technical Manual for the "Configure New Disk" procedure.

Each of the LUNs on the SDD system will appear as a new hard drive to the host.

4 List of Configurations and Parameters

This section provides the list of configurations available for the CreoScitex SDD system. It also gives the LUN characteristics for each configuration.

- Single HSTD, 20 x 36GB Drives (2 LUNs) . . . . . p 44
- Dual HSTD, 20 x 36GB Drives (4 LUNs) . . . . . p 45
- Dual HSTD, 20 x 73GB Drives (4 LUNs) . . . . . p 46
- Dual HSTD, 56 x 73GB Drives (8 LUNs) . . . . . p 47

4.1 Disk Allocation in Enclosures

Each SF-4012 enclosure holds up to 12 disks, separated into two channels of 6 disks. The 6 disks in each channel are connected via dual Fibre Channel Arbitrated Loop (Figure 30).

Configuration of disks in the enclosures must be in sets of complete tier. The SES (SCSI Enclosure Services) requires disks to be present in the rightmost and leftmost lower bays of each enclosure (indicated by shaded background in Figures 31). Since these bays are members of two different tiers, the minimum SDD configuration is two tiers/LUNs and that requires 20 disks. For tiers 3 and up, the disks in Channel S (spare disks) are optional.

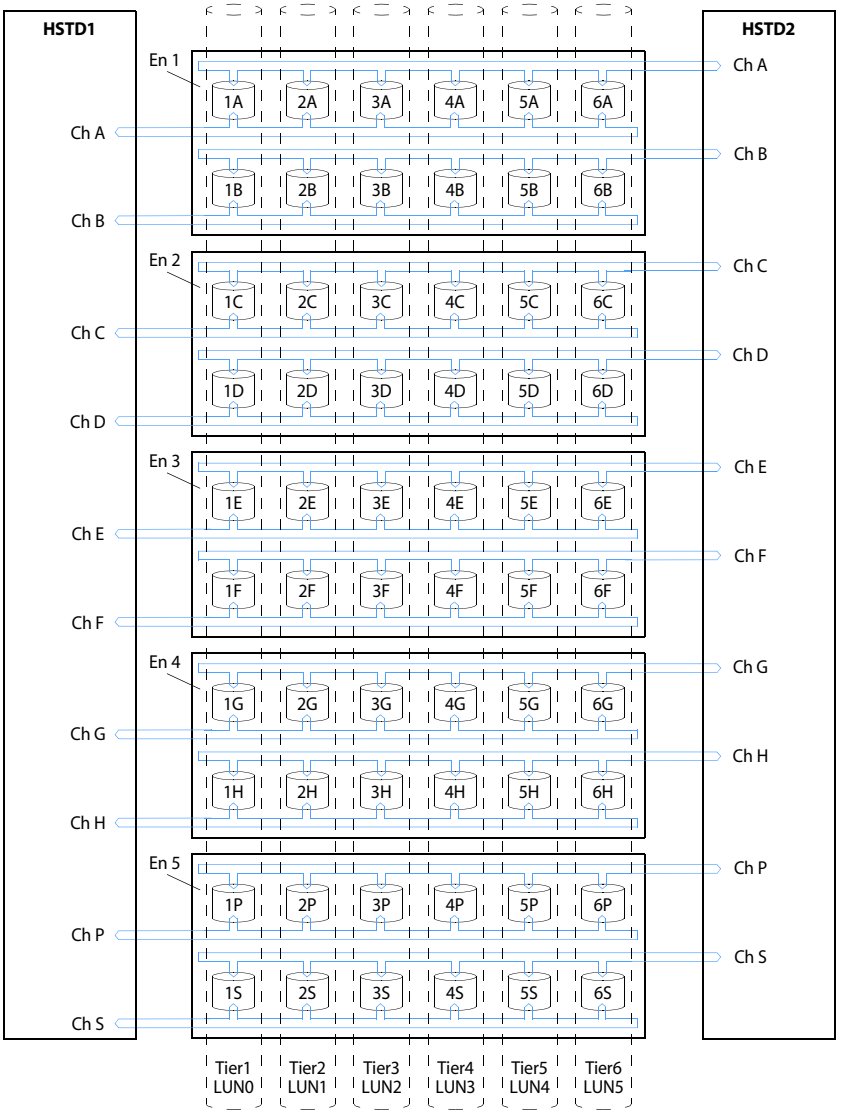


Figure 30. Logical Connection Schemes of Disks/Tiers/LUNs for CreoScitex Configuration (Five SF-4012 Enclosures)

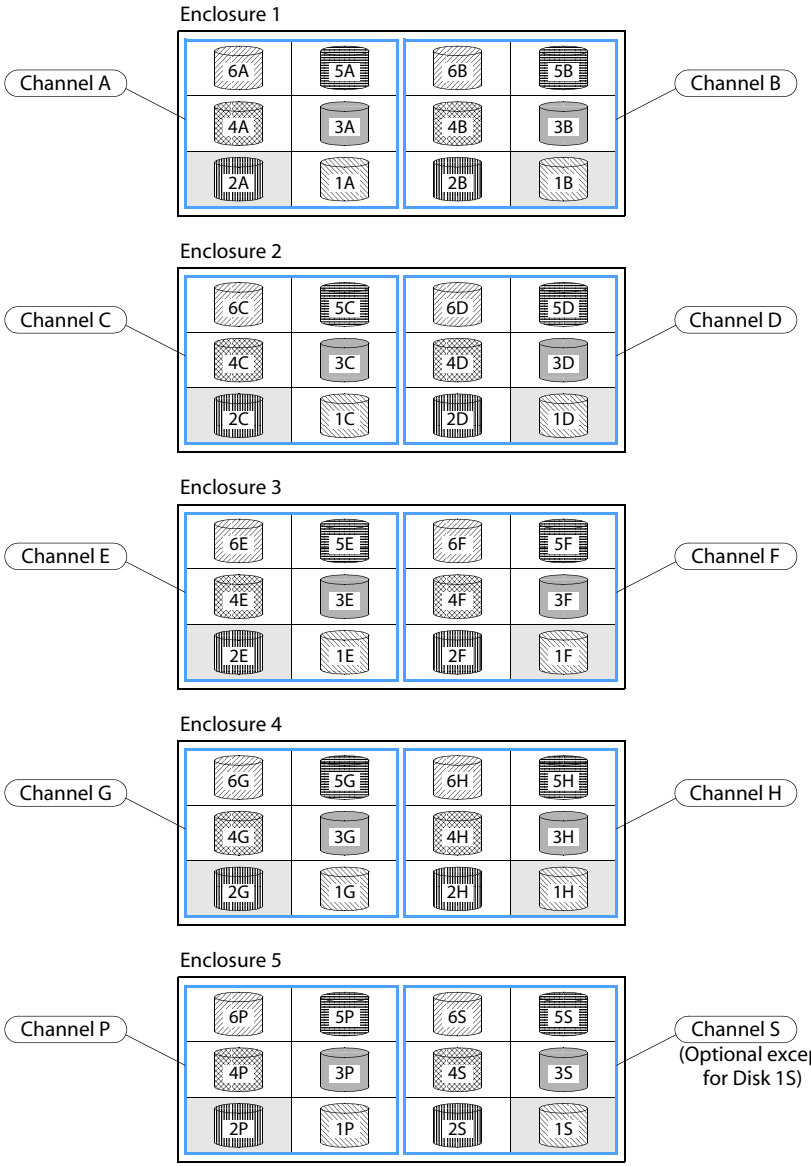


Figure 31. Physical Disk Mapping Scheme for CreoScitex Configuration (Five SF-4012 Enclosures)

4.2 Single HSTD, 20 x 36GB Drives

Cache per HSTD: 640MB
Host ports: HOST1, HOST2 on HSTD1

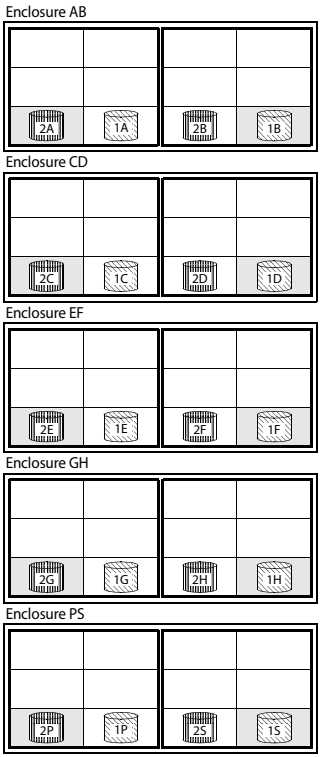
LUN 0, 1 = 18 Active drives + 2 Hot Spares (HS):

Channel Tier	A	B	C	D	E	F	G	H	P	S	
1	LUN 0	LUN 0	LUN 0	LUN 0	LUN 0	LUN 0	LUN 0	LUN 0	LUN 0	HS	HSTD1
2	LUN 1	LUN 1	LUN 1	LUN 1	LUN 1	LUN 1	LUN 1	LUN 1	LUN 1	HS	HSTD1

Both spare drives are owned by HSTD 1.

LUN0:
Capacity: 280020MB
Block Size: 512
Owner: 1
Tiers: 1
Tier List: 1

LUN1:
Capacity: 280020MB
Block Size: 512
Owner: 1
Tiers: 1
Tier List: 2



4.3 Dual HSTD, 20 x 36 GB Drives

Cache per HSTD: 640 MB
Host ports: HOST1, HOST2 on HSTD1
HOST1, HOST2 on HSTD2

LUN 0..3 = 18 Active drives + 2 Hot Spares (HS):

Channel Tier	A	B	C	D	E	F	G	H	P	S	
1	LUN 0,1	LUN 0,1	LUN 0,1	LUN 0,1	LUN 0,1	LUN 0,1	LUN 0,1	LUN 0,1	LUN 0,1	HS	HSTD1
2	LUN 2,3	LUN 2,3	LUN 2,3	LUN 2,3	LUN 2,3	LUN 2,3	LUN 2,3	LUN 2,3	LUN 2,3	HS	HSTD2

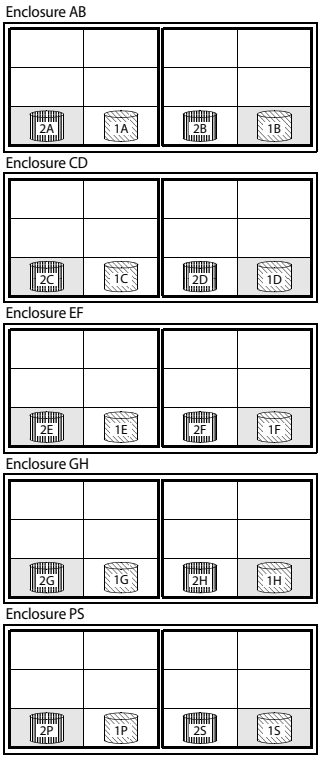
Spare drive 1S is owned by HSTD 1 and 2S is owned by HSTD 2.

LUN 0:
Capacity: 140006 MB
Block Size: 512
Owner: 1
Tiers: 1
Tier List: 1

LUN 1:
Capacity: 140006 MB
Block Size: 512
Owner: 1
Tiers: 1
Tier List: 1

LUN 2:
Capacity: 140006 MB
Block Size: 512
Owner: 2
Tiers: 1
Tier List: 2

LUN 3:
Capacity: 140006 MB
Block Size: 512
Owner: 2
Tiers: 1
Tier List: 2



4.4 Dual HSTD, 20 x 73 GB Drives

Cache per HSTD: 640MB
Host ports: HOST1, HOST2 on HSTD1
HOST1, HOST2 on HSTD2

LUN 0..3 = 18 Active drives + 2 Hot Spares (HS):

Channel Tier	A	B	C	D	E	F	G	H	P	S	
1	LUN 0,1	LUN 0,1	LUN 0,1	LUN 0,1	LUN 0,1	LUN 0,1	LUN 0,1	LUN 0,1	LUN 0,1	HS	HSTD1
2	LUN 2,3	LUN 2,3	LUN 2,3	LUN 2,3	LUN 2,3	LUN 2,3	LUN 2,3	LUN 2,3	LUN 2,3	HS	HSTD2

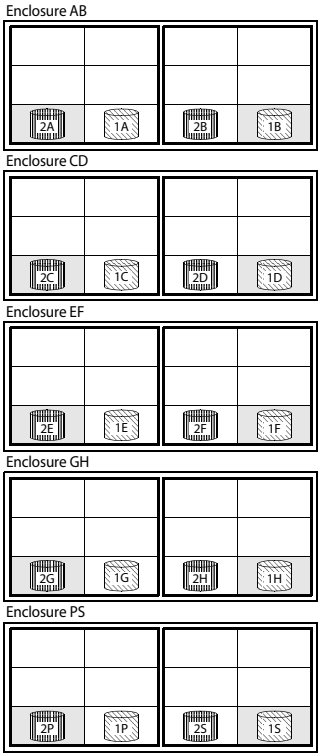
Spare drive 1S is owned by HSTD 1 and 2S is owned by HSTD 2.

LUN 0:
Capacity: 280020MB
Block Size: 512
Owner: 1
Tiers: 1
Tier List: 1

LUN 1:
Capacity: 280020MB
Block Size: 512
Owner: 1
Tiers: 1
Tier List: 1

LUN 2:
Capacity: 280020MB
Block Size: 512
Owner: 2
Tiers: 1
Tier List: 2

LUN 3:
Capacity: 280020MB
Block Size: 512
Owner: 2
Tiers: 1
Tier List: 2



4.5 Dual HSTD, 56 x 73 GB Drives

Cache per HSTD: 1280 MB
Host ports: HOST1, HOST2, HOST3, HOST4 on HSTD1
HOST1, HOST2, HOST3, HOST4 on HSTD2

LUN 0..7 = 54 Active drives + 2 Hot Spares (HS):

Channel Tier	A	B	C	D	E	F	G	H	P	S	
1	LUN 0	LUN 0	LUN 0	LUN 0	LUN 0	LUN 0	LUN 0	LUN 0	LUN 0	HS	HSTD1
2	LUN 1	LUN 1	LUN 1	LUN 1	LUN 1	LUN 1	LUN 1	LUN 1	LUN 1	HS	HSTD2
3	LUN 2	LUN 2	LUN 2	LUN 2	LUN 2	LUN 2	LUN 2	LUN 2	LUN 2		HSTD1
4	LUN 3	LUN 3	LUN 3	LUN 3	LUN 3	LUN 3	LUN 3	LUN 3	LUN 3		HSTD2
5	LUN 4,5	LUN 4,5	LUN 4,5	LUN 4,5	LUN 4,5	LUN 4,5	LUN 4,5	LUN 4,5	LUN 4,5		HSTD1
6	LUN 6,7	LUN 6,7	LUN 6,7	LUN 6,7	LUN 6,7	LUN 6,7	LUN 6,7	LUN 6,7	LUN 6,7		HSTD2

Spare drive 1S is owned by HSTD 1 and 2S is owned by HSTD 2.

LUN0:
Capacity: 560040 MB
Block Size: 512
Owner: 1
Tiers: 1
Tier List: 1

LUN1:
Capacity: 560040 MB
Block Size: 512
Owner: 2
Tiers: 1
Tier List: 2

LUN2:
Capacity: 560040 MB
Block Size: 512
Owner: 1
Tiers: 1
Tier List: 3

LUN3:
Capacity: 560040 MB
Block Size: 512
Owner: 2
Tiers: 1
Tier List: 4

LUN4:

Capacity:	280020MB
Block Size:	512
Owner:	1
Tiers:	1
Tier List:	5

LUN5:

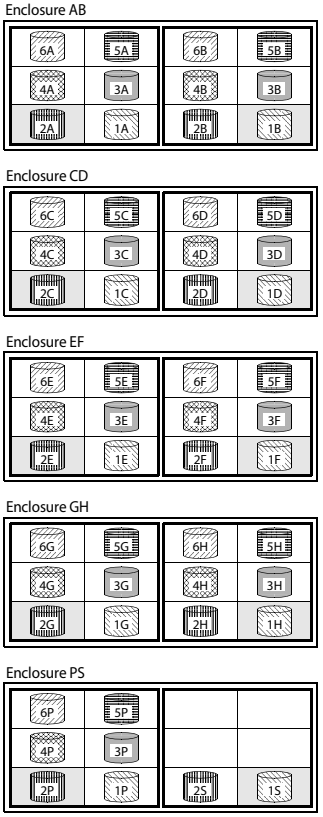
Capacity:	280020MB
Block Size:	512
Owner:	1
Tiers:	1
Tier List:	5

LUN6:

Capacity:	280020MB
Block Size:	512
Owner:	2
Tiers:	1
Tier List:	6

LUN7:

Capacity:	280020MB
Block Size:	512
Owner:	2
Tiers:	1
Tier List:	6



4.6 Cable Connections between SDD and SF-4012 Enclosures

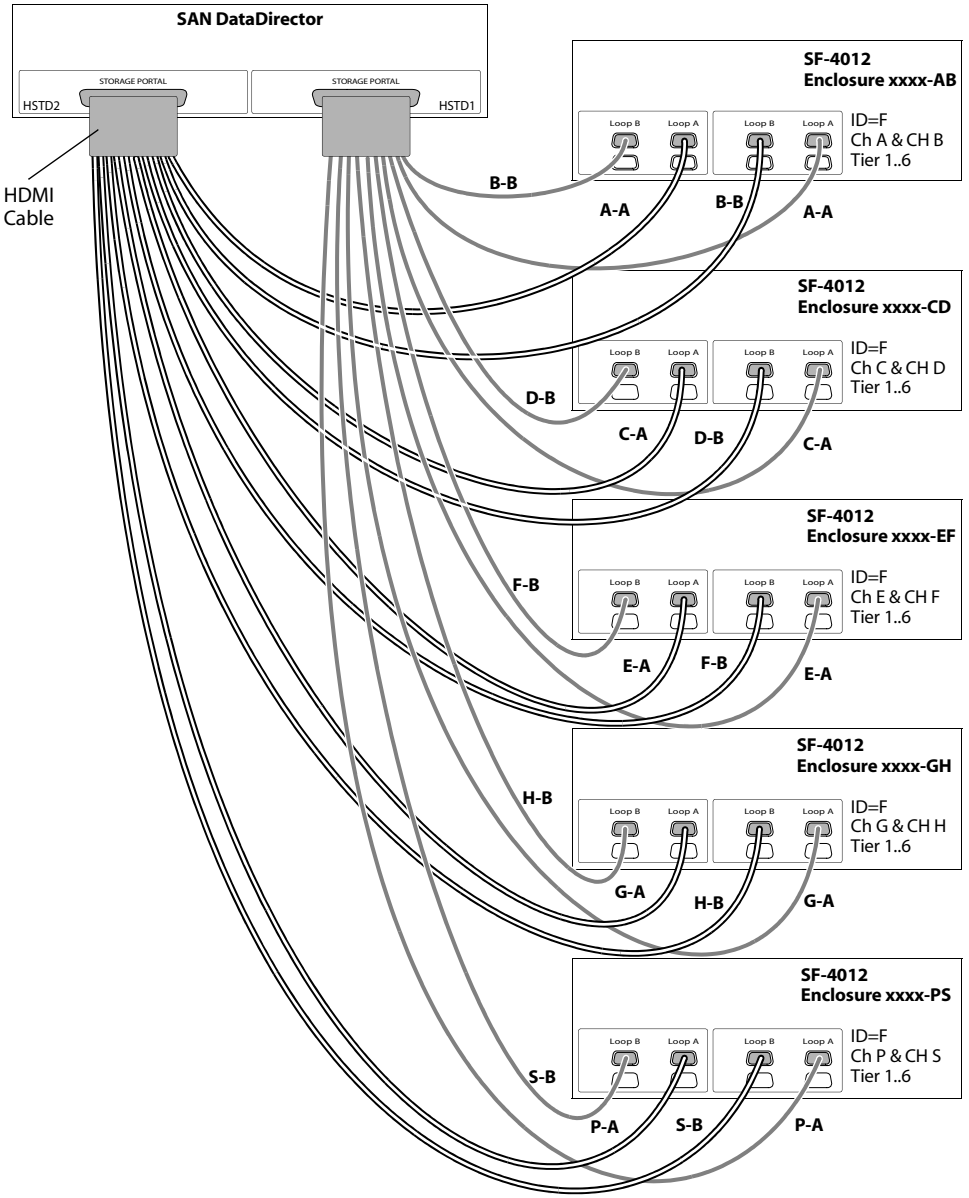


Figure 32. Connecting the SF-4012 Enclosures to SAN DataDirector

5 Drive Upgrade Procedure



Warning ! It is very important to follow this procedure exactly as described below to avoid accidental deletion of existing customer data.

Note : *Drives must be added in sets of complete tier. Your upgrade pack must contain at least 9 drives. If the capacity of the new drives are larger than the existing spare drives, make sure you are also adding a spare drive to this new tier (i.e. your upgrade pack should contain 10 drives).*

1. On the SDD, enter command "tier" to see the number of existing tiers and determine the next tier to add.

2. Take out the blank modules from the slots where the new drives will be used on the enclosures (refer to Figures 31 on page 43 for module locations). Insert the new drive modules.

For example, your system currently contains two tiers and you are now adding tier 3, insert the new drives to bays 3A, 3B, 3C, 3D, 3E, 3F, 3G, 3H, and 3P (and 3S, if you are also adding a spare).

3. Wait for the drives to spin up. The upper LED will turn green when the drive is ready.

4. Log into the correct HSTD.
If you are adding an odd tier (even LUN), log into HSTD 1.
If you are adding an even tier (odd LUN), log into HSTD 2.

5. Enter command "disk scan" to check for new disks in the system. Verify that all your new drives can be seen.

6. Format the new LUN using the "lun add" command. If you are adding LUN 4 (tier 3), for example, type:

- `lun add`<Enter>
- Enter the LUN to add. Valid LUN numbers are 0..31.
  `4`<Enter>

- Enter the capacity in MBytes.
  `140006`<Enter>
- Enter the number of tiers to use.
  `1`<Enter>
- Then select the tier(s) by entering the Tier number.
  `3`<Enter>
- Enter the block size in Bytes.
  `512`<Enter>

7. The message "Operation successful: LUN 4 added to the system" then appears. When you are asked to initiate LUN format, press <y> to continue.

After you have initiated LUN format, the message "Starting Format of LUN" is displayed.

8. You may add the next LUN, if needed, as soon as format has started for the previous LUN. To add LUN 5, type:

- `lun add`<Enter>
- Enter the LUN to add.
  `5`<Enter>
- Enter the capacity in MBytes.
  `140006`<Enter>
- Enter the number of tiers to use.
  `1`<Enter>
- Then select the tier(s) by entering the Tier number.
  `3`<Enter>
- Enter the block size in Bytes.
  `512`<Enter>

9. The message "Operation successful: LUN 5 added to the system" appears. When you are asked to initiate LUN format, press <y> to continue. The message "Starting Format of LUN" is displayed.

10. You may monitor the format progress by entering the command "`lun`" which will display the Logical Unit Status screen with the current percentage of completion (Figure 33).

```
HSTD 1: lun
                              Logical Unit Status

    LUN      Status     Capacity     Block     Owner   Tiers   Tier List
                        (Mbytes)      Size
-------------------------------------------------------------------------------
      0       Ready       140006       512         1       1       1
      1       Ready       140006       512         1       1       1
      2       Ready       140006       512         2       1       2
      3       Ready       140006       512         2       1       2
      4    Format 35%     140006       512         1       1       3
      5    Format 10%     140006       512         1       1       3
```

Figure 33. Logical Unit Status - Formatting

11. Upon completion, the message "Finished Format of LUN" will be displayed. Enter command "lun" to check the status of the LUN, which should be "Ready".

12. Follow the procedure given in Section 3.15 on page 39 to set security level for the new LUN.

This completes the drive upgrade procedure. The new LUN(s) on the SDD will appear as new hard drive(s) to the host.

6 Complete Formatting Instructions (assuming no factory pre-formatting)

This section explains how to fully format a SDD system. This can be done via the RS-232 terminal or Telnet.

Warning ! This will delete any data on the SDD.

When you format a LUN, note that:

- LUNs will be "owned" by the HSTD via which they are created. Hosts will only see the LUNs on the HSTD that they are connected to.
- LUN ownership should be evenly distributed between the two HSTDs. For example, LUN 0 on HSTD1, LUN 1 on HSTD2, LUN 2 on HSTD1, and LUN 3 on HSTD2.
- Spare drives, located in Channel S, are owned by individual HSTDs, according to the tier ownership. For example, if a spare drive is on Tier 1 which is used to create LUN 0 via HSTD1, this spare drive is owned by HSTD1 and will not be used to replace a failed drive on Tier 2 that is owned by HSTD2. Hence, spare drives should be evenly spread out.

Note : *The steps needed to format the SDD system are the same for any CreoScitex configurations. Only the LUN parameters, such as tier selection and LUN ownership, will vary. Please refer to section "List of Configurations and Parameters" on page 41 for the list of parameters to enter.*

1. Login as admin. The password is creoscitex.
2. Select a cache segment size for your array. To set the segment size to 256 KBytes, for example, enter command:
   `cache size=256`<Enter>
3. Enter command "`lun`". The Logical Unit Status chart will display the existing LUNs present on the system.

To delete a LUN, enter command: `LUN DEL=x`<Enter>
where "x" is the LUN <0..31>. You can only delete a LUN which is owned by the HSTD that you are connected to.

4. To create a new LUN, enter command:
`lun add`<Enter>

5. You are prompted to enter the parameter values for the LUN. You may press <e> at any time to exit the format LUN menu and cancel the command completely. Using the configuration described in Section 4.2, the parameters to enter for LUN 1 will be:
   - Enter the LUN to add. Valid LUN numbers are 0..31.
     `1`<Enter>
   - Enter the capacity in MBytes.
     `280020`<Enter>
   - Enter the number of tiers to use.
     `1`<Enter>
   - Then select the tier(s) by entering the Tier number.
     `2`<Enter>
   - Enter the block size in Bytes.
     `512`<Enter>

6. The message "Operation successful: LUN 1 added to the system" then appears. When you are asked to initiate LUN format, press <y> to continue.

7. After you have initiated LUN format, the message "Starting Format of LUN" is displayed.

   You may monitor the format progress by entering the command "`lun`" which will display the Logical Unit Status screen with the current percentage of completion (Figure 34).

```
HSTD 1: lun

                              Logical Unit Status
    LUN      Status     Capacity      Block      Owner    Tiers    Tier List
                        (Mbytes)       Size
-------------------------------------------------------------------------------
     1     Format 14%     280020       512        1        1      2

            System Capacity 560040 Mbytes, 280020 Mbytes available.
```

Figure 34. Logical Unit Status - Formatting

8. Upon completion, the message “Finished Format of LUN” will be displayed. Enter command “lun” to check the status of the LUN, which should be “Ready” (Figure 35).

```
HSTD 1: lun

                              Logical Unit Status

    LUN      Status     Capacity      Block      Owner    Tiers    Tier List
                        (Mbytes)      Size
-------------------------------------------------------------------------------
      1       Ready       280020       512         1        1       2

              System Capacity 560040 Mbytes, 280020 Mbytes available.
```

Figure 35. Logical Unit Status - Ready

9. To create more LUNs, repeat Steps [4] to [8] above and enter the corresponding parameters.

LUN format is a background process and you can start adding the next LUN as soon as format has started for the previous LUN.

10. After all format processes are complete, select a prefetch setting for all the LUNs. Enter command:

`cache prefetch=16`<Enter>

11. Check the cache parameters as described in Section 3.13.3 on page 36.

This completes the LUN format process.

7 Procedure to Failover dataVolumes

The SDD's multi-ported design and Fibre Channel permissions capability make failover a very simple process. Below are two different error scenarios requiring different type of intervention:

7.1 Host machine fails - moving the dataVolumes to another CreoScitex host

If a host machine fails and another host is available, it is possible to reconfigure the SDD and the new host to move the dataVolumes from the failed machine. For example, if Brisque1 and Brisque2 each have their own sets of dataVolumes (their own LUN) on the SDD, and Brisque1 fails, it is then possible to reconfigure the system so that Brisque2 can access both LUNs. The procedure below describes this process. These procedures are intended to be used by certified product specialists.

On the SDD, it is simply a matter of reconfiguring the “User” command to map both LUNs on the new host.

1. Use the serial port (see Section 3.9) and log in as admin on either HSTD.

2. Type the USER command and view the current user LUN assignments. In our example, it gives us the following output:

```
   HSTD 1: user

                                                External LUN Mapping
User            World Wide Name    0  1  2  3  4  5  6  7  8  9 10 11
-------------------------------------------------------------------------
1 Timna1-fc1    200000E08B00E867   0
2 Timna1-fc2    200000E08B007B68      1
3 Brisque1-fc1  200000E08B007E68         2
4 Brisque2-fc2  200000E08B007C68            3

     User auditing is enabled.
```

3. In our example, Brisque1 is no longer operational and we need to move LUN 2 from Brisque1 to Brisque2. It is recommended to delete the LUN mapping from Brisque1 before adding it in Brisque2.

Type “User Edit” at the CLI prompt (Figure 36). In our example, Brisque 1 is user 3, so we hit <3> and hit <Enter> when prompted for the user ID. Then hit <Enter> when prompted to enter an alias name (we are not changing alias).

```
HSTD 1: user edit

 ID  User         Port    S_ID   World Wide Name    Login
-------------------------------------------------------------------------------
  1  Timna1-fc1    1       2    200000E08B00E867    THU MAY 17 13:04:32 2001
  2  Timna1-fc2    1       2    200000E08B007B68    THU MAY 17 09:05:34 2001
  3  Brisque1-fc1  1       2    200000E08B007C68    THU MAY 17 14:00:13 2001
  4  Brisque2-fc2  1       2    200000E08B007E68    THU MAY 17 16:18:46 2001


Enter a user ID or 's' to specify a world wide name or 'e' to escape.
3
Enter an alias name for the user up to 12 characters.
Enter the new LUN zoning for user brisque1-1 10000000C92135FE.
Specify the internal LUN (0..31), or 'n' for none or 'e' to escape.
External LUN 0 is zoned to:
External LUN 1 is zoned to:
External LUN 2 is zoned to: n
External LUN 3 is zoned to: e
```

Figure 36. Changing the LUN Mapping (1)

For external LUN 0 mapping, hit <Enter> (we are not changing this, merely proceeding to LUN 2).

For external LUN 1 mapping, hit <Enter> (we are not changing this, merely proceeding to lun 2).

For external LUN 2 mapping, hit <n> and hit <Enter> (this removes LUN 2 mapping).

For external LUN 3, hit <e> to exit menu.

4. Next, we need to add LUN 2 to Brisque2’s mapped LUNs.

Type “User Edit” and hit <Enter>.

In our example, Brisque2 is user 4, so we hit <4> and <Enter> when prompted for the user ID.

Hit <Enter> when prompted to change the name (we are not changing alias).

For external LUN 0 mapping, hit <Enter> (we are not changing this, merely proceeding to LUN 2).

For external LUN 1 mapping, hit <Enter> (we are not changing this, merely proceeding to LUN 2).

For external LUN 2 mapping, hit <2> and hit <Enter> (this adds LUN 2 mapping).

For external LUN 3, hit <e> to exit menu.

In our example, the output from the "user" command will now read as follows:

```
   HSTD 1: user

                                                  External LUN Mapping
User             World Wide Name    0  1  2  3  4  5  6  7  8  9  10 11
-------------------------------------------------------------------------
1 Timna1-fc1     200000E08B00E867   0
2 Timna1-fc2     200000E08B007B68      1
3 Brisque1-fc1   200000E08B007E68
4 Brisque2-fc2   200000E08B007C68         2  3

     User auditing is enabled.
```

5. After changing the user LUN mapping rules, it is necessary to perform the following steps on AIX. As with any maintenance operation, it is recommended to verify that a backup of the existing dataVolumes is present and valid before proceeding.

- Log into AIX as root
- Type lsdev -Ccdisk and make a note of the existing hdisks
- Run cfgmgr. This will cause AIX to detect new devices, including the LUN that was just added. *Note: a number of low-level messages will be displayed during lpfc FC scanning.*
- After cfgmgr has completed, type lsdev -Ccdisk and hit <Enter>. Verify that an additional hdisk is now present. It will appear as the next available hdisk number.
- At this point, it will be necessary to import this hdisk using Scismit ->Devices->Fixed Disk->F4->(hdiskX)
- Note: If the svg name definition and slv definitions that were stored on the hdisk are already in use in the machine, then additional steps are required. To continue our example, if LUN 2 was configured as hdisk3, svg3 in Brisque1 but is now hdisk4 in Brisque2, and hdisk3, svg3 are already in use, then the conflicting names needs to be resolved.

Resolving the name conflict consists of the following general steps:

- Import the hdisk into a temporary volume group using the importvg command
- Correct the names of the logical volumes to the proper slv names using the chlv command
- Correct the names of the filesystems to the proper dataVolumes names using chfs
- Exporting the temporary volume group using exportvg
- Then using scismit to import the hdisk.

- Type importvg -y tempvg hdisk4 (LUN 2 is hdisk4 in our example, use the appropriate hdisk definition in your actual system). You will observe synclvodm messages indicating that the logical volume name conflicts are being automatically resolved.
- Type lsvg -l tempvg to obtain a list of renamed volume groups and the filesystems they correspond to for each one of the logical volumes. In our example, we would see that fslv00 is the new lv name for dataVolume/Brisque1.3.0. Note that it will show the host name of the old machine (Brisque1) even though we are now on Brisque2.
- Use the chlv command to rename the logical volumes. Syntax is chlv -n (new name) (existing name). In our example we would type chlv -n slv1.0 fslv00
- Correct the names of the filesystems for each filesystem by typing chfs -m "<new path>" "<old path>". In our example, we would type chfs -m "dataVolumes/Brisque2.4.0" "dataVolumes/Brisque1.3.0"
- After all the filesystems have been renamed, type: varyoffvg tempvg. Then type: exportvg tempvg
- It is then possible to import the hdisk using scismit. After scismit imports the dataVolumes they will be mounted and accessible on Brisque2.

7.2 Recovering from HSTD Failure

Use the following general guidelines to recover from HSTD failure in a dual HSTD configuration.

1. On the Creoscitex host machines, unmount the file systems present on the hdisk of the failed HSTD (unmount command)

2. Varyoff the volume group of the now missing hdisk (varyoffvg command)

3. Export the volume group of the missing hdisk (exportvg command)

4. Remove the hdisk entry from AIX (rmdev command)

5. Move the port connection from the failed HSTD to a free host port in the alternate HSTD (if inactive, it may be necessary to obtain a temporary license to enable the port).

6. Once connected, run cfgmgr (cfgmgr command)

7. Run scismit to import the hdisk and remount the dataVolume

If an HSTD failure occurs in a dual HSTD system, it is necessary to reconnect the Fibre Channel interfaces into the alternate HSTD. It may be necessary to obtain a temporary license to enable any inactive ports on the second HSTD.

8 Troubleshooting

8.1 Drive Failure Recovery

When a drive failure occurs on the SAN DataDirector, the tier containing that drive will begin operating in degraded mode. This means that the tier will continue to handle I/O commands from the host, but there will be no redundancy to protect against additional drive failures on the same tier. If another disk drive fails before the first drive is rebuilt, the tier will go offline.

If one disk in a tier fails, the data or parity information on the failed disk will be reconstructed from the parity disk and data disks of that tier. An entire channel may fail without data loss.

The spare drives, installed in Channel S, are owned by individual HSTDs, according to the tier ownership.

It is recommended that the SAN DataDirector's Automatic Disk Rebuild function to be enabled at all times (`TIER AUTOREBUILD=ON`).

Note : *If more than one disk is failed in a single tier, only the first will be replaced by a spare disk. All failed disks after the first in each tier will not be replaced by the spares.*

8.1.1 Single Drive Failures

A single drive failure in any tier does not result in the loss of data. The logical unit(s) on that tier will continue to operate in degraded mode. If a spare drive is available, the SAN DataDirector will automatically rebuild the data on the spare drive if "autorebuild" is enabled. System performance is not affected while recovery is taking place.

When a drive failure occurs, the SAN DataDirector will display an error message on your console, indicating which drive has failed. If your drive enclosure is on DataDirect's official SAN DataDirector compatibility list, the Fault LED on the failed drive will turn amber. The error is also written to the event log. The SAN DataDirector will rebuild the drive automatically once it finds a suitable spare drive. You may monitor the rebuild progress or change the rebuild rate to match the user load.

To obtain additional information, use the “TIER” or “LOG” command. The TIER command will display the status of the disks. The failed drive is denoted by an “r” which means it is being replaced by a spare drive.

If a rebuild is taking place, the percentage of completion is also displayed. Figure 37 illustrates a system that has a failed drive on Tier 2, Channel D and it is being rebuilt. When rebuild is complete, a message “Finished Replacing disk 2D” will be displayed.

```
                        Tier Configuration


                Capacity   Space Available
 Tier           (Mbytes)       (Mbytes)      Disk Status    Lun List
-------------------------------------------------------------------------
   1             140006            0          ABCDEFGHPS     0 1
   2             140006            0          ABCrEFGHPS     2 3


Rebuilding disk 2D, 14.6% completed.

Automatic disk rebuilding is Enabled
System rebuild extent: 32 Mbytes
System rebuild delay: 60

System Capacity 280936 Mbytes, 0 Mbytes available.
```

Figure 37. Checking the Disk Status

The DISK INFO command will tell you which spare drive is replacing the failed drive (Figure 38).

```
HSTD 1: disk info=2d

Disk:        2D
Status:      Failed and replaced by spare 2S
Capacity:    34524
Block size   512
Write cache: Enabled
AL_PA:       E8
Vendor Id:   SEAGATE
Product ID:  ST318203FC
Product Rev: 0004
Serial Num:  LR225022
Global Id:   2000002037294419
```

```
HSTD 1: disk info=2s

Disk:        2S
Status:      Replacing failed drive 2D
Capacity:    34524
Block size   512
Write cache: Enabled
AL_PA:       E8
Vendor Id:   SEAGATE
Product ID:  ST318203FC
Product Rev: 0004
Serial Num:  LR418906
Global Id:   2000002035292423
```

Figure 38. Obtaining the Disk Information

Returning the system to fault-tolerant state:

It is recommended that you replace the failed drive as soon as possible so that the tier can return to its optimal state. If you replace the failed drive while rebuild is taking place, the system will finish rebuilding data on the spare drive first. When rebuild is complete and the failed drive has been replaced, the system will automatically copy the data from the spare drive to the new drive, and return the spare drive to its standby state. The tier is then fully restored.

If no suitable spare drive exists when a drive failure occurs, you will need to replace the failed drive and initiate a rebuild:

- Replace the failed drive
- Enter command "`disk scan`"
  The system will check each channel and look for newly inserted drive(s). If the new drive is in good condition, a rebuild operation is automatically started.
- You may also initiate a rebuild by issuing the command "`DISK REBUILD=<tier><channel>`".

Changing the Rate of Rebuild

You may use the commands "`TIER DELAY`" and "`TIER EXTENT`" to control the percentage of processor time allocated to rebuild compare to I/O handling. Rebuild is done in steps. `DELAY` will control the amount of time to wait before rebuilding the next chunk of data. The size of the chunk of data to rebuild each time is controlled by the parameter `EXTENT`.

To increase the rate of rebuild, reduce the DELAY value. However, the default DELAY setting is recommended unless you have very special needs. Changing the LUN configuration will be a better approach.

Interrupting the Rebuild Operation

If you want to abort the rebuild, issue command "`TIER STOP`" which will stop all current rebuild operations.

8.1.2 Multiple Drive Failures and Channel Failures

If multiple drives on the same drive channel fail simultaneously, the problem may be a channel failure rather than a series of drive failures. For example, if drives 1D, 2D, and 3D fail at the same time, the problem may be in Channel D rather than in the three drives. If the drives fail as the result of a channel failure, data on the drives may not be lost. Any single channel failure can be recovered.

Before you replace any drives, use the "TIER" command to check the current disk status (Figure 39) and see if the drives failed are all on the same channel.

```
                        Tier Configuration

              Capacity  Space Available
  Tier        (Mbytes)      (Mbytes)      Disk Status  Lun List
 ------------------------------------------------------------------
    1           138914        138914      ABC.EFGHPS
    2           138914        128912      ABC.EFGHPS
    3           138914        138914      ABC.EFGHPS

Automatic disk rebuilding is Enabled
System rebuild extent: 32 Mbytes
System rebuild delay: 60

System Capacity 416742 Mbytes, 416742 Mbytes available.
```

Figure 39. Checking the Tier Status

Then use the "DISK" command to check the status of the channel. Figure 40 below shows that the system is looking for Channel D and there may be a problem with that channel.

```
HSTD 1: disk

     Disk Channel Status
Disk Channel A healthy.
Disk Channel B healthy.
Disk Channel C healthy.
Disk Channel D acquiring loop synchronization.
Disk Channel E healthy.
Disk Channel F healthy.
Disk Channel G healthy.
Disk Channel H healthy.
Disk Channel P healthy.
Disk Channel S healthy.

     Disk write caching is Enabled.

     Disk command timeout: 10 seconds.
     Disk command outstanding: 0
```

Figure 40. Disk Channel Information

Recovery steps:

- You may get guidance from DataDirect Technical Support to determine the cause of error and steps to recover.
- Isolate the cause of channel failure. (e.g. loose cable connections)
- Rebuild all the drives on that channel individually by issuing command: `DISK REBUILD=<tier><channel>`
  e.g. `disk rebuild=1d`
  `disk rebuild=2d`
  `disk rebuild=3d`
- Two rebuild operations will be processed at the same time. The other rebuild jobs will be queued up and processed in the same order as they were entered.

8.2 SAN DataDirector Messages & Descriptions

This section describes the format and content of the system messages displayed by the SAN DataDirector. This will help explain the system messages displayed on the RS-232 terminal and help an administrator quickly diagnose the severity of the problem.

The messages reported by the SAN DataDirector will fall into the following categories: Fault messages, Warning messages, Timeout messages, and Informational messages.

8.2.1 Fault Messages

All system fault messages will begin with “Fault:” as shown below.

```
Fault: Disk read piece error!
```

These are the most serious messages displayed by the SAN DataDirector and should be reported immediately. These messages indicate that a hardware or software error has occurred which is unrecoverable and may cause the SAN DataDirector to become unstable. This means that the firmware has detected an error that prevents further operation. The unit may not function correctly after this type of error and a graceful shutdown of the system may not be possible. *Steps will be taken to isolate the error that may allow the unit to continue functioning but continued operation in **not** recommended.*

Actions to be taken in the field:

- Run diagnostics on the SAN DataDirector to insure it is still operational.

8.2.2 Warning Messages

All system warning messages will begin with "Warning:" as shown below.

```
Warning: SDRAM not detected on disk channel A, slot 0.
```

These messages indicate that the SAN DataDirector has encountered a serious error that may require user intervention. These messages may indicate a hardware error (such as a bus parity error), a failure of a hardware component (such as the cache memory on a disk channel), or an internal firmware error (such as a system variable goes out of range).

Note : *These errors do not include disk failures. Handling of disk failures is part of the normal operation of the SAN DataDirector. Warning messages only indicate a problem with the SAN DataDirector itself.*

The difference between a "Fault" and a "Warning" is that the firmware will take steps to continue operation and insure the integrity of the data. However the firmware may be unable to continue normal operation and data may be lost due to the error. *These errors should be reported immediately and continued operation is not recommended.*

Actions to be taken in the field:

- Run diagnostics on the SAN DataDirector to insure it is still operational.
- Downgrade the firmware in the SAN DataDirector to a previous version known to be stable.

8.2.3 Timeout Messages

All system timeout messages will begin with "Timeout:" as shown in the following example.

```
Timeout: Read Disk 1A, Id:1
```

These messages indicate that the SAN DataDirector has timed out waiting for a data transfer such as a read from an initiator. This means that the unit may have trouble communicating with an initiator or a disk in the array. Timeout messages may also be generated under heavy I/O conditions or when an error occurs like a disk failure or a LIP on the Fibre Channel bus. Timeouts should generally not occur during normal operation and should be reported if they keep reappearing.

8.2.4 Informational Messages

All other system messages are used to inform the operator of a change in the system status. These messages do not indicate a problem with the SAN DataDirector but may indicate a problem that requires user intervention.

```
Failing Disk 1A
Replacing Failed Disk 1A with Spare Disk 1S
```

All informational messages that are related to an I/O command from an initiator will be displayed with the initiator information. This will include the initiator's 64-bit World Wide Name, the host port the initiator is communicating on, the source ID the initiator is using on the Fibre Channel bus, and the exchange ID of the SCSI command (see following example).

```
Read Address error LUN:0 address:80000000 length:1
WWN:2000000011111111 port:4 S_ID:10 OX_ID:4189
```

8.2.5 SDRAM and Cache Error Messages

```
Warning: SDRAM not detected on disk channel A, slot 0.
Warning: SDRAM not detected on disk channel A, slot 1.
```

The above messages indicate that the SAN DataDirector cannot locate the SDRAM on the disk channel. The SDRAM must be installed in slot 0 of each disk channel. If the SDRAM is installed in slot 1 then all the disk channels must have it installed in slot 1 as well. This error will prevent the system from running normally. Make sure the SDRAM is installed correctly.

```
Warning: SDRAM configuration mismatch detected on channel A,
slot 0.
Warning: SDRAM configuration mismatch detected on channel A,
slot 1.
```

The above messages indicate that there is a mismatch on the SDRAM configurations. The SAN DataDirector requires that all the SDRAM installed have the same size, configuration and speed. This error will prevent the system from running normally. Make sure the SDRAM is installed correctly.

```
Warning: Cache diagnostic failure on host port 1.
Warning: Cache diagnostic failure on disk channel A.
```

The above messages indicate that the SAN DataDirector performed a diagnostic test on the SDRAM from the host and disk sides and discovered an error. This error will prevent the system from running normally. Make sure the SDRAM is installed correctly.

```
Warning: Unknown cache diagnostic status on host port 1.
Warning: Unknown cache diagnostic status on disk channel A.
```

The above messages indicate that the SAN DataDirector performed a diagnostic test on the SDRAM from the host and disk sides and discovered an error with the test itself. This error will prevent the system from running normally. This may indicate a problem with the firmware.

```
Timeout: Cache diagnostic host port 1.
Timeout: Cache diagnostic disk channel A.
```

The SAN DataDirector performed a diagnostic test on the SDRAM from the host and disk sides but the test took too long to complete. This error will prevent the system from running normally. This may indicate a problem with the hardware.

```
Warning: SDRAM Cache size is invalid.
```

The SAN DataDirector tried to initialize the cache descriptors and found that the size reported for the SDRAM was invalid. This error will prevent the system from running normally. Make sure the SDRAM is installed correctly.

```
Warning: Cache descriptor allocation is full.
```

The SAN DataDirector tried to initialize the cache descriptors and ran out of memory. The SAN DataDirector will continue to function

normally but will be unable to use all of the SDRAM in the system for caching. This error should only occur if an extremely large amount of SDRAM cache is installed in the system and the cache cluster size is set very small. This can be corrected by increasing the cache cluster size of the unit.

```
Warning: Cluster size is invalid. Restoring saved value.
```

The SAN DataDirector tried to initialize the cache descriptors and found that the cache cluster size to be used was invalid. The SAN DataDirector will load the saved value from the parameter blocks and continue. It should continue to run normally but the cluster size may need to be adjusted. This may indicate a problem with the firmware.

```
Warning: Cluster size is invalid. Restoring default value.
```

The SAN DataDirector tried to initialize the cache descriptors and found that the cache cluster size to be used was invalid. The SAN DataDirector also found the saved value in the parameter block to be invalid as well. It will load the default value and continue. This unit should continue to run normally but the cluster size may need to be adjusted. This may indicate that the parameter block has been corrupted.

8.2.6 Disk Boot-up Error Messages

```
Warning: Unexpected Disk interrupt channel:A status: msg:
Warning: Unexpected Host interrupt port:1 status: msg:
```

The SAN DataDirector received an interrupt from the host port or disk channel that it was not expecting. This may indicate a problem with the firmware or hardware.

```
Waiting for disks to Boot: 3FF
```

The SAN DataDirector sent a request to the disk channels to perform a LIP and to report the results back. This message indicates that the LIP request is taking a long time and the SAN DataDirector is still waiting. The LIP results will be delayed if a disk is in the process of spinning up. It is normal for the disks to take a while to boot when the unit is first powered on. The hex number at the end of the message is a bitmap that indicates which disk channels the unit is still waiting for. This message is informational only.

```
Warning: Disk boot incomplete: 3FF
```

The SAN DataDirector sent a request to the disk channels to perform a LIP and to report the results back. This message indicates that the LIP request took too long and at least one disk channel failed to report in. The hex number at the end of the message is a bitmap that indicates which disk channels failed to report in. This error will prevent the system from running normally. This may indicate a problem with the hardware or the disks in the array.

```
Warning: Disk channel A boot failure.
```

The above message indicates that a disk channel failed to boot properly. This error will prevent the system from running normally. This may indicate a problem with the hardware.

```
Warning: Disk 1A requested AL_PA EF, received 01
```

The above message indicates that the disk did not receive the hard assigned AL_PA it had requested on the Fibre Channel bus. This indicates a problem with the configuration of the disks in the array. Check to make sure the disks are all assigned unique addresses, power cycle the disks and reboot the SAN DataDirector.

```
Disk 1A returned invalid inquiry data.
```

The above message indicates that the SAN DataDirector received an error when asking for the SCSI inquiry data from the disk. The disk may have returned an error for the inquiry command, the inquiry data may be incorrect or the inquiry data may indicate that the device is not a disk. Make sure the disk is installed correctly.

```
Disk 1A returned invalid capacity data.
```

The above message indicates that the SAN DataDirector received an error when asking for the SCSI read capacity data from the disk. The disk may have returned an error for the read capacity command. Make sure the disk is installed correctly.

```
Disk 1A returned an invalid blocksize of 400 bytes.
```

The above message indicates that the SAN DataDirector received an error when asking for the SCSI read capacity data from the disk. The disk returned a blocksize that is not supported by the unit. Check the disk to make sure it is correct.

```
Disk 1A returned an invalid capacity of 100 blocks.
```

The above message indicates that the SAN DataDirector received an error when asking for the SCSI read capacity data from the disk. The disk returned a capacity that is too small to be supported by the unit. Check the disk to make sure it is correct.

```
Could not find Disk 1A
```

The above message indicates that the SAN DataDirector could not locate a disk that is part of a valid LUN in the system. The data in the LUN will not be available until the SAN DataDirector can locate the disk or the disk is marked as failed. Make sure the disk is installed correctly.

```
Warning: Could not login to disk 1A. Device unknown.
```

The above message indicates that the SAN DataDirector found a device on the Fibre Channel bus but could not login with it. Make sure the disk is installed correctly and cycle power on the disk.

```
Disk 1A Capacity of %ld is less than the minimum required of
%ld.
```

The above message indicates that the capacity of the disk is not large enough to support the existing LUN's that use the disk. Check the disk to make sure it is correct.

```
Warning: Disk 1A reports it should be disk 2A.
```

The above message indicates that a disk that is part of a valid LUN in the system is not in the correct location. It may be on the wrong channel or may have a different AL_PA. The data in the LUN's will not be available until the disk is restored to the correct location or the disk is marked as failed. Make sure the disk is installed correctly.

```
Warning: Disk 1A does not match the installed disk.
```

The above message indicates that the SAN DataDirector does not recognize a disk that is part of a valid LUN in the system. It may be in the wrong location or it may have been replaced without informing the SAN DataDirector. The data in the LUN's will not be available until the original disk is restored or the disk is marked as failed. Make sure the disk is installed correctly.

```
Warning: Internal parameter block 0 is invalid. Defaults
loaded.
```

The above message indicates that the internal parameter block was invalid so the SAN DataDirector loaded a default copy. This is a normal response when a SAN DataDirector is powered on for the first time. It will attempt to get a valid copy of the parameter block from the disks. Saving the parameter blocks from the terminal with the SAVE command will fix this error. If this error occurs after the system has been configured properly then this may indicate that the parameter block has been corrupted, the hardware is faulty, or there is a problem with the firmware.

```
Found older parameter block 0 on disk 1A.
   Old Date: TUE MAY 02 11:18:58 2000
   New Date: WED MAY 03 11:18:58 2000
```

The above message indicates that all the disk copies of this parameter block were older than the internal copy of the parameter block. This usually occurs when the system is shut down before the SAN DataDirector can save an updated parameter block to the disks. In this case the SAN DataDirector will correct the problem the next time the parameters are saved. Saving the parameter blocks from the terminal with the SAVE command will fix this error. This error may also occur if a new HSTD with a valid configuration is attached to disks with a different configuration. In this case, disconnect the new HSTD from the disks and use the DEFAULTS command to reset its settings and then reconnect it to the disks. The new HSTD will then load the correct parameter blocks from the disks.

```
Loaded parameter block 0 from disk 1A.
   Old Date: TUE MAY 02 11:18:58 2000
   New Date: WED MAY 03 11:18:58 2000
```

The above message indicates that the internal copy of the parameter block did not match any of the disk copies of the parameter block. The SAN DataDirector will load the latest copy of the parameter blocks from the disks. In this case the SAN DataDirector will correct the problem the next time the parameters are saved. Saving the parameter blocks from the terminal with the SAVE command will also fix this error. This error may also occur if a new HSTD is attached to disks with a different configuration.

```
Fault: Parameter block error: %s is %ld should be %ld
```

The above message indicates that the SAN DataDirector detected a firmware incompatibility error. This indicates a problem with the firmware. The SAN DataDirector may not function correctly after this type of error. *Do not use the SAN DataDirector in this state or the system may become permanently corrupted*. Downgrade the firmware in the SAN DataDirector to a previous version known to be stable.

```
Warning: Error saving parameters, Invalid block 0
```

The above message indicates that the SAN DataDirector has detected an internal firmware error. The SAN DataDirector may not function correctly after this type of error and data may have been lost. This indicates a problem with the firmware. Downgrade the firmware in the SAN DataDirector to a previous version known to be stable.

```
Disk bad current cache mode page data: 1A
Disk bad changeable cache mode page data: 1A
Disk bad new cache mode page data: 1A
Disk bad current error recovery mode page data: 1A
Disk bad changeable error recovery mode page data: 1A
Disk bad new error recovery mode page data: 1A
Disk bad current disconnect mode page data: 1A
Disk bad disconnect mode page data: 1A
Disk bad new disconnect mode page data: 1A
```

The above messages indicate that the SAN DataDirector received an error when asking for the SCSI mode page data from the disk. The disk may have returned an error for the mode sense command, the data returned may be incorrect, or the disk may not support the mode page requested. The mode sense data is not required for the normal operation of the SAN DataDirector. Make sure the disk is installed correctly.

8.2.7 Disk Error Messages

```
Failing Disk 1A
```

The above message indicates that the SAN DataDirector failed the disk. The disk may have encountered an error, returned bad status to a SCSI command, failed to respond, or took too long to process a command. Check the disk and replace it if it is no longer functional.

```
Replacing Failed Disk 1A with Spare Disk 1S
```

The above message indicates that the SAN DataDirector failed the disk and replaced it with an available spare. The disk may have encountered an error, returned bad status to a SCSI command, failed to respond, or took too long to process a command. Check the disk and replace it if it is no longer functional.

```
No Spares available.
```

The above message indicates that the SAN DataDirector failed a disk in the array but could not find a spare disk to replace it with. This message is informational only.

```
Spare too small %d, %x
LUN 1 won't fit on spare 1S, %x
```

The above message indicates that the SAN DataDirector failed a disk in the array and replaced it with a spare disk but discovered that the spare disk is not large enough to support the LUN's. The hex value at the end of the message indicates the capacity of the disk. This message is informational only.

```
Restoring Disk 1A
```

The above message indicates that the SAN DataDirector is restoring a failed disk by rebuilding the parity information from the other disks in the array. This message is informational only. The SAN DataDirector will indicate when the restore operation has completed.

```
Healing Disk 1A
```

The above message indicates that the SAN DataDirector is healing a failed disk without rebuilding the parity information from the other disks in the array. The operator must request this action. This message is informational only. The SAN DataDirector will indicate when operation has completed.

```
Failing Disk channel A
```

The above message indicates that the SAN DataDirector has failed an entire disk channel due to a hardware error. The SAN DataDirector will continue to operate and the data will be available unless other disks or channels have failed in the system. Reboot the SAN DataDirector and run diagnostics.

```
Healing Disk channel A
```

The above message indicates that the SAN DataDirector has restored a disk channel to healthy status after it was failed due to a hardware error. The operator must request this action. This message is informational only.

```
Timeout: Read Disk 1A, Id:EF
Timeout: Write Disk 1A, Id:EF
Timeout: Command 2A Disk 1A, Id:EF
Timeout: Manual command 2A Disk 1A
```

The above messages indicate that a SCSI command sent to the disk has taken too long to complete. The timeout messages may be generated under heavy I/O conditions when an error occurs, such as a disk failure, or a LIP on the Fibre Channel bus. This could also indicate that the SAN DataDirector might have trouble communicating with the disk. Timeouts should generally not occur during normal operation and should be reported if they keep reappearing. Check the disk and replace it if it is no longer functional.

```
SCSI Check Condition Disk 1A
```

The above message indicates that the SAN DataDirector received a check condition status on a SCSI command it sent to a disk. The SAN DataDirector will display any valid sense data returned with the status. Check the disk and replace it if it is no longer functional.

```
SCSI Reservation Conflict Disk 1A
```

The above message indicates that the SAN DataDirector received a reservation conflict status on a SCSI command it sent to a disk. The disks should not be reserved in the normal operation of the SAN DataDirector. The SAN DataDirector will display any valid sense data returned with the status.

```
SCSI Command Terminated Disk 1A
```

The above message indicates that the SAN DataDirector received a command terminated status on a SCSI command it sent to a disk. The SAN DataDirector will display any valid sense data returned with the status. Check the disk and replace it if it is no longer functional.

```
Disk missing 1A
```

The above message indicates that the SAN DataDirector sent a SCSI command to a disk that it could no longer locate on the Fibre Channel bus. Check the disk and replace it if it is no longer functional.

```
Disk not responding 1A
```

The above message indicates that the SAN DataDirector sent a SCSI command to a disk that is no longer responding to commands on the Fibre Channel bus. Check the disk and replace it if it is no longer functional.

```
Disk ALPA changed 1A
```

The above message indicates that the AL_PA which the disk was using on the Fibre Channel bus has unexpectedly changed. This indicates a problem with the configuration of the disks in the array. Check to make sure the disks are all assigned unique addresses, cycle power on the disks and reboot the SAN DataDirector.

```
Disk Login failed 1A
```

The above message indicates that the SAN DataDirector found a device on the Fibre Channel bus but could not login with it. Make sure the disk is installed correctly and cycle power on the disk.

```
Disk Fibre channel loop failure 1A
```

The above message indicates that the SAN DataDirector found a device on the Fibre Channel bus but could not login with it. Make sure the disk is installed correctly and cycle power on the disk.

```
Disk Command Timeout 1A
```

The above message indicates that the SCSI command sent to the disk was aborted because the command took too long to complete. Check the disk and replace it if it is no longer functional.

```
Disk Command Data Under-run 1A
```

The above message indicates that a read or write SCSI command completed with a data under-run status. This indicates a problem with the firmware or the configuration of the disks in the array.

```
Disk Command aborted 1A ID EF
```

The above message indicates that the disk aborted a SCSI command. Check the disk and replace it if it is no longer functional.

```
Warning: SDRAM parity error detected 1A ID EF, p:%x
```

The above message indicates that the SAN DataDirector detected a parity error when reading the data on a disk channel. This indicates a problem with the hardware. Make sure the SDRAM is installed correctly and run the cache diagnostics on the SAN DataDirector.

```
Warning: SDRAM parity error recovered 1A ID EF, p:%x
```

The above message indicates that the SAN DataDirector detected a parity error when reading the data on a disk channel but was able to recover after a retry. This indicates a problem with the hardware. Make sure the SDRAM is installed correctly and run the cache diagnostics on the SAN DataDirector.

```
Warning: Galeforce parity error detected 1A ID EF, p:%x
```

The above message indicates that the SAN DataDirector detected a parity error inside a disk Fibre Channel chip when reading the data on a disk channel. This indicates a problem with the hardware. Run the cache diagnostics on the SAN DataDirector.

```
Warning: Galeforce parity error recovered 1A ID EF, p:%x
```

The above message indicates that the SAN DataDirector detected a parity error inside a disk Fibre Channel chip when reading the data on a disk channel but was able to recovery after a retry. This indicates a problem with the hardware. Run the cache diagnostics on the SAN DataDirector.

```
Warning: Bus parity error detected 1A ID EF
```

The above message indicates that the SAN DataDirector detected a parity error inside a disk channel when reading the data on a disk channel. This indicates a problem with the hardware. Run the cache diagnostics on the SAN DataDirector.

```
Warning: Bus parity error recovered 1A ID EF
```

The above message indicates that the SAN DataDirector detected a parity error inside a disk channel when reading the data on a disk

channel but was able to recover after a retry. This indicates a problem with the hardware. Run the cache diagnostics on the SAN DataDirector.

```
SCSI Error Status: %x Disk 1A ID EF
```

The above message indicates that the SAN DataDirector received a SCSI error status on a command it sent to a disk. The SAN DataDirector will display any valid sense data returned with the status. Check the disk and replace it if it is no longer functional.

```
Data recovered disk:1A
Data rebuild recovered disk:1A
```

The above message indicates that the SAN DataDirector successfully rebuilt a section of missing data on a disk. This is usually due to an error encountered while reading from a disk drive such as a media error or a recovered error. This message is informational only. This could indicate a problem with the disk.

```
Warning: Retry failure detected! disk:1A
```

The above message indicates that the SAN DataDirector was not able to rebuild a section of missing data on a disk after several retries. This is usually due to an error encountered while reading from a disk drive, such as a media error or a recovered error, which does not go away. This indicates a problem with the disk.

```
Warning: Data loss detected! disk 1A
Warning: Data rebuild loss detected! disk:1A
```

The above message indicates that the SAN DataDirector was saving the data to the disks when it encountered an error on more than one disk and the retries were unsuccessful. This indicates a problem with the disks.

```
Fault: Invalid manual command semaphore 2A disk 1A
Fault: Disk Invalid operation code:
Fault: Disk read piece error!
Fault: Disk normal piece error!
Fault: Disk write invalid error:
Fault: DMT DISKQ != NULL
Warning: Unknown manual command 2A disk 1A
Warning: Invalid Manual command buffer %02x disk 1A
Warning: Disk Fail error t:1, c:A
Warning: Disk channel fail error %d
Warning: Disk channel heal error %d
```

```
Warning: Disk manual command invalid c:%c %x:%x
Warning: Disk manual command length error c:%c L:%x RC:%x
Warning: Disk command invalid:1A rsp:%d cmd:%d, status:%x
Warning: Disk command previously finished 1A rsp:%d cmd:%d,
status:%x
Warning: Disk timeout check overflow!
Warning: DMT disk reuse error!
Warning: WBK count reset:
```

The above messages indicate that the SAN DataDirector has detected an internal firmware error. The SAN DataDirector may not function correctly after this type of error and data may have been lost. This indicates a problem with the firmware. Downgrade the firmware in the SAN DataDirector to a previous version known to be stable.

8.2.8 Host Error Messages

```
Warning: Host Array parity error.
```

The above message indicates that the SAN DataDirector detected an array parity error when a host Fibre Channel port was reading the data from the SDRAM. This indicates that the parity data may not be consistent or the data may be corrupted. This may have been caused by an error with the disks.

```
Warning: Host Bus parity error: %03x
Warning: Host %d, Bus and array parity error: %03x
```

The above messages indicate that the SAN DataDirector detected a bus parity error when a host Fibre Channel port was reading the data from the SDRAM. The hex number at the end of the message is a bitmap that indicates which disk channels the error was detected on. This indicates a problem with the hardware. Run the cache diagnostics on the SAN DataDirector.

```
Warning: Host Internal error.
```

The above message indicates that the SAN DataDirector detected an internal error in a host Fibre Channel port when transferring data. This indicates a problem with the hardware or the firmware. Run the cache diagnostics on the SAN DataDirector.

```
Timeout: Host SCSI command:%02X LUN:1 Lane:%d
```

The above message indicates that a SCSI command from an initiator has taken too long to complete. Timeout messages may be generated

under heavy I/O conditions or when an error occurs, such as a disk failure. This could also indicate that the SAN DataDirector might have trouble communicating with the initiator. Timeouts should generally not occur during normal operation and should be reported if they keep reappearing. Check the connection to the initiator on the host port.

```
Command %02X aborted LUN:1 T:%x
```

The above message indicates that a SCSI command from an initiator was aborted. The abort may have come from the initiator, a target reset, or from a timeout in the SAN DataDirector. This could also indicate that the SAN DataDirector might have trouble communicating with the initiator. Aborts should generally not occur often during normal operation and should be reported if they keep reappearing. Check the connection to the initiator on the host port.

```
Target Reset from host 1
```

The above message indicates that a SCSI target reset message was received on a host port. The target reset came from an initiator connected to the SAN DataDirector. This could also indicate that the SAN DataDirector might have trouble communicating with the initiator. Target resets should generally not occur often during normal operation and should be reported if they keep reappearing. Check the connection to the initiator on the host port.

```
Read Address error LUN:1 address:%x length:%x
Write Address error LUN:1 address:%x length:%x
Write Flush Address error LUN:1 address:%x length:%x
```

The above messages indicate that an initiator sent a SCSI command to the SAN DataDirector for an address beyond the capacity of the LUN. This means that the initiator is sending an illegal address request to the SAN DataDirector. The SAN DataDirector will report the error to the initiator without transferring any data. This often occurs if a LUN is deleted and added back with different capacity without informing the initiator. This message is intended to be informational only.

```
Write Under Run LUN:1 length:%x DL:%x
Read Under Run LUN:1 length:%x DL:%x
```

The above messages indicate that an initiator sent a SCSI read or write command to the SAN DataDirector with a length in the CDB which is less than the length in the DL field of the command frame. This means that the initiator is not building the command frames correctly. The

SAN DataDirector will transfer the data using the length specified in the CDB and report the error to the initiator. This often occurs if a LUN is deleted and added back with a different blocksize without informing the initiator. This message is intended to be informational only.

```
Read Over Run LUN:1 length:%x DL:%x
Write Over Run LUN:1 length:%x DL:%x
```

The above messages indicate that an initiator sent a SCSI read or write command to the SAN DataDirector with a length in the CDB which is greater than the length in the DL field of the command frame. This indicates that the initiator is not building the command frames correctly. The SAN DataDirector will transfer the data using the length specified in the DL field of the command frame and report the error to the initiator. This often occurs if a LUN is deleted and added back with a different blocksize without informing the initiator. This message is intended to be informational only.

```
Fault: Host invalid operation code: %x
Fault: Load lock error n:%x m:%x
Warning: Host node finished read error L:%d N:%x RC:%x RD:%x
P:%x
Warning: Host node finished write error L:%d N:%x WC:%x WD:%x
```

The above messages indicate that the SAN DataDirector has detected an internal firmware error. The SAN DataDirector may not function correctly after this type of error and data may have been lost. This indicates a problem with the firmware. Downgrade the firmware in the SAN DataDirector to a previous version known to be stable.

8.2.9 Rebuild Error Messages

```
Diagnostics Failed disk 1A
```

The above message indicates that the SAN DataDirector was unable to rebuild a failed disk because the disk did not pass the diagnostic tests. Check the disk and replace it if it is no longer functional.

```
Timeout: Host 1 Rebuild LUN:0 Address:%x
```

The above message indicates that a rebuild request in the SAN DataDirector has taken too long to complete. Timeout messages may be generated under heavy I/O conditions or when an error occurs, such as a disk failure. This could also indicate that the SAN DataDirector is having hardware problems. Timeouts should generally not occur

during normal operation and should be reported if they keep reappearing.

```
Warning: Spare tier 1 configuration error: %d, %d
```

The above message indicates that the SAN DataDirector detected a discrepancy in the configuration information for the spare disk. The SAN DataDirector may remove the spare from use if it cannot determine the spare disk's proper configuration. This may indicate a problem with the configuration of the system or a firmware error.

```
Rebuild not needed on LUN: 0
```

The above message indicates that the SAN DataDirector tried to rebuild data on a LUN that no longer exists. This usually occurs when a LUN is deleted while the system is rebuilding a disk. This message is intended to be informational only.

```
Rebuild aborted on LUN: 0
Format aborted on LUN: 0
```

The above messages indicate that the SAN DataDirector aborted a rebuild or format operation on a LUN. This usually occurs when the user cancels a format or rebuild operation. These messages are intended to be informational only.

```
Warning: Host 1 rebuild bus error: %x
```

The above message indicates that the SAN DataDirector detected a bus parity error when a host Fibre Channel port was reading the data from the SDRAM. The hex number at the end of the message is a bitmap that indicates which disk channel the error was detected on. This indicates a problem with the hardware. Run the cache diagnostics on the SAN DataDirector.

```
Warning: Disk rebuild error %d,%d
Warning: Rebuild Disk invalid: %d,%d %d
```

The above messages indicate that the SAN DataDirector has detected an internal firmware error. The SAN DataDirector may not function correctly after this type of error and data may have been lost. This indicates a problem with the firmware. Downgrade the firmware in the SAN DataDirector to a previous version known to be stable.

8.2.10 SES (SCSI Enclosure Services) Messages

```
Unsupported SES device configuration detected on channel A.
```

The above message indicates that the SAN DataDirector does not recognize the drive enclosure that is connected to Channel x (i.e. the enclosure is not supported). The SAN DataDirector, therefore, will not light the Fault LED of a failed drive in that enclosure, but probably will still be able to monitor the common drive enclosure elements such as power supply and cooling fans.

Full SES monitoring and visual disk fault indication are supported on the DataDirect Networks drive enclosures. To obtain a list of supported enclosures, please contact DataDirect Technical Support.

```
ses_C 15:06:43 EncID:50050CC0000033C8: Power Supply 1: DC
Power Failure.
```

The above message indicates that there is a change in status on the drive enclosure where "EncID" (Enclosure ID) is the disk enclosure's WWN. Each element (such as power supply, cooling fans, and temperature sensors) is checked for status changes. If an element's status has changed since it was previously checked (OK -> failure, failure -> OK), a message is printed to the console.

8.2.11 Other Messages

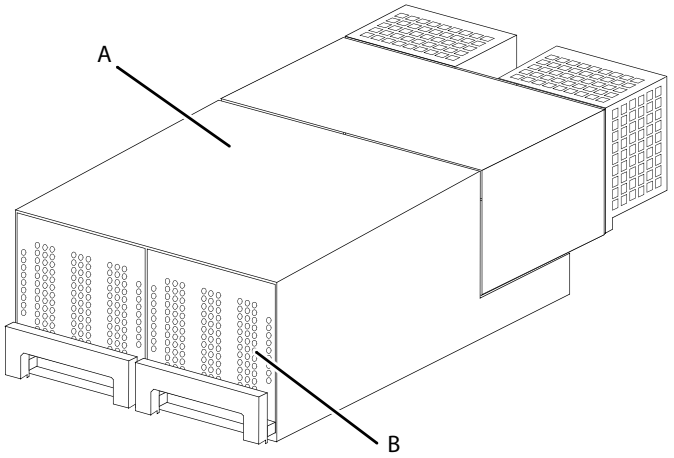
```
Fault: taskLock %x
Fault: taskUnlock %x
Fault: semGive %x
Fault: semTake %x
Fault: semDelay %x
Fault: taskSpawn %x,%x
Fault: task ended
```

These messages mean that the firmware has detected a problem with the operating system of the SAN DataDirector that prevents further operation. The SAN DataDirector may not function correctly after this type of error and a graceful shutdown of the system may not be possible. *Continued operation is not recommended.* This may indicate a problem with the firmware. Run diagnostics on the SAN DataDirector to insure it is still operational or downgrade the firmware in the HSTD to a previous version known to be stable.

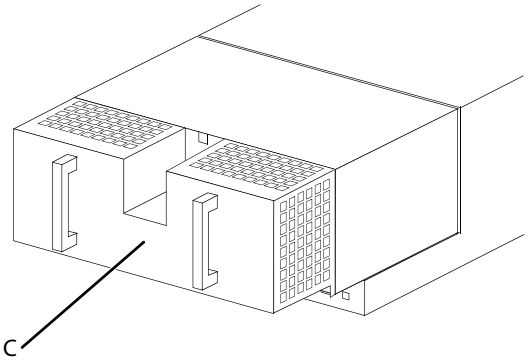
9 List of Replacement Parts for SDD System

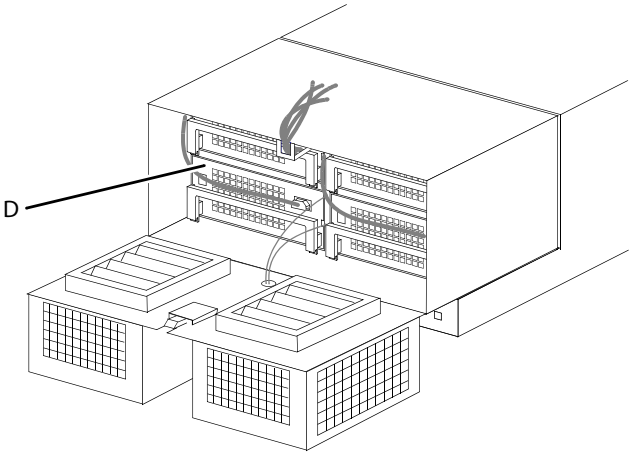
Listed below are the replacement parts and their product numbers for the CreoScitex SDD system.

SAN DataDirector

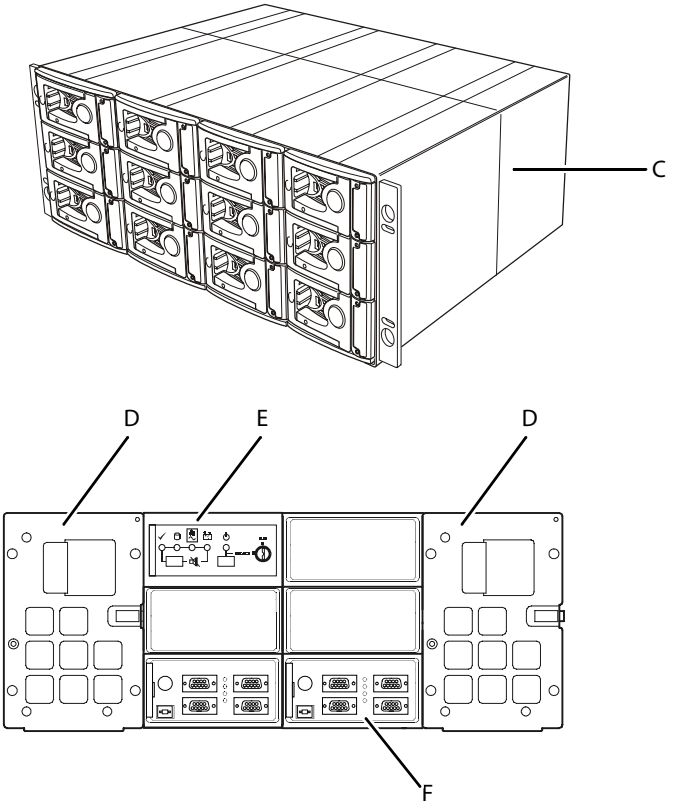


Item	Description	Product Number
A	SDD chassis	SDD-300ENC-BK
B	Single HSTD, copper interface with 640 MB cache	A-340-SDD-BK
C	SDD cooling unit	A-300-SDD-BK
D	SDD power supply module	A-310-SDD


C


D

SF-4012 Drive Enclosures



Item	Description	Product Number
C	SF-4012 drive enclosure	SF4012
D	115/230 Volt power supply/cooling module	EF-PSU-450
E	ESI/Ops panel module	87-00017-001
F	I/O module	87-00015-001

Drive Modules

Description	Product Number
36GB FC 10,000RPM 3.5" disk module	FM36GC
73GB FC 10,000RPM 3.5" disk module	FM73GC
Drive Slot Cover	FMCOVER

Cables and Accessories

Description	Product Number
Switch, 10/100 baseT 5-port	64-00024-001
FC host bus adapter, single loop 64 bit copper GBIC	I-188-CS
FC cable, copper, DB9-DB9, 5-meter	C-300-AC-15
RS-232 cable	75-00038-006
High Density Modular Interface cable	C-350-SDD
FC cable, optical, 30-meter	C-350-MMO-90
FC cable, optical, 100-meter	C-350-MMO-100
MIA optical-to-copper converter	C-001-AOC
Cover panel, 4U	16-00063-001
Cover panel, 2U	16-00065-001
Cover panel, 1U	16-00064-001
Monitoring computer, 1U rackmount	SDD-SYS-TN-CS
SAN DataDirector Installation Procedures for CreoScitex	96-00111-001
DataDirect Networks SAN DataDirector User Guide	96-00084-001
CreoScitex SAN DataDirector CD-ROM	55-00006-001

10 Notes on Handling and Shipping the Product

Use only the original packaging material to ship the components.

Do not operate the SDD and the drive enclosures with any uncovered slots for any extended period of time. Failure to do so could affect the air cooling system.