

DiskShelf14mk2 AT

Hardware Service Guide

Network Appliance, Inc.
495 East Java Drive
Sunnyvale, CA 94089 USA
Telephone: +1 (408) 822-6000
Fax: +1 (408) 822-4501
Support telephone: +1 (888) 4-NETAPP
Documentation comments: doccomments@netapp.com
Information Web: <http://www.netapp.com>

Part number 210-02360-A0
February 2005

Copyright and trademark information

Copyright information

Copyright © 1994–2005 Network Appliance, Inc. All rights reserved. Printed in the U.S.A.

No part of this document covered by copyright may be reproduced in any form or by any means—graphic, electronic, or mechanical, including photocopying, recording, taping, or storage in an electronic retrieval system—without prior written permission of the copyright owner.

Network Appliance reserves the right to change any products described herein at any time, and without notice. Network Appliance assumes no responsibility or liability arising from the use of products described herein, except as expressly agreed to in writing by Network Appliance. The use or purchase of this product does not convey a license under any patent rights, trademark rights, or any other intellectual property rights of Network Appliance.

The product described in this manual may be protected by one or more U.S. patents, foreign patents, or pending applications.

RESTRICTED RIGHTS LEGEND: Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.277-7103 (October 1988) and FAR 52-227-19 (June 1987).

Trademark information

NetApp, the Network Appliance logo, the bolt design, NetApp—the Network Appliance Company, DataFabric, FAServer, FilerView, MultiStore, NearStore, NetCache, SecureShare, SnapManager, SnapMirror, SnapMover, SnapRestore, SnapVault, SyncMirror, and WAFL are registered trademarks of Network Appliance, Inc. in the United States, and/or other countries. Data ONTAP, gFiler, Network Appliance, SnapCopy, Snapshot, and The Evolution of Storage are trademarks of Network Appliance, Inc. in the United States and/or other countries and registered trademarks in some other countries. ApplianceWatch, BareMetal, Camera-to-Viewer, ComplianceClock, ComplianceJournal, ContentDirector, ContentFabric, EdgeFiler, FlexClone, FlexVol, FPolicy, HyperSAN, InfoFabric, LockVault, Manage ONTAP, NOW, NetApp on the Web, ONTAPI, RAID-DP, RoboCache, RoboFiler, SecureAdmin, Serving Data by Design, SharedStorage, Simulate ONTAP, Smart SAN, SnapCache, SnapDirector, SnapDrive, SnapFilter, SnapLock, SnapMigrator, SnapSuite, SnapValidator, SohoFiler, vFiler, VFM, Virtual File Manager, VPolicy, and Web Filer are trademarks of Network Appliance, Inc. in the United States and other countries. NetApp Availability Assurance and NetApp ProTech Expert are service marks of Network Appliance, Inc. in the United States. Spinnaker Networks, the Spinnaker Networks logo, SpinAccess, SpinCluster, SpinFS, SpinHA, SpinMove, and SpinServer are registered trademarks of Spinnaker Networks, LLC in the United States and/or other countries. SpinAV, SpinManager, SpinMirror, SpinRestore, SpinShot, and SpinStor are trademarks of Spinnaker Networks, LLC in the United States and/or other countries.

All other brands or products are trademarks or registered trademarks of their respective holders and should be treated as such.

Network Appliance is a licensee of the CompactFlash and CF Logo trademarks.

Network Appliance NetCache is certified RealSystem compatible.

Table of Contents

	Preface	v
	Safety Information (Sicherheitshinweise)	vii
Chapter 1	Installation roadmap for the DS14mk2 AT	1
	Before you begin your installation	2
	The installation process.	5
Chapter 2	Monitoring the Disk Shelf.	7
	Monitoring the front operation panel.	8
	Monitoring the AT-FCX module	11
	Monitoring the power supply.	14
	Monitoring the ATA disk.	16
Chapter 3	Replacing Disk Shelf Devices	19
	Replacing a disk shelf	20
	Removing a disk shelf from a single disk shelf configuration.	21
	Removing a disk shelf from a loop.	23
	Installing a disk shelf in a rack.	25
	Replacing a disk in a disk shelf.	27
	Replacing a power supply in a disk shelf.	29
	Hot-Swapping the AT-FCX module	31
Appendix A	Hot-Adding a Disk Shelf to an Existing System	33
	Hot-adding a DS14mk2 AT to an existing loop	34
Appendix B	Recommended Power Line Sizes	37
	Recommended AC power line sizes	38

Appendix C	Feature Update Record	39
Appendix D	Communications Regulations.	41
	Regulatory notices	42
	Index	45

Preface

About this guide

This guide provides general information about the NetApp® DiskShelf14mk2 AT (DS14mk2 AT), a roadmap on the installation, and information on managing the disk shelf that connects to storage appliances.

Audience

This guide is for system administrators who are familiar with operating systems that run on the storage system's clients, such as UNIX®, Windows 95™, Windows NT®, Windows® 2000, and Windows XP. The procedures in this guide describe replacement, upgrade, and maintenance tasks for personnel with the following skills and experience:

- ◆ Working familiarity with small computer system hardware and operation
- ◆ Basic understanding of common networking concepts and practices
- ◆ Working familiarity with accepted tools and procedures for installing and operating sensitive electronic equipment

Terminology

This guide uses the following terms:

- ◆ *Disk shelf* refers to a DS14mk2 AT disk shelf.
- ◆ *Storage appliance* refers to those Fibre Attached Storage (FAS) appliances that the disk shelves connect to.
- ◆ *Storage system* refers to the FAS appliances and disk shelves as one unit.
- ◆ *Loop* refers to one or more daisy-chained disk shelves connected to a NetApp appliance.
- ◆ *AT-FCX* refers to the AT-Fibre Channel module on the back of the disk shelf that connects to a FAS appliance.

Note

For information about the AT-FC module on the back of the disk shelf that connects to a NearStore® storage engine, see the *R200 Hardware and Service Guide*.

- ◆ *Module* refers to the AT-FCX module.
- ◆ *Device carrier* refers to the container encasing a fan/power supply unit or a disk.
- ◆ *Disk* applies to any ATA disk encased in its device carrier.

Formatting conventions

The following table lists the kinds of formatting this guide uses to identify special information.

Formatting convention	Type of information
<i>Italic type</i>	◆ Words or characters that require special attention. ◆ File names and path names. ◆ Man page names. ◆ Book titles in cross-references. ◆ Placeholders for information you must supply. For example, if the guide says to enter the command <code>arp -d hostname</code>, you enter the characters “arp -d” followed by the actual name of the host.
Monospaced font	◆ Command and daemon names. ◆ Information displayed on the system console or other computer monitors. ◆ The contents of files.
Bold monospace font	Words or characters you type. What you type is always shown in lowercase letters, unless you must type it in uppercase letters for it to work properly.

Special messages

This guide contains special messages that are described as follows:

Note_____

A note contains important information that helps you install or operate the system efficiently.

Caution_____

A caution contains instructions that you must follow to avoid damage to the equipment, a system crash, or loss of data.

WARNING_____

A warning contains instructions that you must follow to avoid personal injury.

Safety Information (Sicherheitshinweise)

Safety rules

All products are Class 1 laser devices. You must follow these safety rules when working with this equipment:

WARNING

Failure to follow these directions could result in bodily harm or loss of life.

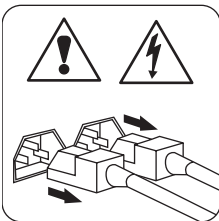
- ◆ **Switzerland only—for FAS900, GF900, R200, and C6200 systems:**
This equipment relies on fuses/circuit breakers in the building installation for overcurrent protection. Each power supply must receive power from a separately dedicated outlet with a 10A fuse/circuit breaker.
- ◆ When installing disk shelves and a storage appliance into a movable cabinet or rack, install from the bottom up for best stability.
- ◆ DC-based systems must be installed in a restricted access location and the two input power terminals for the DC power supply must be connected to separate isolated branch circuits.
- ◆ To reduce the risk of personal injury or equipment damage, allow internal components time to cool before touching them and ensure that the equipment is properly supported or braced when installing options.
- ◆ This equipment is designed for connection to a grounded outlet. The grounding type plug is an important safety feature. To avoid the risk of electrical shock or damage to the equipment, do not disable this feature.
- ◆ This equipment has one or more replaceable batteries. There is danger of explosion if the battery is incorrectly replaced. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Warning for units with multiple power cords

If your storage appliance or disk shelf has multiple power cords and you need to turn the unit off, heed the following warning:

WARNING

This unit has more than one power supply cord. To reduce the risk of electrical shock, disconnect all power supply cords before servicing.



Sicherheitsvorgaben

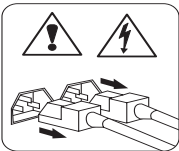
Alle Produkte sind Lasergeräte der Klasse 1. Die folgenden Sicherheitshinweise sind beim Betreiben des Geräts unbedingt zu beachten:

Vorsicht

Nichtbeachtung dieser Anweisungen kann zu schweren Körperschäden führen oder tödlich sein.

- ◆ **Nur für die Schweiz - Systeme FAS900, GF900, R200 und C6200:**
Diese Geräte erfordern den Festeinbau von Sicherungen zum Überstromschutz. Jeder Netzanschluss muss mit Strom aus getrennten, speziell für diesen Zweck vorgesehenen Steckdosen versorgt werden, die jeweils mit einer 10A-Sicherung geschützt sind.
- ◆ Bei der Montage der Diskettenregale und Archivierungsgeräte, des NetCache™ -Geräts oder des NearStore® -Systems in bewegliche Schränke oder Regale sind die Geräte von unten nach oben einzubauen, um optimale Stabilität zu gewährleisten.
- ◆ Gleichstrom-Systeme müssen an Betriebsstätte mit beschränktem Zutritt installiert sein und die beiden Eingangsstromklemmen für das Gleichstrom-Netzteil müssen an separate und isolierte Abzweigungen angeschlossen sein.
- ◆ Zum Schutz vor Körperverletzung oder Sachschäden am Gerät lassen Sie die inneren Bauteile stets vor dem Berühren abkühlen. Sorgen Sie dafür, dass das Gerät richtig abgestützt ist oder fest aufrecht steht, bevor Sie neues Zubehör einbauen.
- ◆ Dieses Gerät ist für die Einspeisung aus einer geerdeten Netzverbindung ausgelegt. Der Netzstecker mit Erdungsvorrichtung ist ein wichtiger Sicherheitsschutz. Zum Schutz vor elektrischem Schlag oder Sachschäden am Gerät die Erdung nicht abschalten.
- ◆ Das Gerät ist mit einer oder mehreren auswechselbaren Batterien ausgestattet. Bei unsachgemäßem Auswechseln der Batterie besteht Explosionsgefahr. Batterien nur mit dem vom Hersteller empfohlenen Typ oder entsprechenden Typen ersetzen. Gebrauchte Batterien sind gemäß den Anweisungen des Herstellers zu entsorgen.

Warnhinweis für Geräte mit mehrfachen Netzanschlussleitungen



Sollte Ihr Archiviergerät, NetCache-Gerät, NearStore-System oder Diskettenregal mehrfache Netzanschlussleitungen aufweisen und Sie wollen das Gerät abschalten, bitte folgenden Warnhinweis beachten.

ACHTUNG

Gerät besitzt zwei Netzanschlussleitungen. Vor Wartung alle Anschlüsse vom Netz trennen.

About this chapter This chapter provides a roadmap for installing the DS14mk2 AT disk shelf.

Topics in this chapter This chapter discusses the following topics:

- ◆ “[Before you begin your installation](#)” on page 2
- ◆ “[The installation process](#)” on page 5

Before you begin your installation

Information you need to understand

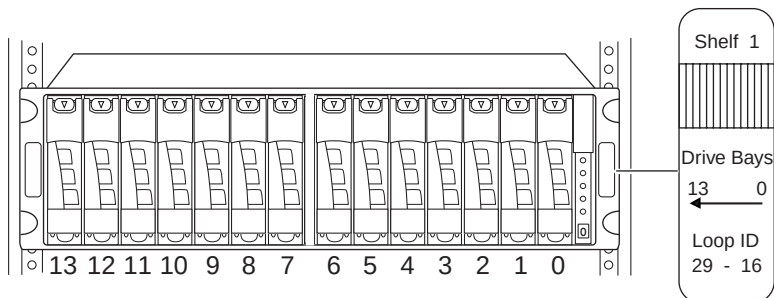
Before you install one or more disk shelves in a rack, you need to understand the following information:

- ◆ Disk shelf numbering
- ◆ Loop IDs
- ◆ Supported disk drives

Disk shelf numbering

Each disk shelf in a loop must have a unique ID. A valid shelf ID is from 1 through 6, with disk shelf 1 connected to the storage appliance. The default for an invalid shelf ID is 7. If you install a second or third loop of disk shelves, the disk shelf IDs in each loop must start at 1. The ID of a single disk shelf should be 1.

Each disk shelf is shipped with its assigned ID set on its back panel. You must ensure that the disk shelf has the correct ID number on the label. The ID label is on the right side of the disk shelf, as shown in the following illustration.

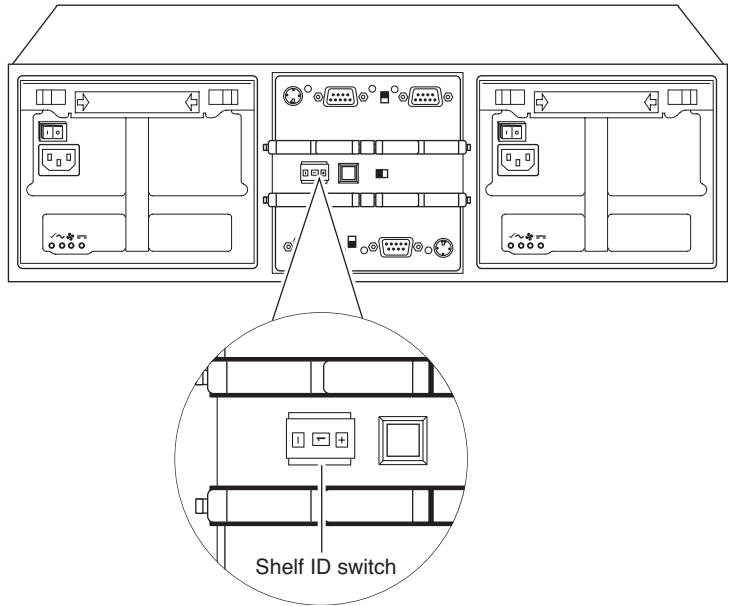


NetApp sets the disk shelf IDs at the factory on configured systems, using an ID switch on the back panel. If you order additional disk shelves, you must set the disk shelf ID yourself.

Note

If you enter a shelf ID that is not from 1 through 7, the drive addresses default to those of a shelf with the ID switch set to 7 even though the shelf ID indicator in the front operation panel displays a dash (-).

The example in the following illustration shows a DS14mk2 AT with the disk shelf ID set to 1.



Loop IDs

In addition to identifying the disk shelf ID and the direction of the drive bays, the ID label on the right side of the disk shelf includes the loop ID. The loop ID identifies the disks in the disk shelf. The last sheet of the quick reference cards that come with your disk shelf shows the seven disk shelf IDs and their corresponding loop IDs.

DS14mk2 AT-FC/FCX

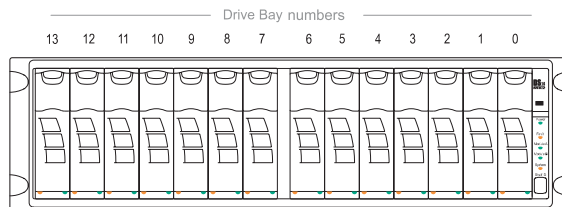
Drive Addressing / Bay Numbers 4 of 4

Drive Addressing

Drive Bay numbers															
13	12	11	10	9	8	7	6	5	4	3	2	1	0		
S E L I D															
125	124	123	122	121	120	119	118	117	116	115	114	113	112	7	Shelf numbers
109	108	107	106	105	104	103	102	101	100	99	98	97	96	6	
93	92	91	90	89	88	87	86	85	84	83	82	81	80	5	
77	76	75	74	73	72	71	70	69	68	67	66	65	64	4	
61	60	59	58	57	56	55	54	53	52	51	50	49	48	3	
45	44	43	42	41	40	39	38	37	36	35	34	33	32	2	
29	28	27	26	25	24	23	22	21	20	19	18	17	16	1	
125	124	123	122	121	120	119	118	117	116	115	114	113	112	-	

Shelf # settings 0, 8, and 9 are displayed as a "-" on the OPS panel display.
SEL IDs below # 16 are reserved. Select shelf ID before powering on.

Drive Bay Numbers



Supported disk drives

The DS14mk2 AT supports 250-GB and 320-GB disk drives. See the *System Configuration Guide* at <http://now.netapp.com> for more information on supported drives and platforms.

The installation process

Installation process tasks The following table lists the tasks in the disk shelf installation process.

Stage	Procedure	Is the procedure required?	For instructions, go to...
1	Install the storage appliances in a freestanding rack.	Only if the installation is part of a new system installation and it was not shipped in a system cabinet.	<i>Installation and Setup Instructions</i> for your storage appliance.
2	Install the disk shelves in the rack.	Yes, if the disk shelf is an addition to your existing system or if your new system was not shipped in a system cabinet.	<i>Installation and Setup Instructions</i> for your storage appliance.
3	Connect the disk shelf to the storage appliance.	Only in the following scenarios:	
		◆ If the disk shelf is part of a new system installation	<i>Installation and Setup Instructions</i> for your storage appliance.
		◆ If the disk shelf is the first in an additional loop to your existing system.	“Installing a disk shelf” on page 25
4	Connect the disk shelves to each other.	Only in the following scenarios:	
		◆ If the new system installation has multiple disk shelves	<i>Installation and Setup Instructions</i> for your storage appliance.
		◆ If the new disk shelf is an addition to your existing system.	Appendix A, “Hot-adding a DS14mk2 AT to an existing loop,” on page 34

Stage	Procedure	Is the procedure required?	For instructions, go to...
5	Ground the system.	Yes.	<i>Installation and Setup Instructions</i> for your storage appliance or “ Installing a disk shelf ” on page 25.
6	Connect the disk shelves to a power source	Yes.	<i>Installation and Setup Instructions</i> for your storage appliance or “ Installing a disk shelf ” on page 25 or Appendix A, “ Hot-adding a DS14mk2 AT to an existing loop ,” on page 34.
		If the system was shipped in a system cabinet, you must connect the system cabinet to redundant power sources.	See the <i>System Cabinet Guide</i> .
7	Configure the system.	Yes, if the disk shelf installation is part of a new system installation.	See the <i>Data ONTAP Software Setup Guide</i> .

About this chapter

This chapter describes how to monitor the disk shelf from the error messages displayed on the console that is connected to the storage appliance. This chapter also identifies the location and status conditions of the various LEDs on the disk shelf, and describes the corrective actions you can take.

Note

The quick reference cards in the slide-out tray at the base of the disk shelf describe the function of each LED on the disk shelf and the suggested course of action.

Topics in this chapter

This chapter discusses the following topics:

- ◆ “[Monitoring the front operation panel](#)” on page 8
- ◆ “[Monitoring the AT-FCX module](#)” on page 11
- ◆ “[Monitoring the power supply](#)” on page 14
- ◆ “[Monitoring the ATA disk](#)” on page 16

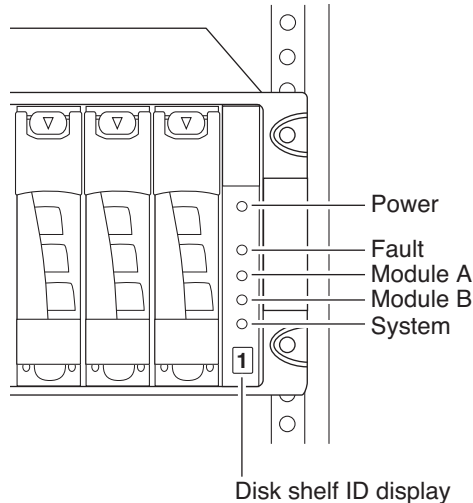
Monitoring the front operation panel

About monitoring the front operation panel

The front operation panel has five LEDs and a disk shelf ID display. The LEDs indicate whether your disk shelf is functioning normally or there are problems with the hardware. You can also identify any hardware failure associated with the front operation panel of the disk shelf from the error messages displayed on your storage appliance console.

Location of LEDs

The following illustration shows the location of the disk shelf ID display and the front panel LEDs.



Note

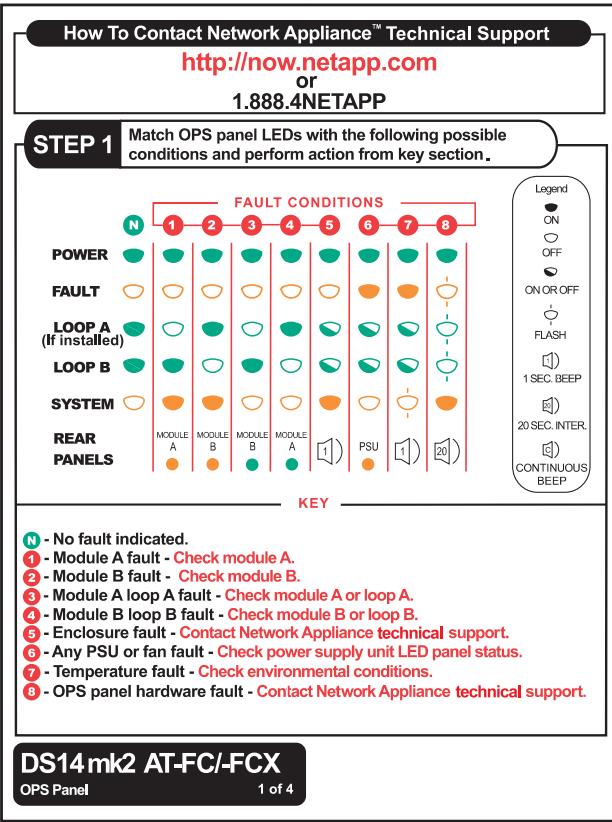
The Fault and System LEDs are amber. The other three LEDs are green. See [“LED status on the front operation panel”](#) on page 9 for an illustrated explanation of how the LEDs function.

Monitoring the disk shelf ID

When you use the thumbwheel switch on the back of the disk shelf to change the disk shelf ID, the disk shelf ID display on the front panel blinks until you power-cycle the disk shelf to make the change take effect.

LED status on the front operation panel

The following illustration is of the first sheet of the quick reference cards that come with your disk shelf. It shows the normal and fault conditions that the LEDs indicate and recommends a corrective action.



Front operation panel console error messages

The following error messages appear on your storage appliance console if an SES element on the front operation panel fails. For information about replacing a disk shelf, see “Replacing a disk shelf” on page 20.

Error message	Action required
Temperature sensor 1: failed	The temperature sensor on the front operation panel failed. Replace the disk shelf.

Error message	Action required
Alarm Element 1: failed	The alarm on the front operation panel failed. Replace the disk shelf.
Display Element 1: failed	The display element on the front operation panel failed. Replace the disk shelf.

Monitoring the AT-FCX module

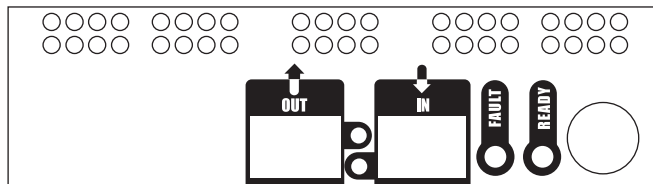
About monitoring the modules

The AT-FCX module has four LEDs. The LEDs indicate whether it is functioning normally, the module's readiness for I/O traffic, or whether there are any problems with the hardware. You can also identify any hardware failure associated with the module from the error messages displayed on your storage appliance console.

This section also describes the different types of messages that appear on the storage appliance console in response to a command monitoring the AT-FCX.

Location of the module LEDs

The AT-FCX module is in the middle of the back of the disk shelf. It has a perforated carrier. The following illustration shows the location of the LEDs for an AT-FCX.

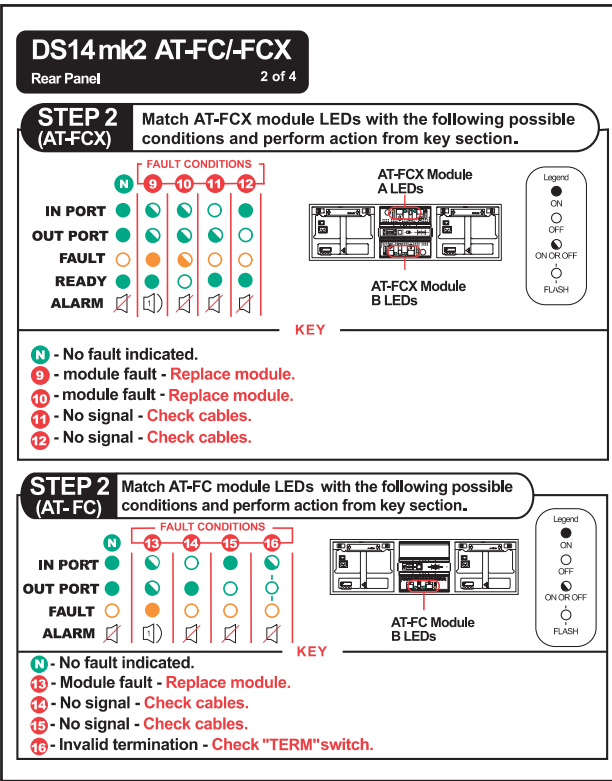


Note

Because module A on the DS14mk2 AT is inverted, the location of the module A LEDs is the inverse of what is shown in the preceding illustration. The Fault LED is amber. The other three LEDs are green. See “[LED status on the AT-FCX](#)” on page 12 for an illustrated explanation of the LED functions.

LED status on the AT-FCX

The following illustration is of the second sheet of the quick reference cards that come with your disk shelf.



Note The rest of the second sheet of the quick reference card identifies the LED status conditions for the power supply and the integrated fan module.

AT-FCX console error messages

The following error messages appear on the storage appliance console if an SES element on the AT-FCX module fails. See “Hot-Swapping the AT-FCX module” on page 31 for more information. The output displayed on the console is similar to the following example.

Example:

```
Mon Aug 25 21:34:05 GMT [ses.status.temperatureWarning:warning]:
DS14-Mk2-AT shelf 3 on channel 5a temperature warning for
Temperature sensor 1: non-critical status; undertemperature
```

warning. Current temperature: 1 C (33 F). This module is on the front side of the shelf, at the right, on the OPS panel.

Error message	Corrective action
Temperature sensor 2: failed	Contact NetApp technical support.
Temperature sensor 3: failed	
SES electronics Element 1: component is from a different product family	This configuration is unsupported. Contact NetApp technical support.
SES electronics Element 1: failed	Contact NetApp technical support.
SES electronics Element 2: failed	The AT-FCX module on the disk shelf failed. Replace the AT-FCX module, as described in “ Hot-Swapping the AT-FCX module ” on page 31.
Temperature sensor 2: not installed or failed	Contact NetApp technical support.
Environmental sensor 3: not installed or failed	Contact NetApp technical support.
SES electronics Element 1: not installed or failed	
Vendor-specific Element 1: not installed or failed	
SES electronics Element 2: not installed or failed	Communication with the temperature sensor on the AT-FCX module failed. Replace the AT-FCX module, as described in “ Hot-Swapping the AT-FCX module ” on page 31.
Vendor-specific Element 2: not installed or failed	

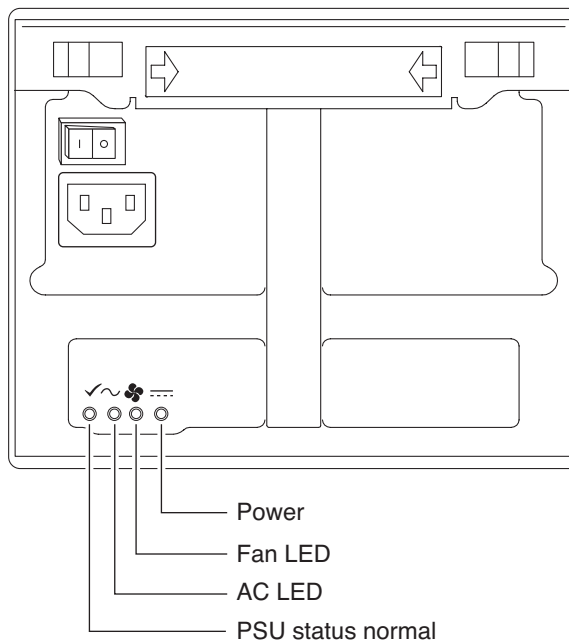
Monitoring the power supply

LEDs on the power supply

The power supply has four LEDs. The LEDs indicate whether the power supply or the integrated fan module is functioning normally or there are problems with the hardware. You can also identify any hardware failure associated with the power supplies from the error messages displayed on your storage appliance console.

Location of LEDs

Each power supply, which contains two LEDs, is encased in a device carrier and housed at the rear of the disk shelf. The following illustration shows the location of the power supply LEDs.



Note

The PSU status LED is green. The other three LEDs are amber. See “[LED status on the AT-FCX](#)” on page 12 for an illustrated explanation of how the LEDs function.

Power supply console error messages

The following error messages appear on your storage appliance console if an SES element on the power supply fails. For information about replacing the power supply, see [“Replacing a power supply in a disk shelf”](#) on page 29.

Error message	Action required
Power supply Element 1: failed	The power supply unit on the left at the back of the disk shelf failed. Contact NetApp technical support to replace the power supply.
Power supply Element 2: failed	The power supply unit on the right at the back of the disk shelf failed. Contact NetApp technical support to replace the power supply.
Cooling element Element 1: failed	The integrated fan module in the power supply unit on the left at the back of the disk shelf failed. Contact NetApp technical support to replace the power supply.
Cooling element Element 2: failed	The integrated fan module in the power supply unit on the right at the back of the disk shelf failed. Contact NetApp technical support to replace the power supply.

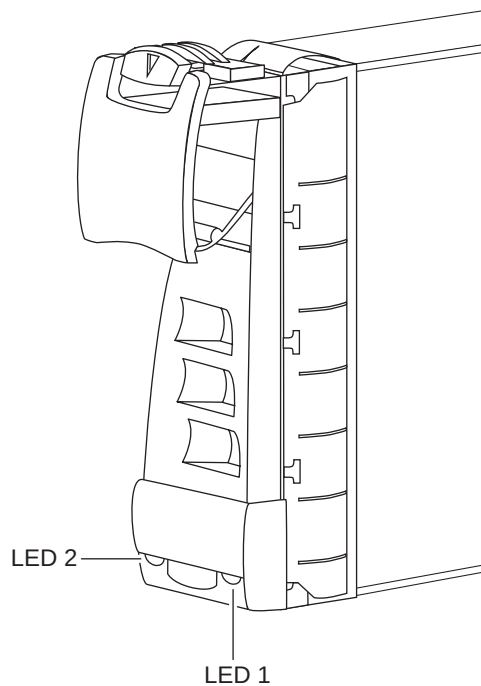
Monitoring the ATA disk

About monitoring the ATA disk

The ATA disk has two LEDs. The LEDs indicate whether the disk is functioning normally or there are problems with the hardware.

Location of LEDs

The following illustration shows the ATA disk, which has two LED indicators on the front.



Interpreting disk drive LEDs

The following illustration shows the top of the second sheet of the quick reference cards that come with each disk shelf. It shows the disk drive LEDs normal and fault conditions, and recommends corrective action.

STEP 3

Match drive LEDs with the following possible conditions and perform action from key section

N

N

GREEN LED

17

18

19

AMBER LED

1s on
1s off

Drive LED

Legend

ON

OFF

ON OR OFF

FLASH

KEY

N

No fault indicated.

17

No drive detected - Reinsert drive.

18

SES device identification set - Find a physical drive identified by software.

19

SES device fault bit set - Replace drive.

STEP 4

Match power supply LEDs with the following possible conditions and perform action from key section

✓

~

⚙

==

N

20

21

22

FAULT CONDITIONS

Power supply 1

Power supply 2

Legend

ON

OFF

KEY

N

No fault indicated.

20

No AC to this PSU - Check power cord and switch.

21

Fan fault - Replace PSU.

22

PSU fault - Replace PSU.

DS14 mk2 AT-FC/FCX

Drives and Power Supplies

3 of 4

Chapter 2: Monitoring the Disk Shelf

17

About this chapter

This chapter describes how to replace disk shelves in a rack, disks in a disk shelf, and other devices.

Topics in this chapter

This chapter discusses the following topics:

- ◆ [“Replacing a disk shelf”](#) on page 20
- ◆ [“Replacing a disk in a disk shelf”](#) on page 27
- ◆ [“Replacing a power supply in a disk shelf”](#) on page 29
- ◆ [“Hot-Swapping the AT-FCX module”](#) on page 31

Replacing a disk shelf

About this section

This section discusses how to disconnect a disk shelf from a NetApp appliance, how to remove a disk shelf from a loop, and how to install a disk shelf. It does not discuss how to hot-add a disk shelf to a storage appliance. For information about hot-adding a disk-shelf, see Appendix A, “[Hot-adding a DS14mk2 AT to an existing loop](#),” on page 34.

Caution

Hot removal or hot-swapping of a disk shelf is not supported.

For detailed information

For detailed information about removing a disk shelf from a rack, see the following topics:

- ◆ “[Removing a disk shelf from a single disk shelf configuration](#)” on page 21
- ◆ “[Removing a disk shelf from a loop](#)” on page 23
- ◆ “[Installing a disk shelf in a rack](#)” on page 25

Removing a disk shelf from a single disk shelf configuration

Removing a disk shelf

To remove a disk shelf from a single disk shelf configuration, complete the following steps.

Step	Action
1	Ground yourself to the system chassis using the grounding leash.
2	Shut down the NetApp appliance by entering the following command at the console: <pre>halt</pre> Caution _____ Always use the <code>halt</code> command to perform a clean shutdown. _____
3	Verify that the LCD display at the front of your NetApp appliance displays the following message: <pre>Halted</pre>
4	Turn off the power switch on the disk shelf.
5	Disconnect the two disk shelf power cords from the disk shelf.
6	Disconnect the Fibre Channel cables connecting the disk shelf and storage appliance.
7	Disconnect the grounding strap connecting the disk shelf and storage appliance.
8	Use a Phillips screwdriver to remove the screws securing the disk shelf to the telco tray, the mid-mount bracket, or the four-post rack.
9	With the help of another person, remove the disk shelf from the rack. WARNING _____ The disk shelf is very heavy when fully loaded and requires at least two people to remove it. _____

Step	Action
10	Go to “ Installing a disk shelf in a rack ” on page 25 to add the replacement shelf.

Removing a disk shelf from a loop

Removing a daisy-chained disk shelf

To remove a disk shelf from a loop of disk shelves, complete the following steps.

Step	Action
1	Ground yourself to the system chassis using the grounding leash.
2	Shut down your NetApp appliance by entering the following command at the console: <pre>halt</pre> Caution _____ Always use the <code>halt</code> command to perform a clean shutdown.
3	Verify that the LCD display at the front of your NetApp appliance displays the following message: <pre>Halted</pre>
4	Turn off the power switch on the disk shelf.
5	Disconnect the two disk shelf power cords from the disk shelf that you are going to remove.
6	Disconnect and remove the Fibre Channel cables connecting the disk shelf to the other disk shelves or your NetApp appliance.
7	Disconnect the grounding strap connecting the disk shelf to the other disk shelves or your NetApp appliance.
8	Use a Phillips screwdriver to remove the screws from the flanges of the disk shelf retention bracket.
9	With the help of another person, remove the disk shelf from the rack. WARNING _____ The disk shelf is very heavy when fully loaded and requires at least two people to remove it.

Step	Action	
10	If you are...	Then...
	Not installing a replacement disk shelf	1. Reestablish the loop by connecting the disconnected disk shelves or by connecting the unconnected disk shelf to the storage appliance. 2. Remove any Fibre Channel cables that are connected to the output port of the last disk shelf in the loop. Caution _____ Failure to do this step will cause an open loop panic. 3. Turn on the power to the disk shelf and then to your NetApp appliance. 4. Reboot your NetApp appliance.
	Installing a replacement disk shelf	See “ Installing a disk shelf in a rack ” on page 25.

Installing a disk shelf in a rack

Installing a disk shelf

To install the disk shelf in a rack, complete the following steps.

WARNING

You must install each disk shelf with either the two-post telco tray kit or the four-post rail kit that came in your shipment package. If you choose to mid-mount the disk shelf, use the mid-mount brackets with the two-post telco tray kit. Do not ear-mount the disk shelf into a telco-type rack; the disk shelf will collapse from the rack under its own weight.

Step	Action
1	Verify that your NetApp appliance meets the minimum software requirements to support the disk shelf. See the <i>System Configuration Guide</i> at http://now.netapp.com for more information.
2	Verify that you received the envelope with the disk shelf ID labels.
3	Ground yourself to the system chassis using the grounding leash.
4	Use the rail kit installation flyer in the rail kit box to install the appropriate rail kits on the rack.
5	Install and secure the disk shelf onto the support brackets and rack.
6	Change the disk shelf ID with the following procedure: 1. Press the thumbwheel switch on the rear of the disk shelf and use the + button to raise the number and the - button to lower the number to a valid ID from 1 through 7. Note ————— If you change a disk shelf ID, you must power-cycle the disk shelf for the new ID to take effect. The disk shelf ID display on the front of the disk shelf blinks until you power-cycle the disk shelf. 2. Select the correct label from the envelope identified in Step 2 and attach it to the right flange of the new disk shelf.

Step	Action
7	If you are adding multiple disk shelves on the same loop, repeat Step 5 and Step 6 to install the remaining disk shelves.
8	Set the loop speed on all new disk shelves to the same speed as the existing disk shelves in the loop.
9	Connect the grounding strap connecting the disk shelf to the other disk shelves or your NetApp appliance.
10	Connect the disk shelf to the other disk shelves using an SFP-to-SFP patch cable or to your NetApp appliance with the LC-to-LC cable.
11	Connect the two disk shelf power cords to each disk shelf that you are adding.
12	Turn on the power first to the disk shelves and then to the storage appliance.
13	Reboot the storage appliance.

Replacing a disk in a disk shelf

Reasons to replace a disk

You can hot-swap disks while the system remains powered on. When a disk fails, your NetApp appliance logs a warning message to the system console indicating which disk on which loop failed.

About replacing a disk in a disk shelf

Replacing a disk in a disk shelf consists of the following procedures:

- ◆ [“Removing a disk”](#)
- ◆ [“Installing a disk”](#)

Removing a disk

To remove a disk, complete the following steps.

Step	Action
1	Ground yourself to the system chassis using the grounding leash.
2	To remove the disk, press down on its release mechanism with one hand while grasping the top flange of the disk shelf with the other hand.
3	Gently slide the disk out until it disengages. Wait 30 seconds for the disk to stop spinning; then continue removing the disk from the chassis. WARNING — When removing a disk, always use two hands to support its weight.

Installing a disk

To install a disk in a disk shelf, complete the following steps.

Step	Action
1	Ground yourself to the system chassis using the grounding leash.

Step	Action
2	Orient the device carrier so that the release mechanism is at the top.
3	Insert the disk into the guide slot in the disk shelf and firmly push it in until it engages the backplane and you see the release mechanism click into place. Caution_____ Do not slam the disk into place. _____

Replacing a power supply in a disk shelf

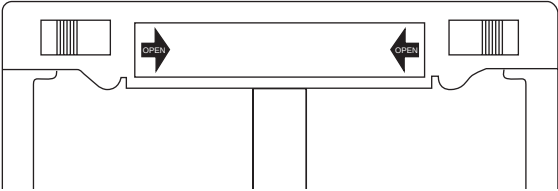
About this section Replacing a power supply in a disk shelf consists of the following procedures:

- ◆ “[Removing a power supply](#)” on page 29
- ◆ “[Installing a power supply](#)” on page 30

Rules for replacing power supplies When replacing the power supply on your disk shelf, observe the following rules:

- ◆ You do not need to turn off the power when you replace one power supply.
- ◆ If you are replacing both power supplies in the same disk shelf, replace them one at a time to avoid powering down the disk shelf.

Removing a power supply To remove a power supply, complete the following steps.

Step	Action
1	Ground yourself to the system chassis using the grounding leash.
2	Turn off the switch on the power supply that you are replacing.
3	Lift up the clip lock and unplug the power cord from the storage appliance power supply.
4	Press the cam mechanism levers toward each other to release the power supply handle, as shown in the following illustration. 

Step	Action
5	Use the handle to pull the power supply out of the disk shelf. WARNING _____ When removing a power supply, always use two hands to support its weight. _____

Installing a power supply

To install a power supply in a disk shelf, complete the following steps.

Step	Action
1	Ground yourself to the system chassis using the grounding leash.
2	Slide the power supply into the disk shelf until you hear the power supply connect with the connector inside the disk shelf chassis. Caution _____ Do not use excessive force when sliding the power supply into the disk shelf; you can damage the connector. _____
3	Press the cam mechanism levers toward each other to engage the power supply into place.
4	Connect the power cord to the back of the disk shelf.
5	Turn on the power supply.

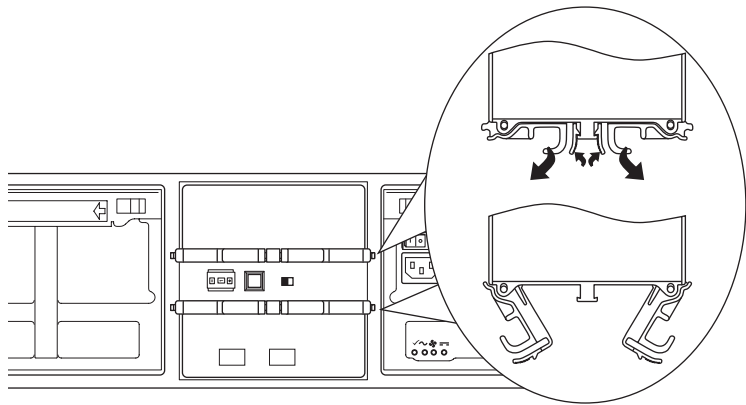
Hot-Swapping the AT-FCX module

About the AT-FCX module

The AT-FCX module controls the external disk shelf LEDs. The module communicates with your storage appliance through the Fibre Channel port that is connected to the backplane of the disk shelf.

Location of the AT-FCX module

The module is plugged into the backplane at the back of the disk shelf enclosure.



Assumptions about this procedure

The assumptions about this procedure are that the AT-FCX modules on the disk shelf use multipath connections to your storage appliance and that you are hot-swapping an AT-FCX with another AT-FCX.

Caution

If you attempt to hot-swap the AT-FCX on a disk shelf that does not have multipath connections, you will lose all access to the drives on this disk shelf as well as those below it.

Hot-swapping a module

To hot-swap a module, complete the following steps.

Note

To hot-swap a module on a disk shelf in a cluster, see the cluster guide for your filer.

Step	Action
1	Verify that your storage appliance meets the minimum software requirements to support the disk shelf and module combination. See the <i>System Configuration Guide</i> at http://now.netapp.com for more information.
2	Ground yourself to the system chassis using the grounding leash.
3	From the storage appliance console, enter the following command to disable the loop in which the failed module is a connection: storage disable adapter adaptername The <i>Data ONTAP System Administrator's Guide</i> (7.0.1 or later) provides more information about these commands.
4	Disconnect the module that you are removing from the loop cabling.
5	Using the thumb and index finger of both hands, press the levers on the CAM mechanism on the module to release it and pull it out of the disk shelf.
6	Slide the replacement module into the slot at the rear of the disk shelf and push the levers of the CAM mechanism into place. Caution Do not use excessive force when sliding the AT-FCX into the disk shelf; you might damage the connector.
7	Reconnect the loop cabling.
8	From the storage appliance console, enter the following command to enable the loop in which the replacement AT-FCX is a connection: storage enable adapter adaptername

About this appendix This appendix discusses how to hot-add a DS14mk2 AT disk shelf with AT-FCX modules into an existing system.

Hot-adding a DS14mk2 AT to an existing loop

- About this section

This section provides information about how to hot-add a DS14mk2 AT to an existing loop. It also tabulates the error messages that appear on your storage appliance console if the attempt at hot-adding was unsuccessful.
- Requirements for hot-adding

The following requirements must be met when hot-adding a DS14mk2 AT to an existing loop:

 - ◆ The new disk shelf and the loop of disk shelves must only have AT-FCX modules.
 - ◆ The hot-added disk shelf must have new drives that will be used as spares only.
 - ◆ You must follow the procedure “[Hot-adding a disk shelf to an existing loop](#)” exactly.

Hot-adding a disk shelf to an existing loop

To hot-add a disk shelf to an existing loop, complete the following steps.

Caution_____

To hot-add disk shelves to a cluster, see the cluster guide for your storage appliance.

Step	Action
1	Ground yourself to the system chassis using the grounding leash.
2	Install the disk shelf. Follow Step 3 through Step 9 of “ Installing a disk shelf ” on page 25.
3	Connect the two disk shelf power cords to each disk shelf that you are adding. Caution_____ Do not turn on the power to the disk shelf yet.

Step	Action
4	Verify that the disk shelf ID is not being used in the loop by entering the following command at the console: <pre>fcstat device_map adaptername</pre> Caution— An invalid disk shelf ID causes the storage appliance to panic.
5	Turn on the power to the disk shelf and you must wait 30 seconds for the shelf electronics to finish initializing.
6	Perform Step 7 through Step 10 exactly. Note— If you connect the cable to the existing loop before you connect it to the new shelf, you end up with an open loop panic.
7	Connect one end of the cable to the AT-FCX A Input on the new disk shelf.
8	Connect the other end of the provided cable to the AT-FCX A Output on the last disk shelf in the existing loop.
9	Connect one end of the cable to the AT-FCX B Input on the new disk shelf.
10	Connect the other end of the provided cable to the AT-FCX B Output on the last disk shelf in the existing loop.
11	Verify that all the cables are securely fastened. Caution— Poorly secured cables cause the storage appliance to panic over an open loop. Result: In 60 seconds, the storage appliance recognizes the hot-added disk shelf.

Error messages

The following error messages appear on your storage appliance console if your attempt at hot-adding the DS14mk2 AT is unsuccessful.

Error message	Explanation
Open loop panic	One of two reasons cause this error message to appear: ◆ The shelf-to-shelf cable between the now second-to-last disk shelf and the newly added disk shelf is defective or is not securely fastened. ◆ The speed of the newly added DS14mk2 AT disk shelf is incorrectly set.
Soft address panic	One of two reasons cause this error message to appear: ◆ There is an invalid disk shelf ID. ◆ The power was turned on before the disk shelf ID was changed and the disk shelf was not power-cycled after the disk shelf ID was changed.

About this appendix This appendix describes how to determine the AC power line lengths running from the storage appliance to the power source.

Recommended AC power line sizes

About AC power feeds

Longer AC power feeds need to be properly designed to preserve voltage levels to the equipment. The wiring from the breaker panel to the power strip, which supplies power to the storage appliance and disk shelves, can often exceed 50 feet.

Note _____
Total AC wire length = breaker to wall or ceiling outlet + extension cable or ceiling drop.

The following table lists the recommended conductor size for 2% voltage drop for a particular distance in feet (taken from the Radio Engineer’s Handbook).

110V, single-phase	20A circuit	30A circuit	40A circuit	50A circuit
25 feet	12 AWG	10 AWG	8 AWG	8 AWG
50 feet	8 AWG	6 AWG	6 AWG	4 AWG
75 feet	6 AWG	4 AWG	4 AWG	2 AWG

220V, single-phase	20A circuit	30A circuit	40A circuit	50A circuit
25 feet	14 AWG	12 AWG	12 AWG	10 AWG
50 feet	12 AWG	10 AWG	8 AWG	8 AWG
75 feet	10 AWG	8 AWG	6 AWG	6 AWG

The following table list the approximate equivalent wire gauge (American Wire Gauge (AWG) to Harmonized Cordage).

AWG	8	10	12
Harmonized, mm-mm (mm-mm = millimeter squared)	4.0	2.5	1.5

Feature update history

The following table lists and describes the history of changes made to this guide. When a change is implemented, it applies to the release in which it was implemented and all subsequent releases, unless otherwise specified.

Feature updates	Feature first implemented in	Feature release date
◆ Initial release of this guide	Data ONTAP 7.0.1	March 2005

About this appendix This appendix lists the regulatory notices you need to be aware of when installing and operating your Network Appliance equipment.

Regulatory notices

FCC notices (U.S. only)

Network Appliance devices are designed for a CFR 47 (Code Federal Regulations) Part 15 Class A environment.

The FCC and Network Appliance guarantee the user's rights to operate this equipment only if the user complies with the following rules and regulations:

- ◆ Install and operate this equipment in accordance with the specifications and instructions in this guide.
- ◆ Modify this equipment only in the ways specified by Network Appliance.
- ◆ Use shielded cables with metallic RFI/EMI connector hoods to maintain compliance with applicable emissions standards.
- ◆ If the system has nine or more Fibre Channel disk shelves, install the system in two or three NetApp System Cabinets to maintain performance within Part 15 of CFR 47 regulations.

Compliance with Part 15 of CFR 47

This equipment has been tested and found compliant with Part 15 of the CFR 47 rules for Class A digital devices. These rules are designed to provide reasonable protection from interference to electronics equipment operated in a commercial environment.

Operation of this device is subject to the following two conditions:

- ◆ This device cannot cause harmful interference.
- ◆ This device must accept any interference received, including interference that may cause undesired operation.

Compliance with ICES-003

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A conforme à la norme NMB-003 du Canada.

Compliance with EN regulations

Marking by the symbol  indicates compliance of this Network Appliance device to the EMC Directive and the Low Voltage Directive of the European Union. Such marking is indicative that this Network Appliance device meets the technical standards listed in "Declaration of Conformity," later in this appendix.

Caution

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

Bureau of Standards, Metrology, and Inspections notice (BSMI, Taiwan only)

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

Translation of the BSMI notice:

Warning: This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

Voluntary Control Council for Interference by Information Technology Equipment (VCCI, Japan)

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Translation of the VCCI-A notice:

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. If such trouble occurs, the user may be required to take corrective actions.

Index

A

- AC power line sizes 38
- AT-FC errors
 - SES electronics Element 1 component is from a different product family 13
 - SES electronics Element 1 failed 13
 - SES electronics Element 1 not installed or failed 13
 - SES electronics Element 2 failed 13
 - Temperature sensor Element 2 failed 13
 - Temperature sensor Element 2 not installed or failed 13
 - Temperature sensor Element 3 failed 13
 - Temperature sensor Element 3 not installed or failed 13
 - Vendor-specific Element 1 not installed or failed 13
 - Vendor-specific Element 2 not installed or failed 13
- AT-FC/AT-FCX module
 - interpreting LEDs 12
- AT-FCX
 - console error messages 12
 - location of the 31
 - replacing the 31
- AT-FCX module
 - hot-swapping 31
- AT-FCX, defined v
- audience v

C

- command
 - fcstat device_map 35
 - halt 21, 23
 - storage disable 32
 - storage enable 32
- console error messages
 - AT-FCX 12
 - cooling element, element 1 and 2 15
 - front operation panel 9
 - Open loop panic 36

- power supply 15
- power supply element 1 and 2 15
- Soft address panic 36
- conventions
 - formatting vi
 - terminology v

D

- device carrier, defined v
- disk drive compatibility 4
- disk shelf ID 2
- disk shelf, defined v
- disk shelves
 - installing 25
 - removing from a single configuration 21
 - replacing 20
- disk, defined v
- disks
 - location of LEDs 16
 - reasons to replace 27

F

- formatting conventions vi
- front operation panel
 - console error messages 9
 - location of LEDs 8
 - monitoring the disk shelf ID 8

H

- hot-adding error message
 - Open loop panic 36
 - Soft address panic 36
- hot-adding to an existing loop 34
- hot-swap of AT-FCX modules 31

I

- IDs, disk shelf 2
- installation
 - before you begin 2

- disk shelves 25
- power supply 30

L

- labels
 - drive bay population 2
- labels on the disk shelf 25
- LED interpretation
 - AT-FC/AT-FCX module 12
 - power supplies 12
- LED locations
 - disks 16
 - front operation panel 8
 - power supply 14
- loops, defined v

M

- module, defined v

P

- power supplies
 - installing in a disk shelf 30
 - interpreting LEDs power supply 12
 - location of LEDs 14
 - removing from a disk shelf 29

- replacing 29
- power supply error messages
 - cooling element, element 1 and 2 15
 - power supply element 1 and 2 15

R

- removal of
 - disk shelf from daisy-chain 23
 - disk shelves 21
 - power supplies 29
- Removing 29
- replacement of
 - AT-FCX 31
 - disk shelves 20
 - power supplies 29

S

- SES electronics Element 2 not installed or failed 13
- special messages vi
- storage appliance, defined v
- storage system, defined v
- supported disks 4

T

- terminology v