

FAS900 Series Appliance Hardware and 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 210-00412
January 2003

Copyright and trademark information

Copyright information

Copyright © 1994–2003 Network Appliance, Inc. All rights reserved. Printed in the U.S.A.

No part of this book 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 and purchase of this product do 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 and the Network Appliance design are registered trademarks of Network Appliance, Inc. in the United States, Canada, and the European Union. Network Appliance is a registered trademark of Network Appliance, Inc. in Monaco and a trademark of Network Appliance, Inc. in the United States and Canada. FAServer is a registered trademark of Network Appliance, Inc. in the United States and the European Union. NetCache is a registered trademark of Network Appliance, Inc. in the European Union and Japan, and a trademark of Network Appliance, Inc. in the United States. SnapCopy is a registered trademark of Network Appliance, Inc. in the European Union and a trademark of Network Appliance, Inc. in the United States. WAFL is a registered trademark of Network Appliance, Inc. in the United States, the European Union, and Canada. FilerView, SecureShare, SnapManager, SnapMirror and SnapRestore are registered trademarks of Network Appliance, Inc. in the United States. Data ONTAP is a trademark of Network Appliance, Inc. in the United States and Canada. Snapshot is a trademark of Network Appliance, Inc. in the United States and the European Union. NetApp—the Network Appliance Company is a registered trademark of Network Appliance, Inc. in the United States and other countries. ApplianceWatch, BareMetal, Center-to-Edge, ContentDirector, DataFabric, MultiStore, NearStore, SecureAdmin, Serving Data by Design, Smart SAN, SnapCache, SnapDrive, SnapVault, Vfiler, and Web Filer are trademarks of Network Appliance, Inc. in the United States.

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

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

Table of Contents

	Preface	v
	Safety Information (Sicherheitshinweise)	ix
Chapter 1	Preparing for the Installation.	1
	Required tools, equipment, and documentation	2
	Appliance dimensions and environmental parameters	4
Chapter 2	Installing Your Appliance	7
	Installing in a four-post equipment rack	8
	Installing in a two-post equipment rack	10
Chapter 3	Connecting Your Appliance	13
	Connecting to a Fibre Channel network	14
	Connecting to an Ethernet network.	16
	Connecting through an RJ-45 connection	17
	Connecting to a fiber optic GbE network	19
	Connecting to a DAFS network	21
	Connecting your remote management card.	22
	Connecting to third-party devices	24
	Connecting to a third-party SCSI tape backup device	26
	Connecting to a third-party Fibre Channel switch	28
	Connecting to an ASCII terminal console	31
	Connecting to an AC power source and powering on	33
Chapter 4	Error Messages and Troubleshooting	35
	Startup error messages	36
	POST error messages.	39
	Boot error messages	45
	Remote management card email notifications	49
	Operational error messages	51

Interpreting LED messages	53
Control panel assembly LEDs	54
FC-AL/FC HBA LEDs.	56
GbE NIC LEDs.	58
DAFS adapter LEDs	61
Remote management card LEDs	62
Power supply LEDs	64

Chapter 5	Maintenance and Servicing	65
	Field-replaceable unit overview	66
	Replacing the cable management tray	67
	Opening the PCB carrier	69
	Removing the PCB carrier	71
	Replacing the motherboard tray	73
	Replacing the motherboard lithium battery.	76
	Replacing the memory card assembly	79
	Replacing SDRAM DIMMs on the memory card assembly	82
	Installing or replacing expansion adapters	85
	Closing the PCB carrier.	91
	Replacing fan subassemblies	92
	Replacing the power supplies.	96
	Replacing the control panel subassembly	100

Appendix A	Recommended Power Line Sizes	105
	Recommended AC power line sizes	106

Appendix B	Communications Regulations.	107
	Regulatory notices	108
	Declaration of Conformity	110

Index	111
------------------------	------------

Preface

About this guide

This guide describes the following tasks and topics:

- ◆ How to install an FAS900 series appliance in a two-post or four-post equipment rack
- ◆ How to connect it to a network
- ◆ How to start up the system
- ◆ How to perform basic troubleshooting
- ◆ How to replace field-replaceable units (FRUs)

This guide does not cover basic system or network administration, which is covered in the *System Administration Guide*.

Audience

This guide is for qualified system administrators and service personnel who are familiar with storage appliances from NetApp—the Network Appliance Company, which features Serving Data by Design™ to share and transfer files through the Network File System (NFS), Common Internet File System (CIFS), and Hypertext Transfer Protocol (HTTP) protocols.

Terminology

This guide uses the following terms:

- ◆ *FRU* refers to any field-replaceable unit that is replaceable at the customer site.
- ◆ *Appliance* refers to an FAS900 series storage appliance.

Command conventions

You can enter commands on the system console or from any client that has access to the system using Telnet. In examples of commands run on a UNIX workstation, this guide uses the command syntax and output of SunOS 4.1x. If you use a different version of UNIX, the command syntax and output might be different.

Keyboard conventions

This guide uses capitalization and some abbreviations to refer to the keys on the keyboard. The keys on your keyboard might not be labeled exactly as they are in this guide.

What is in this guide...	What it means...
hyphen (-)	Used to separate individual keys. Example: Ctrl-D means holding down the Ctrl key while pressing the D key.
Enter	Used to refer to the key that generates a carriage return, although the key is named Return on some keyboards.
type	Used to mean pressing one or more keys on the keyboard.
enter	Used to mean pressing one or more keys and then pressing the Enter key.

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. ◆ Placeholders for information you must supply. For example, if the guide requires you to enter the arp -d hostname command, you enter the characters “arp -d” followed by the actual name of the host. ◆ Book titles in cross-references.
Monospaced font	◆ Command and daemon names. ◆ Information displayed on the system console or other computer monitors. ◆ Contents of files.
Bold monospaced 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

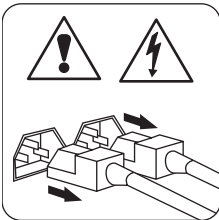
All products are Class 1 laser devices. You must follow these safety rules when working with this equipment:

WARNING

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

- ◆ 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 is furnished with 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

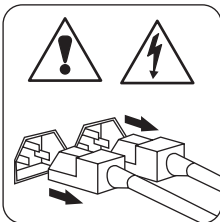
Alle Produkte sind Lasergeräte der Klasse 1. Die folgenden Sicherheitshinweise sind beim Betreiben des Geräts unbedingt zu beachten:

Vorsicht

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

- ◆ 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 Abzweigleitungen 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 Netzan-schlussleitungen



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

ACHTUNG

Gerät besitzt zwei Netzan-schlussleitungen. Vor Wartung alle Anschlüsse vom Netz trennen.

Required materials and information

This chapter identifies the tools, equipment, manuals, and preparation requirements you need for first-time installation of a NetApp® FAS900 series appliance.

This chapter describes the following:

- ◆ Components you receive with the appliance
- ◆ Installation tools and equipment you need
- ◆ Physical characteristics, such as height and weight
- ◆ Electrical, environmental, and space requirements

Topics in this chapter

This chapter discusses the following topics:

- ◆ [“Required tools, equipment, and documentation”](#) on page 2
- ◆ [“Appliance dimensions and environmental parameters”](#) on page 4

Required tools, equipment, and documentation

Equipment you receive with your appliance

In addition to this guide, your shipment should have the following components:

- ◆ An FAS900 series appliance and bezel
- ◆ A DB-9 to DB-9 straight-through serial cable and a DB-9 to RJ-45 adapter for your ASCII terminal connection, if ordered
- ◆ A disposable antistatic grounding leash
- ◆ The appropriate rack installation kit
- ◆ FAS900 series documentation

Equipment rack installation components

The following table lists the components you receive to install your appliance in a specific type of equipment rack.

Tools or equipment	Front-mounted on a two-post equipment rack	Center-mounted on a two-post equipment rack	Front-mounted on a four-post equipment rack
Four-post rack adjustable supports			X
Rail mounting screws	X	X	X
Two-post rack mounts	X	X	

Required tools

To install your appliance components in an equipment rack, you need the following tools and equipment:

- ◆ #2 Phillips screwdriver
- ◆ Marker
- ◆ Hand level
- ◆ Antistatic wrist strap and grounding leash

Caution

The FAS900 series has electronic components that are sensitive to static electricity. Static discharge from your clothing or other fixtures can damage these components. Always wear an antistatic wrist strap and a grounding leash to prevent static discharge.

**Required
configuration
equipment**

To configure your system, you need the following equipment on site:

- ◆ ASCII terminal (also referred to as an ANSI terminal)
- ◆ Serial console

**Required
documentation**

The following table lists additional documentation you need to help manage your FAS900 series appliance.

Document name	When to use
Site Requirements Guide	Use this guide to assist you in preparing your site for your FAS900 series appliance.
<i>Data ONTAP Release Notes</i>	Use this document to see what is new with your appliance, for a list of new procedures that didn't make the user documentation, and for a listing of the changes since the last release of the Data ONTAP™ software.
<i>System Configuration Guide</i>	Use this guide to configure and optimize your appliance.
<i>Routine Administration Guide</i>	Use this guide to administer, manage, and optimize your appliance.

Appliance dimensions and environmental parameters

Installation considerations

You need to consider the following elements:

- ◆ Physical characteristics, such as height and weight
- ◆ Space requirements
- ◆ Environmental requirements, such as temperature and humidity
- ◆ Electrical requirements

Physical characteristics

The following table lists the physical characteristics of your appliance.

Characteristic	U.S.	Metric
Height	10.3 in. (5.9 U)	26.12 cm
Width	17 in.	43.18 cm
Depth without cable management tray	22 in.	55.88 cm
Depth with cable management tray	25 in.	63.5 cm
Weight (without power supplies)	77.8 lbs	35.36 kg
Weight (with power supplies inserted)	105 lbs	47.72 kg

Space requirements

The following table lists the recommended minimum clearances for your appliance.

Recommended minimum clearance	U.S.	Metric
Front clearance for cooling		
Two-post equipment rack	6 in.	15.2 cm
Four-post equipment rack	6 in.	15.2 cm

Recommended minimum clearance	U.S.	Metric
Rear clearance for cooling		
Two-post equipment rack	19 in.	48.3 cm
Four-post equipment rack	12 in.	30.5 cm
Front clearance for maintenance		
Two-post equipment rack	45 in.	114.3 cm
Four-post equipment rack	32 in.	81.28 cm
Rear clearance for maintenance		
Two-post equipment rack	30 in.	76.2 cm
Four-post equipment rack	12 in.	30.5 cm

Environmental requirements

The following table lists the environmental ranges for operation and storage temperatures and humidity.

Environmental condition	Operating range	Storage range
Temperature	10° C to 40° C 50° F to 104° F	0° C to 60° C 32° F to 140° F
Relative humidity	20% to 80%	8% to 80%

Environmental stress specifications

The following table lists the environmental stress specifications for your appliance.

Condition	Requirement
Operating shock	5g 10 ms 1/2 sine
Operating vibration	.21 grms 5–500 Hz random
Altitude	0 to 7,000 ft (2,133m)

Electrical ratings

The following table lists the AC power ratings for your appliance.

Condition	Requirement
Voltage range	100V AC to 240V AC
Frequency	50/60 Hz
Amperage	12-6A
Inrush current	30A at 264V

Power consumption ratings

The following table lists the power consumption rating for your appliance.

Power	Rating
Watts	330W
Heat dissipation BTU/hr.	1,126 BTU

Note

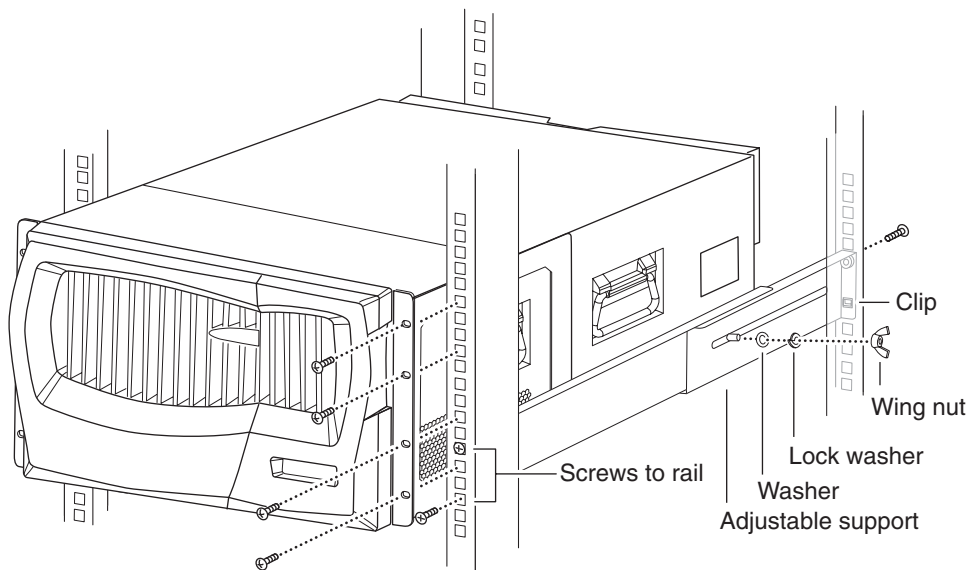
For detailed environmental and electrical information, see the *Site Requirements Guide*.

- Types of installation** You can perform the following types of installations:
- ◆ Four-post installation
 - ◆ Two-post equipment rack as a mid-mount or flush-mount installation
- Topics in this chapter** This chapter discusses the following topics:
- ◆ [“Installing in a four-post equipment rack”](#) on page 8
 - ◆ [“Installing in a two-post equipment rack”](#) on page 10

Installing in a four-post equipment rack

Installing the appliance

To install your appliance in a four-post equipment rack, complete the following steps, using the figure for reference.



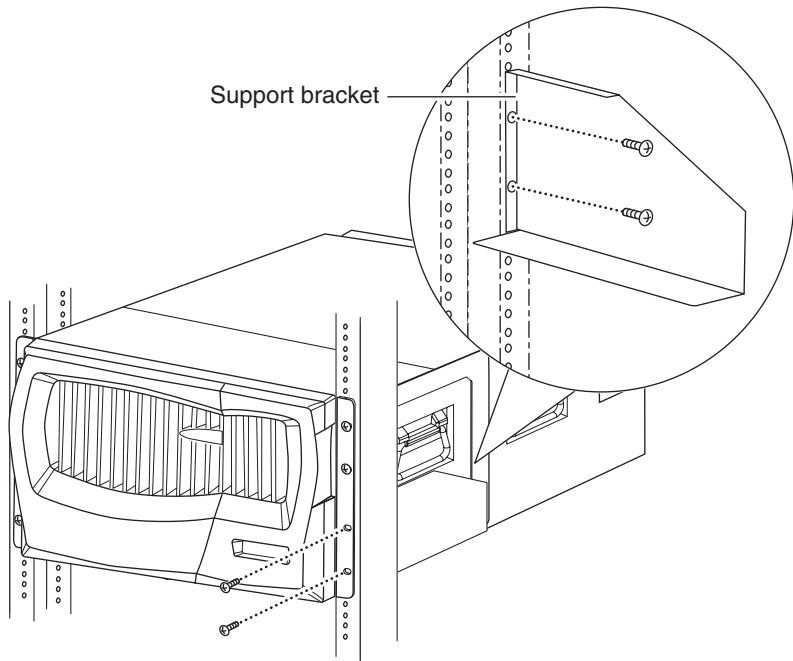
Step	Action
1	Attach the clip of each adjustable support to the appropriate slot of each rear post in the equipment rack.
2	Using the wing nut to adjust the length of the support, align the adjustable supports so that they fit between the front and back posts of the rack.
3	Secure each adjustable support to the front post of the rack using two of the supplied #2 Phillips screws, then tighten the wing nut. Use a level to ensure that the adjustable supports are secured in the correct holes in the rack.
4	Secure each support rail to the back post of the rack using the supplied #2 Phillips screws.

Step	Action
5	Slide your appliance onto the adjustable supports and secure it to the four-post rack by inserting the appropriate screws through the mounting holes on each side of the bezel and into the front posts of the rack.
6	If desired, apply the ear covers over the heads of the mounting screws by peeling the adhesive strip from the back of the ear covers and applying the ear covers to each mounting flange on your appliance.
7	Go to Chapter 3, “ Connecting Your Appliance ,” on page 13, for instructions about connecting your appliance to your network and connecting an ASCII terminal.

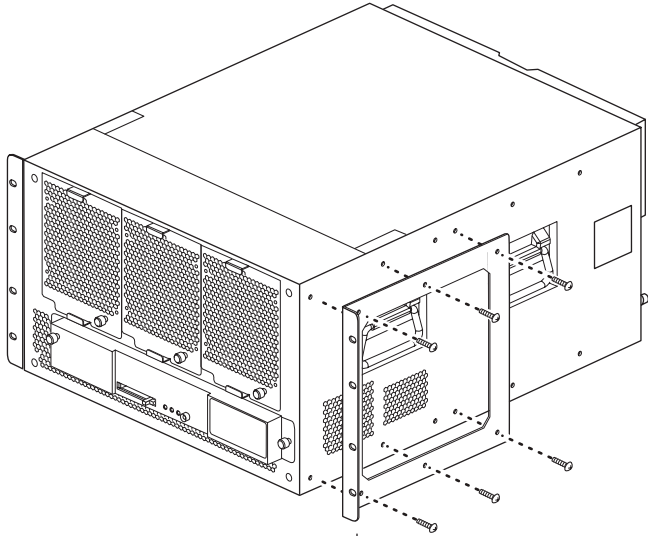
Installing in a two-post equipment rack

Installing the appliance

To install your appliance in a two-post equipment rack as either a mid-mount or flush-mount installation, complete the following steps, using the figure for reference.



Step	Action
1	Attach the small support bracket to the equipment rack, using the appropriate screws from the mounting kit. Do not tighten the screws completely. The bracket should wiggle a little.

Step	Action	
2	If you are mounting the appliance as a...	Then...
	Mid-mount	Complete the following substeps, using the figure for reference. 1. Unscrew the mounting brackets from the side of your appliance. 2. Set the mounting bracket to the furthest position back on the side of your appliance. 3. Repeat Steps 1 and 2 for the other side of your appliance.  The diagram shows a three-dimensional view of a rectangular appliance, likely a range hood or oven, with a mesh filter on the front. A mounting bracket is shown being attached to the side of the appliance. Dashed lines indicate the bracket's position and the screws used for attachment. A label 'Mounting bracket' with a leader line points to the bracket.
3	Flush-mount	Go to Step 4 .

Step	Action
4	Attach the support rack mounts to each post in the rack. Align the mounting brackets with the small brackets attached to the equipment rack, then carefully slide the appliance into place.
5	Secure your appliance to the two-post equipment rack by inserting the appropriate screws from the mounting kit through the mounting holes on each side of the bezel and into the front posts of the rack.
6	If desired, apply the ear covers over the heads of the mounting screws by peeling the adhesive strip from the back of the ear covers and applying the ear covers to each mounting flange on your appliance.
7	Go to Chapter 3, “ Connecting Your Appliance ,” on page 13, for instructions about connecting your appliance to your network and connecting an ASCII terminal.

About this chapter

This chapter discusses how to connect your appliance to a network through several types of expansion adapters, to third-party devices, to an ASCII terminal console, and to an AC power source.

Topics in this chapter

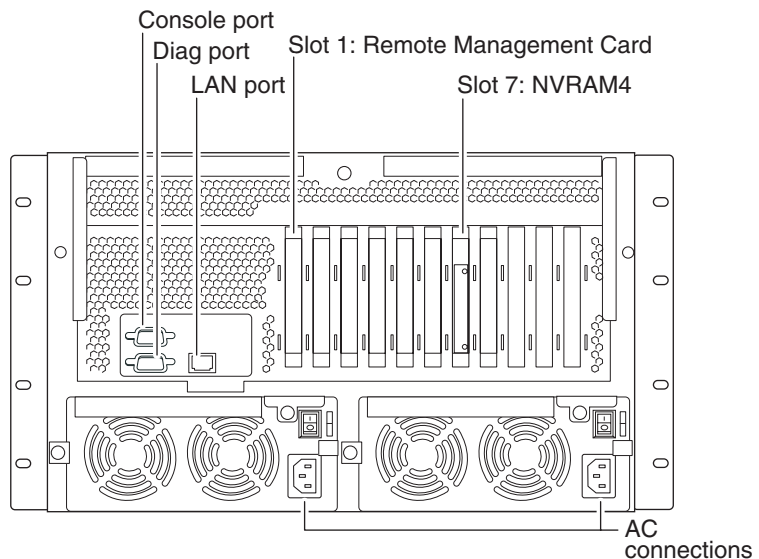
This chapter discusses the following topics:

- ◆ “Connecting to a Fibre Channel network” on page 14
- ◆ “Connecting to an Ethernet network” on page 16
- ◆ “Connecting to a DAFS network” on page 21
- ◆ “Connecting your remote management card” on page 22
- ◆ “Connecting to an ASCII terminal console” on page 31
- ◆ “Connecting to an AC power source and powering on” on page 33

Locating the appropriate connection

You connect your appliance to a network and to power through the back of the chassis. The following illustration gives an overview of onboard ports, PCI slots, and AC connections.

For detailed information about your appliance configuration, see the System Administration Guide at <http://now.netapp.com>.



Connecting to a Fibre Channel network

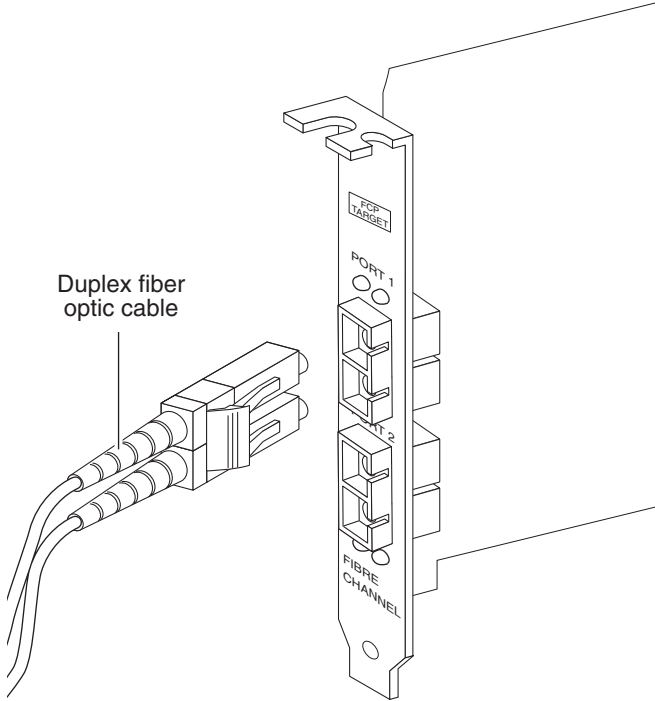
Fibre Channel cabling requirements

The following types of cables and connectors are required for a Fibre Channel network:

- ◆ 50 micron multimode fiber optic cable with LC-to-LC connectors
- ◆ 62.5 micron multimode fiber optic cable with LC-to-LC connectors

Connecting to a Fibre Channel network

To connect your appliance to a Fibre Channel network, complete the following steps.

Step	Action
1	Push the cable with the LC connector into Port 1 on the dual-channel Fibre Channel adapter, until it clicks and locks into place.  The diagram illustrates the connection of a duplex fiber optic cable to a dual-channel Fibre Channel adapter. The cable, labeled 'Duplex fiber optic cable', has two LC connectors. One connector is shown being inserted into 'PORT 1' of the adapter. The adapter is a vertical component with two ports, 'PORT 1' and 'PORT 2', each with an LC connector slot. Above the ports is a label 'FCP TARGET' and below them is 'FIBRE CHANNEL'. The cable is shown in a perspective view, with the two fibers clearly visible.

2	If applicable to your network setup, push the cable with the LC connector into Port 2 on the Fibre Channel adapter, until it clicks and locks into place.
---	---

Connecting to an Ethernet network

Supported Ethernet connections

Your appliance has one onboard 10Base-T/100Base-TX Ethernet port. It also supports the following Ethernet network interface cards (NICs) in the PCI slots of your appliance motherboard:

- ◆ Copper Gigabit Ethernet (GbE) NIC (with an RJ-45 connection)
- ◆ Fiber optic GbE NIC

Note

See the System Configuration Guide at <http://now.netapp.com> for slot assignments.

Cabling requirements

The following table lists the cabling requirements for Ethernet connections.

Note

Network Appliance recommends using a cable with a minimum length of one meter for the onboard Ethernet LAN port.

Ethernet type	Type of cable used	Maximum distance
10Base-T/ 100Base-TX	Category 3 (10Base-T only) or 5 (10Base-T/100Base-TX) unshielded twisted-pair (UTP) cable with RJ-45 connectors	100m
10Base-T/ 100Base-TX/ 1000Base-T adapter	Category 5 UTP cable with RJ-45 connector for the copper GbE adapter only	100m
1000Base-SX adapter	50 micron multimode fiber optic cable, SC connector	550m
	62.5 micron multimode fiber optic cable, SC connector	220m

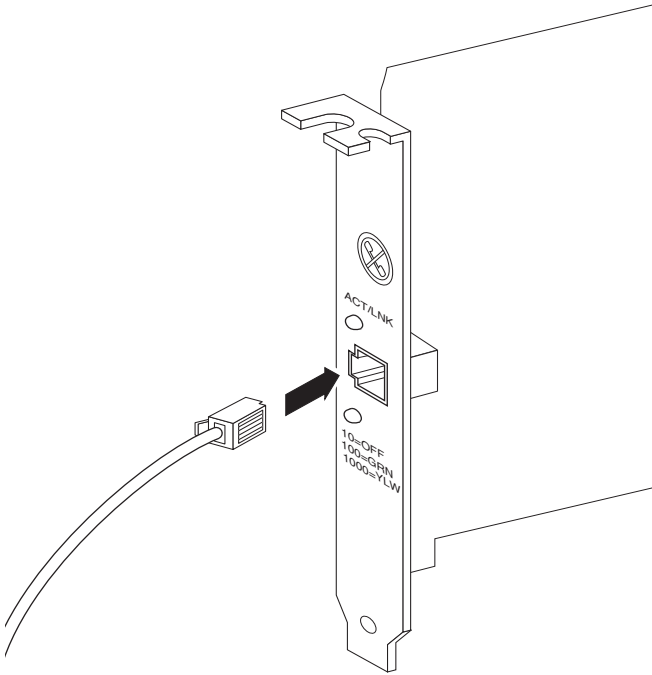
Connecting to an Ethernet network

Connecting through an RJ-45 connection

Connecting through an RJ-45 connection

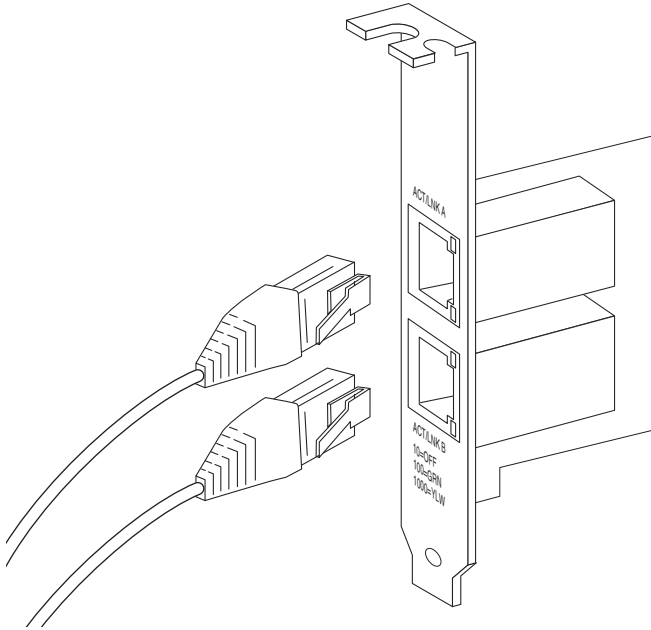
To connect your appliance to a 10Base-T/100Base-TX or 10Base-T/100Base-TX/1000Base-T Ethernet network, complete the following step.

Caution — If you use a copper GbE NIC, you should place a ferrite on your cable approximately four inches from the NIC port.

Step	Action
1	Push the RJ-45 connector into the Ethernet port until it clicks and locks into place. The following figure shows a UTP cable with an RJ-45 connector connecting to a copper GbE NIC. 

**Connecting through
a dual-port RJ-45
connection**

To connect your appliance to a 10Base-T/100Base-TX or 10Base-T/100Base-TX/1000Base-T Ethernet network, complete the following step.

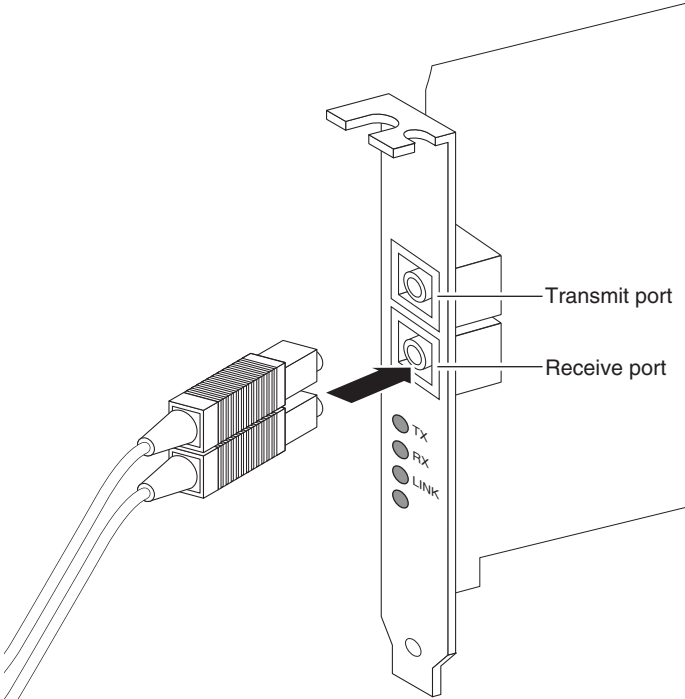
Step	Action
1	Push the RJ-45 connector into the Ethernet port until it clicks and locks into place. Repeat this step to connect another network to the second port. The following figure shows a UTP cable with an RJ-45 connector connecting to a dual-port copper GbE NIC. 

Connecting to an Ethernet network

Connecting to a fiber optic GbE network

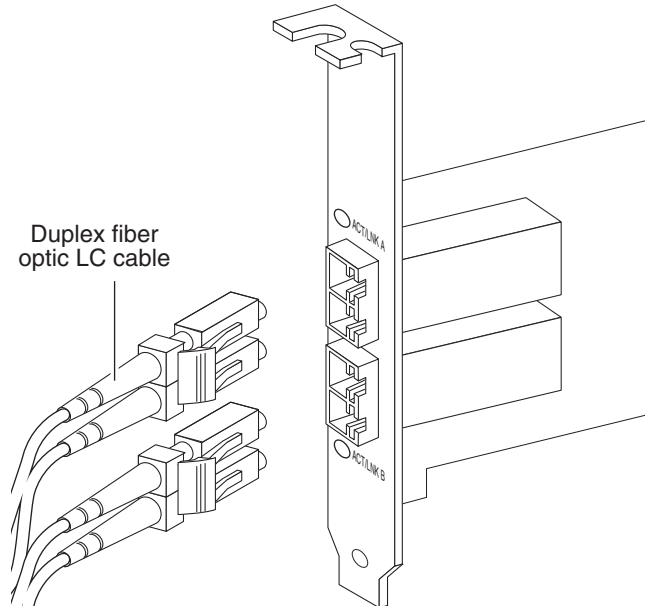
**Connecting through
a fiber optic GbE
connection**

To connect your appliance to a fiber optic GbE network, complete the following step.

Step	Action
1	Push the duplex fiber optic cable with the SC connector into the ports on the NIC, until it clicks and locks into place. The following figure shows a duplex SC cable connecting to a fiber optic GbE NIC. 

**Connecting through
a dual-port fiber
optic GbE
connection**

To connect your appliance to a dual-port fiber optic GbE network, complete the following step.

Step	Action
1	Push the duplex fiber optic cable with the duplex fiber optic LC connector into the port on the NIC, until it clicks and locks into place. Repeat this step to connect another network to the second port. The following figure shows a duplex fiber optic cable with an LC connector connecting to a dual-port fiber 10Base-T/100Base-TX/1000Base-T NIC. 

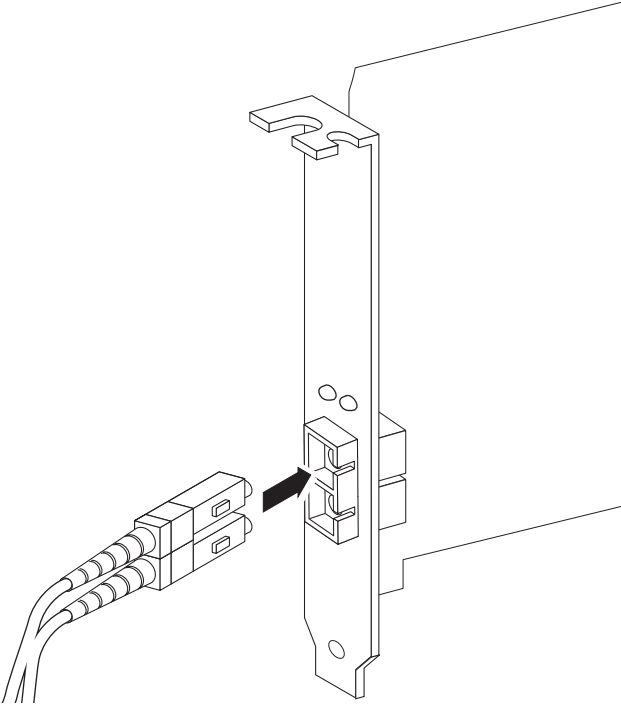
Connecting to a DAFS network

Cabling requirements

A 50 micron multimode fiber optic cable with an LC-to-LC connector is required for a DAFS network.

Connecting to a DAFS network

To connect to a DAFS network, complete the following step.

Step	Action
1	Push the LC cable connector into the port on the DAFS adapter until it clicks and locks into place. 

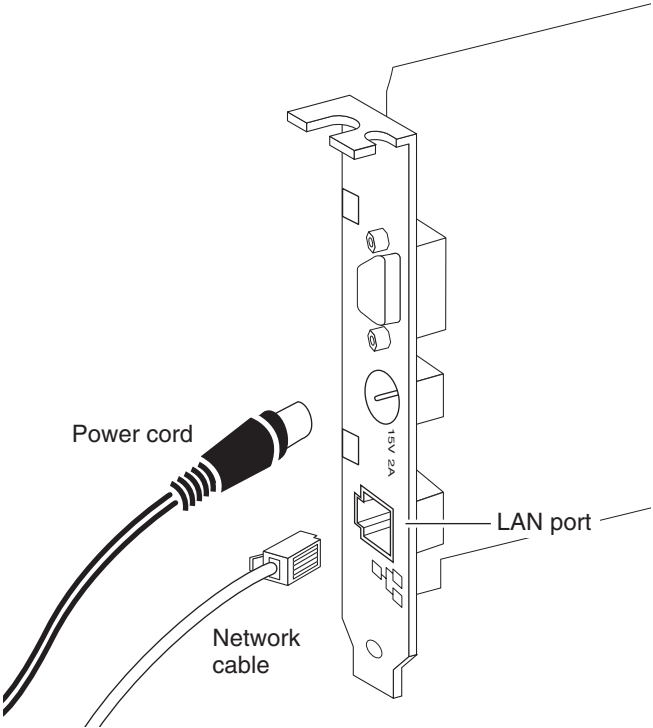
Connecting your remote management card

What your remote management card does

The remote management card optionally sends a message to configured autosupport recipients, including Network Appliance Customer Support, when your appliance needs support.

Connecting your remote management card

To connect your remote management card to a LAN network and to power, complete the following steps, using the figure for reference.



Step	Action
1	Connect your remote management card to the LAN network through the LAN port.

2	Connect the power cord for the remote management card into the socket on the back of the card. Note_____ The remote management card comes with a power cord for connection to its own external power source. Network Appliance recommends that you connect the remote management card to an uninterruptible power supply in case of a power outage.
3	When you install your equipment into a two-post or four-post rack, use the velcro strips to attach the remote management card power supply to an appropriate space on your rack.
4	Connect the power cord to a separate power source. Note_____ If your system comes with a NetApp System Cabinet, do not plug the remote management card power cable into a power strip inside the cabinet. Instead, you must connect the remote management card to a separate power source.

Connecting to third-party devices

Preparing the third-party devices

To prepare the third-party devices, complete the following steps.

Step	Action
1	Set the appropriate ID on the tape backup device. See the documentation for the tape backup device.
2	If you have a robotic loader on the tape backup device or a Fibre Channel switch, set its ID. See the documentation for the Fibre Channel switch.
3	Turn off all third-party devices and go to the following sections, as applicable: ◆ “Connecting to a third-party SCSI tape backup device” on page 26 ◆ “Connecting to a third-party Fibre Channel switch” on page 28.

Rules for connecting the third-party devices

Observe the following rules for connecting the third-party devices:

- ◆ Use a cable that is
 - ❖ Appropriate to the tape adapter installed in your appliance
 - ❖ Of an approved length for the third-party device

Note

See the documentation for the third-party device.

- ◆ The expansion slots assigned for tape adapters and the type of tape adapters installed in your appliance are identified in the System Configuration Guide at <http://now.netapp.com>.
- ◆ Check the System Configuration Guide to verify support for your tape backup device. An unsupported tape backup device might cause the appliance to halt.

**For detailed
information**

For details about connecting third-party devices, see the following topics:

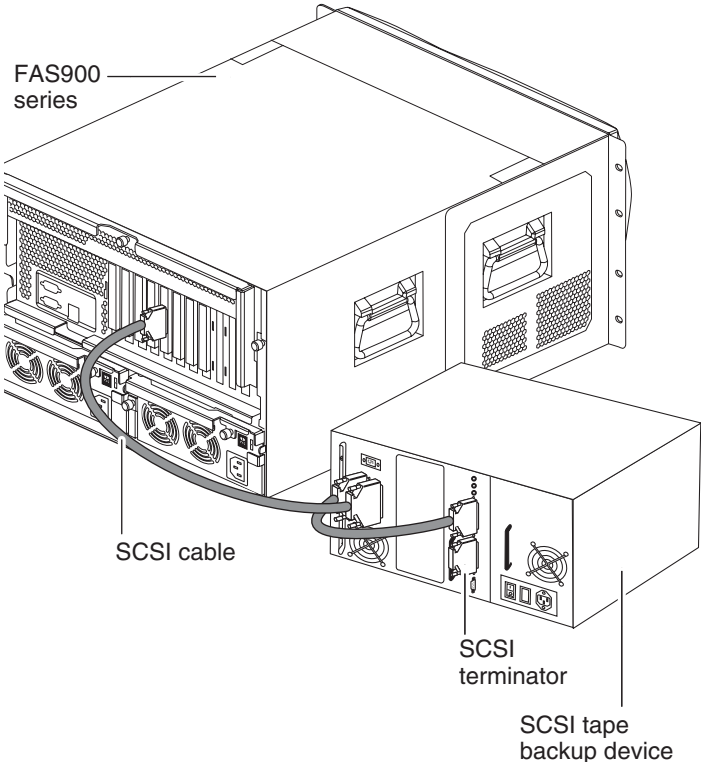
- ◆ [“Connecting to a third-party SCSI tape backup device”](#) on page 26
- ◆ [“Connecting to a third-party Fibre Channel switch”](#) on page 28

Connecting to a third-party SCSI tape backup device

Connecting a SCSI tape backup device

To connect a third-party SCSI tape backup device to your appliance, complete the following steps.

Step	Action
1	Shut down the appliance by entering the following command at the console: halt Caution_____ Always use the <code>halt</code> command to perform a clean shutdown.
2	Turn off the power to your appliance.
3	Connect the cable provided with the tape device to the following points of connection: • The appropriate port on the back panel of your appliance • The port on the tape device
4	Tighten each end of the cable.

Step	Action
5	Terminate any open port on the tape backup device with an active SCSI terminator. For information about terminating the open port, see the documentation for the tape backup device.  The diagram illustrates the connection of a SCSI cable between two devices. On the left is the FAS900 series device, and on the right is the SCSI tape backup device. A SCSI cable is connected between the two. A SCSI terminator is connected to the open port on the SCSI tape backup device.
6	Go to “Connecting to an ASCII terminal console” on page 31.

Connecting to a third-party Fibre Channel switch

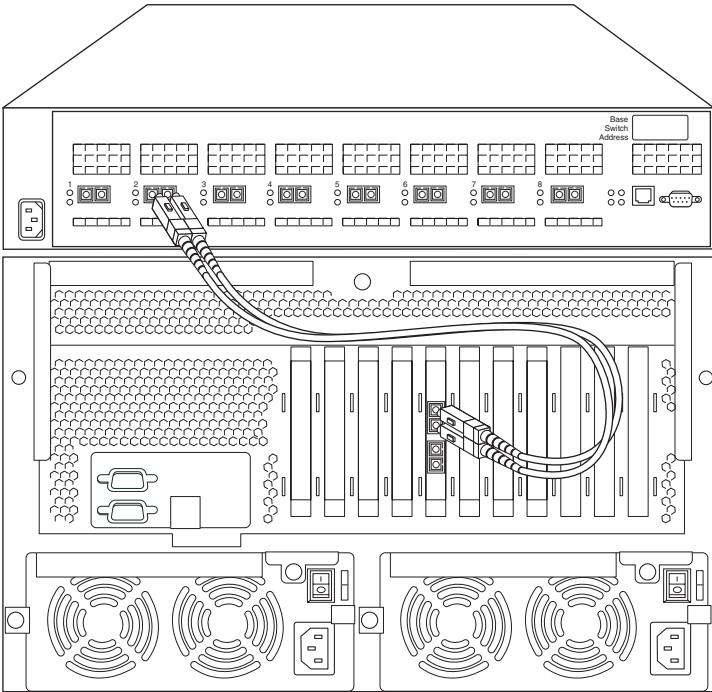
Connecting a Fibre Channel switch

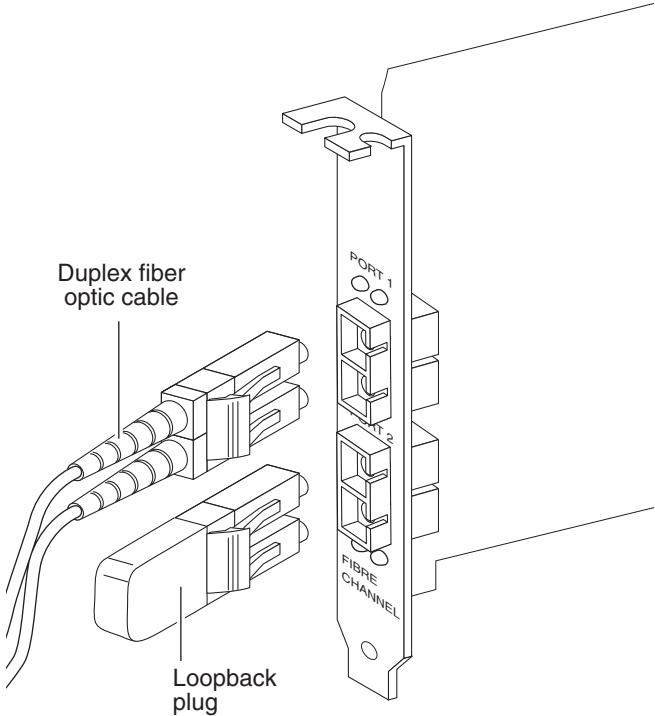
To connect your appliance to a third-party Fibre Channel switch, complete the following steps.

Note_____

See the third-party documentation about connecting a Fibre Channel tape backup device to the Fibre Channel switch.

Step	Action
1	Shut down the appliance by entering the following command at the console: halt Caution_____ Always use the halt command to perform a clean shutdown.
2	Turn off the power to your appliance.

Step	Action
3	Connect the cable provided with the Fibre Channel switch to the following points of connection: ◆ The appropriate port on the back panel of your appliance ◆ An available port on the Fibre Channel switch  The diagram illustrates the back panel of a server or storage appliance. At the top, there is a control panel with several status LEDs and a 'Base Switch Address' label. Below this, a row of ports is visible, including a power input on the left and a series of Fibre Channel ports. A cable with a multi-fiber connector is shown plugged into one of these ports. The cable runs down the front of the unit, passing through a series of vertical slots, and then connects to a port on a lower section of the back panel. The bottom of the unit features two large cooling fans and additional power and status ports.

Step	Action
4	When connecting to a dual-channel Fibre Channel adapter in your appliance, insert the LC cable into Port 1 and the LC loopback plug into Port 2 until they click and lock into place. 
5	Go to “Connecting to an ASCII terminal console” on page 31.

Connecting to an ASCII terminal console

About the ASCII terminal console

The ASCII terminal console enables you to monitor the boot process and helps you configure the appliance after it boots. Use an ASCII terminal, which can be attached through the serial port on the back of your appliance if you want to do local system administration.

ASCII terminal console cable wiring

The ASCII terminal console is connected to your appliance with a DB-9 serial cable, attached to a DB-9 to RJ-45 converter cable, then through the serial port on the back of your appliance.

The following table lists how the DB-9 serial cable is wired. Input indicates data flow from the ASCII terminal to your appliance and output indicates data flow from the appliance to the ASCII terminal.

Pin number	Signal	Data flow direction	Description
1	DCD	Input	Data carrier detect
2	SIN	Input	Serial input
3	SOUT	Output	Serial output
4	DTR	Output	Data terminal ready
5	GND	N/A	Signal ground
6	DSR	Input	Data set ready
7	RTS	Output	Request to send
8	CTS	Input	Clear to send
9	RI	Input	Ring indicator

Connecting to an ASCII terminal console

To connect an AMSCII terminal console to your appliance, complete the following steps.

Step	Action	
1	Set the following communications parameters to the same values for both your appliance and the ASCII terminal.	
	Parameter	Setting
	Baud	9600
	Data bit	8
	Parity	None
	Stop bits	1
	Flow control	None
	Note _____	
See your terminal documentation for information about changing your ASCII console terminal settings.		

2	Connect the DB-9 serial cable to the DB-9 to RJ-45 converter cable, then connect the RJ-45 end to the console port on your appliance and the other end to the ASCII terminal.	
3	Go to “ Connecting to an AC power source and powering on ” on page 33.	

Connecting to an AC power source and powering on

What the power-on sequence does

The power-on sequence for a new installation automatically

- ◆ Checks all connections to the appliance
- ◆ Runs the `setup` command

Note

See the *Getting Started Guide* for more information about the resources for configuring your appliance.

Connecting and powering on an AC system

To connect your appliance to an AC power source and power it on, complete the following steps.

Step	Action
1	Turn on any third-party devices, if applicable.
2	Power on your disk shelves. To power on the disk shelves, see your disk shelf guide. Caution It is important that you power on your appliance after the disk shelves. The disk shelves and disk drives require time to power on, reset, and prepare to respond to your appliance, which expects these units to be ready for input/output when it powers on and performs its reset and self-test.
3	Make sure that the power switch on each power supply on your appliance is in the Off (0) position.
4	Connect the socket end of the supplied power cord to the recessed power plug on the power supply.
5	Secure the power cord with the retaining adjustable clip on the power supply.
6	Plug the other end of the power cord into a grounded electrical outlet.

Step	Action
7	Repeat Steps 1 through 6 for the second power supply, if needed. Caution_____ To obtain power supply redundancy, you must connect the second power supply to a separate AC circuit.
8	Ground your appliance and disk shelves by attaching the grounding cable to the appropriate grounding hole on the side of your appliance chassis.
9	Turn the power switch on the power supplies to the On (I) position. Result: The system verifies the hardware and loads the operating system.
10	Make sure that the following LEDs illuminate: ◆ Front panel LEDs ◆ Power supply LEDs ◆ Network port LEDs The LED responses are described in “Interpreting LED messages” on page 53. Note_____ If the LEDs do not illuminate, contact Network Appliance Technical Support.
11	Check the startup messages as they appear on the console or LCD. The system messages are described in Chapter 4, “Error Messages and Troubleshooting,” on page 35. Note_____ If the startup messages do not appear, contact Network Appliance Technical Support.
12	Go to the <i>Getting Started Guide</i> when the following default host name prompt appears on the console screen: toaster>

About this chapter

This chapter lists error messages you might encounter during the boot process. It also describes the location of the LEDs and how to interpret the information they provide.

Topics in this chapter

This chapter discusses the following topics:

- ◆ “[Startup error messages](#)” on page 36
- ◆ “[Remote management card email notifications](#)” on page 49
- ◆ “[Operational error messages](#)” on page 51
- ◆ “[Interpreting LED messages](#)” on page 53

Where to get more information

The following table lists the guides that can help you with some of the corrective actions.

If you are troubleshooting...	Then see...
FAS900 series hardware problems and need to open your appliance	This guide
Fibre Channel disk shelf problems	The disk shelf hardware guide
Software problems	The <i>Data ONTAP System Administrator's Guide</i>

Startup error messages

Startup sequence

When you apply power to the your appliance, it verifies the hardware that is in the system, loads the operating system, and displays two types of startup informational and error messages on the system console:

- ◆ Power-On Self-Test (POST) messages
- ◆ Boot messages

POST messages

POST is a series of tests run from the motherboard PROM. These tests check the hardware on the motherboard and differ depending on your system configuration. The following series of messages are examples of POST messages displayed on the console.

Header:

```
Intel Open Firmware by FirmWorks  
Copyright 1995-2002 FirmWorks, Network Appliance. All Rights  
Reserved.  
Firmware release x.x_in
```

POST messages:

```
Memory size is 6GB  
Testing SIO  
Testing LCD  
Probing devices  
Testing 512MB  
Complete  
Finding image...  
Starting
```

Note

Your appliance LCD displays only the POST messages without the preceding header.

Boot messages

After the boot is successfully completed, your appliance loads the operating system. The following message is an example of the boot message that appears on the system console of an FAS940 storage appliance at first boot. The exact boot messages that appear on your system console depend on your system configuration.

Boot messages

```
NetApp Release x.x.x: Thu January 10 04:06:00: PST 2002
Copyright (c) 1992-2002 Network Appliance, Inc.
Starting boot on Thu January 10 23:42:47 GMT 2002
System ID: 0016777216 ()
slot 0: System Board
        Processors:          1
        Memory Size:         3072 MB
slot 0: 10/100 Ethernet Controller IV
        e0 MAC Address:      00:00:4c:0f:2c:22 (auto-100tx-
fd-up)
slot 0: NetApp ATA/IDE Adapter ata0a (1f0)
        1 Disk:              0.2GB
slot 3: Fibre Channel Host Adapter 3
        7 Disks:             119.0GB
        1 shelf with EDM
slot 6: NVRAM
        Memory Size:         256 MB
slot 6: NetApp ATA/IDE Adapter atala (9fe0)
        1 Disk:              0.2GB
slot 11: 10/100/1000 Ethernet Controller IV
        e11 MAC Address:     00:02:b3:8f:a4:e7 (auto-
unknown-cfg_down)
Please enter the new hostname []:
```

Types of startup error messages

You might encounter two groups of startup error messages during the boot process:

- ◆ POST error messages
- ◆ Boot error messages

Both error message types are displayed on the system console, and an email notification sent out by your remote management card, if configured to do so.

For detailed information

For a detailed list of the startup error messages, see the following sections:

- ◆ [“POST error messages”](#) on page 39
- ◆ [“Boot error messages”](#) on page 45

POST error messages

POST error messages

The following table describes the extended POST error messages that might appear on the system console if your appliance encounters CPU-level system errors during the POST process.

If any Processor 2 error messages are displayed, power cycle the system. If the error message persists, replace the motherboard, as described in “[Replacing the motherboard tray](#)” on page 73.

Note

Always power cycle your appliance when you receive any of the following errors. If the system repeats the error message, follow the corrective action for that error message.

Error message or code	Description	Corrective action
*BMC disable	The baseboard management card (BMC) is in a state where it can not supply environmental data. The message can result from two conditions: ◆ The BMC has an internal error and might be able to supply correct environmental data. No further environmental error messages are displayed after this message. ◆ The BMC is in Firmware Update Mode and does nothing else until removed from this mode. Other environmental messages follow this message.	Replace the motherboard, as described in “Replacing the motherboard tray” on page 73. Use your <i>Diagnostics Guide</i> to get the BMC out of the Firmware Update Mode.
*Watchdog error	An error occurred during the testing of the Watchdog timer.	Replace the motherboard, as described in “ Replacing the motherboard tray ” on page 73.

Error message or code	Description	Corrective action
*Missing CF-card	The CompactFlash™ card is missing from the front of the machine. The kernel does not boot correctly.	Insert a valid CompactFlash card or replace the control panel subassembly, as described in “Replacing the control panel subassembly” on page 100
*Inv boot device	An error with the CompactFlash card occurred. This is usually caused by a card made by an unsupported manufacturer.	Insert a valid CompactFlash card.
*Boot device err	A CompactFlash card could not be found to boot from.	Insert a valid CompactFlash card.
*2.5V power bad *3.3V power bad *5V power bad *+12V power bad *-12V power bad	One (or more) of the power voltages is bad. This could be due to a bad power supply or power-regulation device.	Replace the motherboard, as described in “Replacing the motherboard tray” on page 73, or replace the memory card assembly, as described in “Replacing the memory card assembly” on page 79.
*Pwr Sup #1 bad	An error occurred within the power supply.	Replace the power supply, as described in “Replacing the power supplies” on page 96.
*Pwr Sup #2 bad	An error occurred within the power supply.	Replace the power supply, as described in “Replacing the power supplies” on page 96.
*Pwr Sup #1 out	The power supply is not connected to the system chassis.	Replace the power supply, as described in “Replacing the power supplies” on page 96.
*Pwr Sup #2 out	The power supply is not connected to the system chassis.	Replace the power supply, as described in “Replacing the power supplies” on page 96.
*Boot DeviceErr	The CompactFlash card could not be found to boot from.	Insert a CompactFlash card.

Error message or code	Description	Corrective action
<i>*Clock invalid. Date reset</i>	The system real-time clock (RTC) contains an invalid date value. The system does not boot, but the date is reset to January 1, 1970, to enable a subsequent boot.	Replace your motherboard battery and reset the date immediately to avoid file system problems.
<i>*Clock dead</i>	The system RTC failed.	Replace the motherboard tray.
<i>*Clock batt dead</i>	The system RTC failed and its battery expired.	Replace the failed motherboard battery, and reset the date immediately to avoid file system problems.
<i>*Clock error</i>	The system RTC is not operating (counting) correctly.	Replace the motherboard tray.
<i>*Clock reset</i>	The system RTC is not running. The system does not boot, but the date is reset to January 1, 1970, to enable a subsequent boot.	Reboot your appliance and reset the date immediately to avoid file system problems.
<i>*CPU ucode err</i>	The CPU microcode update did not occur or, in a multiprocessor system, the microcode updates in the CPUs do not match; that is, they have different revisions.	Update the firmware to a version that contains an updated microcode database.
<i>*CPU speed err</i>	The CPU's measured clock speed does not match the expected value for the appliance model. This indicates problems with system clocks and/or buses.	Update the firmware to a version that contains an updated microcode database, or replace the motherboard, as described in “Replacing the motherboard tray” on page 73.
<i>*CPU count err</i>	The number of CPUs found by the firmware does not correspond to the expected number based on the system model.	Replace the motherboard.

Error message or code	Description	Corrective action
<i>*FP button stuck</i>	The front panel Interrupt button is stuck.	1. Free the Interrupt button. 2. Replace the LED/LCD subassembly. 3. Replace the motherboard.
<i>*LCD won't open</i> <i>*LCD cmd stall</i> <i>*LCD cursor err</i> <i>*LCD data error</i>	The system LCD device is not operating correctly. All subsequent POST messages are displayed on the console.	Replace the control panel assembly.
<i>*Env-A rupt err</i> <i>*Env-B rupt err</i> <i>*Env-C rupt err</i> <i>*Env-D rupt err</i>	One of four environmental status monitors on your appliance cannot interrupt the processor, which prevents your appliance from properly monitoring its environmental health.	Replace the motherboard, as described in “ Replacing the motherboard tray ” on page 73.
<i>*Env-A stat err</i> <i>*Env-B stat err</i> <i>*Env-C stat err</i> <i>*Env-D stat err</i>	One of four environmental status monitors on your appliance indicates that it cannot properly monitor its environmental health.	Replace the motherboard, as described in “ Replacing the motherboard tray ” on page 73.
<i>*No power info</i>	The system is clearly running but no information about the power supply is being reported. Something is wrong with the power supply or the status reporting circuitry.	Replace the power supply or the motherboard.
<i>*Onboard battery low</i>	The lithium battery on the motherboard is low.	Replace the lithium battery on the motherboard, as described in “ Replacing the motherboard lithium battery ” on page 76.

Error message or code	Description	Corrective action
<i>*Overtemp alert</i>	The internal temperature sensor detected a dangerously high temperature that can damage the system components inside the chassis.	1. Power down your appliance. 2. Reduce the ambient temperature to 40° C or lower. 3. Make sure that you have proper air circulation through your appliance. If the temperature inside your appliance is not excessively hot, the sensor itself might have failed. 4. Replace the motherboard.
<i>*PCCRD init fail</i> <i>*PCCRD reg error</i> <i>*PCCRD seek err</i> <i>*PCCRD track err</i> <i>*PCCRD head err</i> <i>*PCCRD format err</i> <i>*PCCRD read err</i> <i>*PCCRD setup err</i>	These messages indicate that the control panel assembly failed.	Replace the CompactFlash card, the control panel assembly, or the motherboard.
<i>*SIO error</i>	Your appliance SIO or ISA bridge chip failed its timer interrupt test. The system cannot operate properly without this function.	Replace the motherboard.
<i>*Watchdog failed</i>	Your appliance watchdog reset hardware, used to reset your appliance from a system hang condition, is not functioning properly.	Replace the motherboard.

Error message or code	Description	Corrective action
<i>*Fan(s) failed</i>	A fan in your appliance stopped and should be replaced as soon as possible. The system console displays information about which fan stopped.	Replace the fan, as described in “ Replacing fan subassemblies ” on page 92.
<i>*Unknown System</i>	The system information in the backplane is incorrect.	Replace your appliance.
<i>*Post error. Rebooting...</i>	BMC has taken a CPU out of operation. Open Firmware is rebooting the system.	If your system is in a reboot loop, press Delete to return to the OK prompt and run diagnostics on your system. If pressing the Delete key several times does not end the reboot loop, press Ctrl-Backspace.

Boot error messages

When boot error messages appear

Boot error messages might appear after the hardware passes all POSTs and your appliance begins to load the operating system.

Boot error messages

The following table describes the error messages that might appear on the LCD if your appliance encounters errors while starting up.

Boot error message	Explanation	Corrective action
<i>No /etc/rc</i>	The /etc/rc file is corrupted.	1. At the hostname> prompt, enter setup. 2. As the system prompts for system configuration information, use the information you recorded in your appliance configuration information worksheet in the <i>Getting Started Guide</i>. For more information about your appliance setup program, see the <i>System Administration Guide</i>.
<i>No /etc/rc, running setup</i>	The system cannot find the /etc/rc file and automatically starts setup.	As the system prompts for system configuration information, use the information you recorded in your appliance configuration information worksheet in the <i>Getting Started Guide</i> . For more information about your appliance setup program, see the <i>System Administration Guide</i> .

Boot error message	Explanation	Corrective action
<i>Cannot initialize labels</i>	When the system tries to create a new file system, it cannot initialize the disk labels.	Usually, you do not need to create and initialize a file system; do so only after consulting Network Appliance Customer Support.
<i>Cannot read labels</i>	When your appliance tries to initialize a new file system, it has a problem reading the disk labels it wrote to the disks. This problem can be because the system failed to read the disk size, or the written disk labels were invalid	Usually, you do not need to create and initialize a file system; do so only after consulting Network Appliance Customer Support.
<i>Disk label processing failed</i>	Your appliance detects that the disk is not in the correct drive bay.	Make sure that the disk is in the correct bay.
<i>Dirty shutdown in degraded mode</i>	The file system is inconsistent because you did not shut down the system cleanly when it was in degraded mode.	Contact Network Appliance Customer Support for instructions about repairing the file system.
<i>Halted: firmware too old</i>	The disk firmware is an old version.	Update the disk firmware by entering the following command: disk_fw_update
<i>No disks</i>	The system cannot detect any FC-AL disks.	Verify that all disks are properly seated in the drive bays.
No disk controllers	The system cannot detect any FC-AL disk controllers.	Turn off your appliance power and verify that all NICs are properly seated in the appropriate expansion slots.
<i>Drive %s.%d not supported</i>	%s—The disk number; %d—The disk ID number. The system detects an unsupported disk drive.	1. Remove the drive immediately or the system drops down to the PROM monitor within 30 seconds. 2. Check the System Configuration Guide at http://now.netapp.com to verify support for your disk drive.

Boot error message	Explanation	Corrective action
<i>FC-AL loop down, adapter %d</i>	The system cannot detect the FC-AL loop or adapter.	1. Identify the adapter by entering the following command: storage show adapter 2. Turn off the power on your appliance and verify that the adapter is properly seated in the expansion slot. 3. Verify that all Fibre Channel cables are connected.
<i>Halted: Illegal configuration</i>	Incorrect cluster configuration.	1. Check the console for details. 2. Verify that all cables are correctly connected.
<i>File system may be scrambled</i>	One of the following errors causes the file system to be inconsistent: ◆ An unclean shutdown when your appliance is in degraded mode and when NVRAM is not working. ◆ The number of disks detected in the disk array is different from the number of disks recorded in the disk labels. The system cannot start when more than one disk is missing. ◆ The system encounters a read error while reconstructing parity. ◆ A disk failed at the same time the system crashed.	
		Contact Network Appliance Customer Support to learn how to start the system from a system boot diskette and repair the file system.
		Make sure that all disks on the system are properly installed in the disk shelves.
		Contact Network Appliance Customer Support for help.
<i>Invalid PCI card slot %d</i>	%d—The expansion slot number. The system detects a adapter that is not supported by Network Appliance.	Replace the unsupported adapter with an adapter that is included in the System Configuration Guide at http://now.netapp.com .

Boot error message	Explanation	Corrective action
<i>Configuration exceeds max PCI space</i>	The memory space for mapping PCI adapters has been exhausted, because either ◆ There are too many PCI adapters in the system ◆ An adapter is demanding too many resources	Verify that all expansion adapters in your appliance are supported. Contact Network Appliance Customer Support for help. Have a list ready of all expansion adapters installed in your appliance.
<i>No network interfaces</i>	The system cannot detect any network interfaces.	1. Turn off the system and verify that all NICs are seated properly in the appropriate expansion slots. 2. Run diagnostics to check the onboard Ethernet port. If the problem persists, contact Network Appliance Customer Support.
<i>ServerNet: wrong pci slot</i>	The system cannot detect the NVRAM adapter.	Make sure that the NVRAM adapter is securely installed in expansion slot 7.
<i>No NVRAM present</i>	<i>n</i> —The serial number of the NVRAM adapter. The NVRAM adapter is an early revision that cannot be used with the system.	Check the console for information about which revision of the NVRAM adapter is required. Replace the NVRAM adapter.
<i>NVRAM #n downrev</i>	<i>%d</i> —The amount of memory on the NVRAM adapter. The specified size is not supported.	Verify that the system has 256 MB of NVRAM.

Remote management card email notifications

When the remote management card sends out email notification

You can configure your remote management card to send email to designated email addresses, in addition to Autosupport at Network Appliance. When enabled, your remote management card sends email notification to you if your system fails.

The following message is an example of an email notification sent by your remote management card:

Subject: RMC ALERT 00000 03200 Down system

Message: 03200 24-jul-2002 21:59:25 Down system

System Information

Server Name: RMC ALERT

Server URL: -

System Info:

SYSTEM_ID='0050383432'

SYS_SERIAL_NUM='30163'

MB_SERIAL_NUM='30063'

MODEL='FAS960'

Server ID: 00000

Server IP:

Card Information

Card Name: RMC

Card URL: http://172.22.6.40

Card IP: 172.22.6.40

Card Serial Number: DE42090466

Card Version: RMC_NA_1.1

Contact: postmaster@lab.netapp.com

Location: hw-165

Phone Number: -

Note

You cannot use the remote management card to access your appliance.

Remote management card messages

The following table explains the error messages your remote management card sends.

Error message	Action
<i>Down System</i>	1. Gather information from your LCD and console. 2. Contact Network Appliance Customer Support.
<i>Boot error</i>	1. Gather information from your LCD and console. 2. Check to see whether your CompactFlash unit is inserted correctly into the Control Panel Assembly. 3. Contact Network Appliance Customer Support.
<i>POST error</i>	1. Gather information from your LCD and console. 2. Run diagnostics on your system. 3. Contact Network Appliance Customer Support.

Operational error messages

When operational error messages appear

These error messages might appear on the system console or LCD when the system is operating, when it is halted, or when it is restarting because of system problems.

Error messages

The following table describes other error messages that might appear on the LCD if your appliance encounters errors while starting up or during operation.

Error message	Explanation	Fatal?	Corrective action
<i>Disk n is broken</i>	<i>n</i> —The RAID group disk number. The solution depends on whether you have a hot spare in the system.	No	See the <i>System Administration Guide</i> for information about how to locate a disk based on the RAID group disk number and how to replace a faulty disk.
<i>Fans stopped; replace them</i>	One of the fan subassemblies of your appliance failed.	No	Replace the failed fan subassembly as soon as possible.
<i>Power supply degraded</i>	One of the power supply units is turned off, was removed from your appliance, or failed.	No	Verify that both power supplies are installed and turned on. If you still get this error, replace the power supplies one at a time to determine the failed power supply.
<i>Dumping core</i>	The system is dumping core after a system crash.	Yes	Write down the system crash message on the system console and report the problem to Network Appliance Customer Support.

Error message	Explanation	Fatal?	Corrective action
<i>Disk hung during swap</i>	A disk error occurred as you were hot swapping a disk.	Yes	1. Disconnect the disk from the power supply by opening the latch and pulling it half-way out. 2. Wait 15 seconds to allow all disks to spin down. 3. Reinstall the disk. 4. Restart the system by entering the following command: boot
<i>Error dumping core</i>	The system cannot dump core during a system crash and restarts without dumping core.	Yes	Report the problem to Network Appliance Customer Support.
<i>Panicking</i>	The system is crashing. If the system does not hang while crashing, the message <code>Dumping core</code> appears.	Yes	Report the problem to Network Appliance Customer Support.
<i>System too hot</i>	The temperature sensor indicates that the system temperature is too high.	Yes	Verify that the ventilation holes on the top cover of the system are not blocked. If the ventilation holes are not blocked and the problem persists, contact Network Appliance Customer Support for help.

Interpreting LED messages

Types of LEDs

Two sets of LEDs provide you with basic information about how your system is running. These sets give high-level device status at a glance, along with network activity:

- ◆ LEDs visible on the front of your appliance with the bezel in place
- ◆ LEDs visible on the back of your appliance

For detailed information

For detailed information about the LEDs, see the following sections:

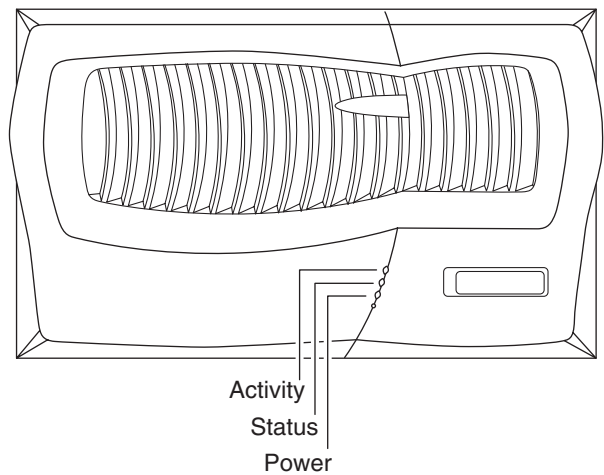
- ◆ [“Control panel assembly LEDs”](#) on page 54
- ◆ [“FC-AL/FC HBA LEDs”](#) on page 56
- ◆ [“GbE NIC LEDs”](#) on page 58
- ◆ [“DAFS adapter LEDs”](#) on page 61
- ◆ [“Remote management card LEDs”](#) on page 62
- ◆ [“Power supply LEDs”](#) on page 64

Interpreting LED messages

Control panel assembly LEDs

Location of the LEDs

Control panel assembly LEDs are visible from the front of your appliance.



What the LEDs mean

The following table describes what the control panel assembly LEDs mean.

LED label	Status indicator	Description
Activity	Green	The system is operating and is active.
	Blinking	The system is actively processing data.
	Off	No activity is detected.

LED label	Status indicator	Description
Status	Green	The system is operating normally.
	Amber	The system halted or a fault occurred. The fault is displayed in the LCD. Note_____ This LED remains lit during boot, while the operating system loads. _____
Power	Green	The system is receiving power.
	Off	The system is not receiving power.

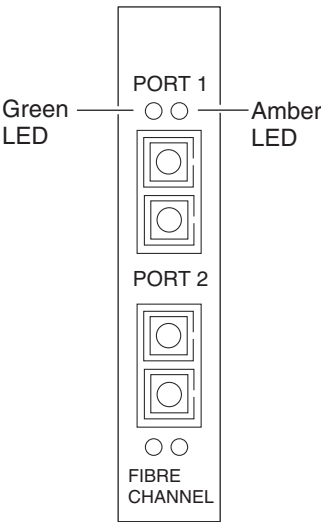
Interpreting LED messages

FC-AL/FC HBA LEDs

Location of the LEDs

The dual-port Fibre Channel Host Bus Adapter (HBA) can be used in two modes: Initiator and Target. The LEDs on both cards are the same color and in the same location, but the Status and Activity indications are different.

The following illustration shows the LED locations for a dual-port Fibre Channel HBA.



What the initiator mode LEDs mean

The following table describes the LEDs on the dual-port Fibre Channel HBA in Initiator mode.

Green	Amber	Indicates...
On	On	Power
Off	Flashing	Loss of synch
Off	On	Signal acquired
On	Off	Ready

Green	Amber	Indicates...
Flashing	Flashing	Adapter firmware error

What the target mode LEDs mean

The following table describes the LEDs on the Fibre Channel HBA in Target mode.

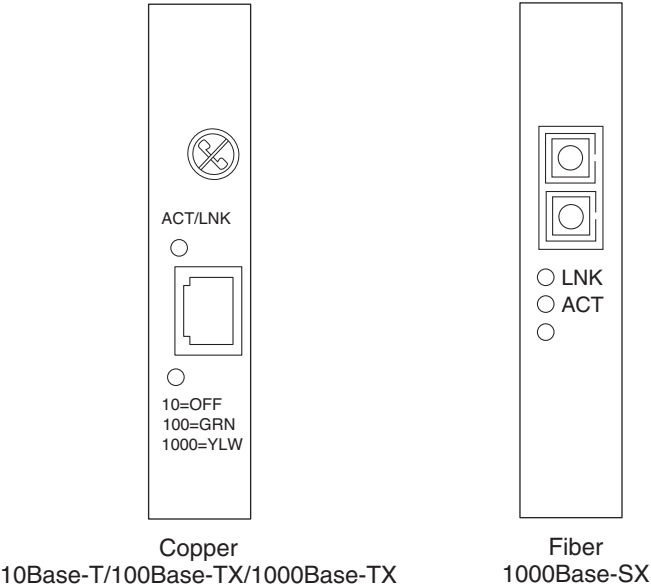
Green	Amber	Indicates...
On	On	Power On
Off	Flashing	Loss of synch
Off	On	Signal acquired
On	Off	Online
Flashing	Flashing	Adapter firmware error

Interpreting LED messages

GbE NIC LEDs

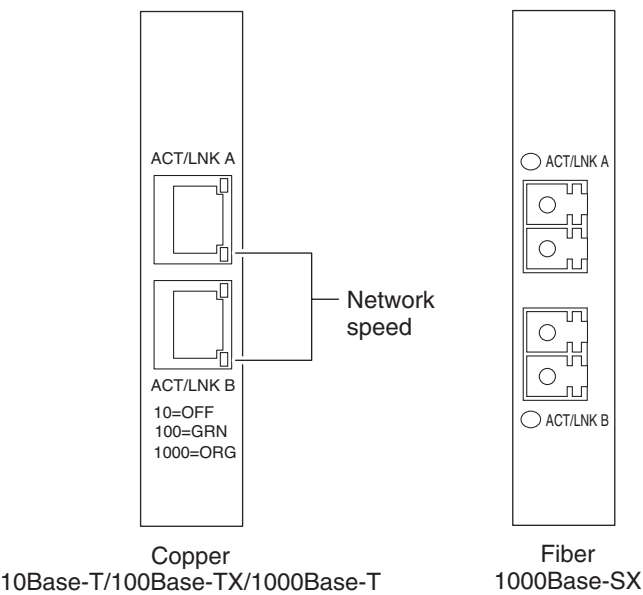
Location of the LEDs for single port GbE NICs

The following illustration shows the location of LEDs for both the copper and fiber single port GbE NICs.



**Location of LEDS
on dual-port GbE
NICs**

The following illustration shows the location of LEDs for both the copper and fiber dual-port GbE NICs.



**What the copper
GbE NIC LEDs
mean**

The following table explains what the LEDs on the copper GbE NIC mean.

LED type	Status indicator	Description
ACT/LNK	Green	A valid network connection is established.
	Blinking green	Data is being transmitted across the network.
	Off	There is no network connection present.
10=OFF	Off	Data transmits at 10 Mbps.
100=GRN	Green	Data transmits at 100 Mbps
1000=YLW	Yellow	Data transmits at 1000 Mbps

What the fiber GbE NIC LEDs mean

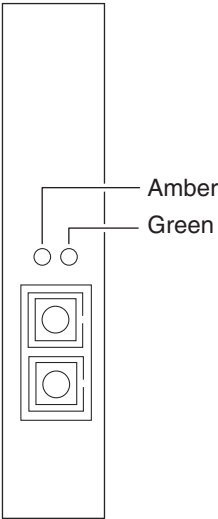
The following table explains what the LEDs on the fiber GbE NIC mean.

LED type	Status indicator	Description
LNK	On	A valid network connection is established.
	Off	There is no network connection present.
ACT	On	Data is being transmitted across the network.
	Off	There is no network activity present.

Interpreting LED messages

DAFS adapter LEDs

Location of LEDs The following illustration shows the LED locations for a DAFS network adapter.



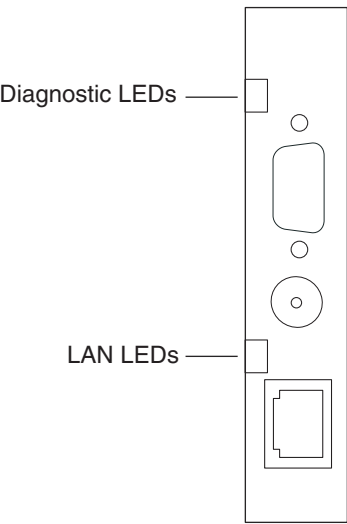
What the LEDs mean The following table describes the LED locations for a DAFS network adapter.

Green	Amber	Indicates...
On	Off	Link.
Off	Off	No link.
Flashing	Off	HBA asserted/panicked.
On	Flashing or On	HBA transmitting/receiving data.

Remote management card LEDs

Location of LEDs

The following illustration shows the location of the remote management card LEDs.



What the LEDS mean

The following table explains what the LEDs on the remote management card mean.

LED type	Status Indicator	Description
LAN connection LEDs	Green	The LAN connection is valid.
	Red	There is no connectivity present.
Diagnostic LEDs	Blinks code	This LED flashes red consecutively for the first digit of the code, then subsequently pauses and blinks once with a pause between blinks.

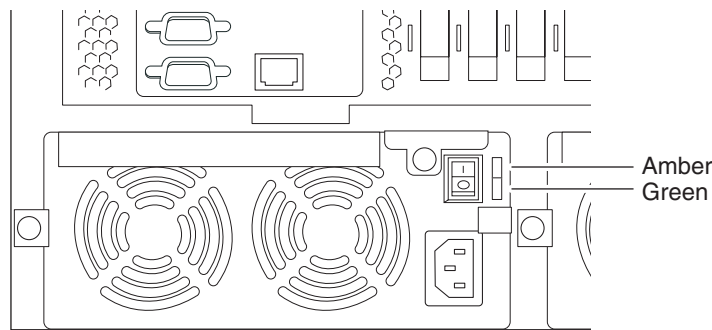
LED type	Status Indicator	Description
	3111	Error occurred during the LAN loopback test.
	4111	Incorrect data returned during the UART1 test (Universal Asynchronous Receiver/Transmitter).
	4112	No data returned during UART1 test.
	4211	Incorrect data returned during UART2 test.
	4212	No data returned during UART1 test.
	4311	Incorrect data returned during UART485 test.
	4312	No data returned during UART1 test.

Interpreting LED messages

Power supply LEDs

Location of LEDs

The following illustration shows the location of the LEDs on your appliance power supplies.



What the LEDs on your power supplies mean

The following table explains what the LEDs on your appliance power supplies mean.

LED type	Amber	Green	Description
Power supply LED	On	On	The AC power source is good and is powering the system.
	Off	Blinking green	The AC power source is good and the power supply is in standby mode.
	On	Off	The AC power source is good, but no power is reaching the power supply or the power supply failed.
	On	Off	There is no power to this power supply.

About this chapter

This chapter lists field-replaceable units (FRUs) that are available for your appliance, and describes the tasks you must complete to replace each type of FRU.

Topics in this chapter

This chapter discusses the following topics:

- ◆ [“Field-replaceable unit overview”](#) on page 66
- ◆ [“Replacing the cable management tray”](#) on page 67
- ◆ [“Opening the PCB carrier”](#) on page 69
- ◆ [“Removing the PCB carrier”](#) on page 71
- ◆ [“Replacing the motherboard tray”](#) on page 73
- ◆ [“Replacing the motherboard lithium battery”](#) on page 76
- ◆ [“Replacing the memory card assembly”](#) on page 79
- ◆ [“Replacing SDRAM DIMMs on the memory card assembly”](#) on page 82
- ◆ [“Installing or replacing expansion adapters”](#) on page 85
- ◆ [“Closing the PCB carrier”](#) on page 91
- ◆ [“Replacing fan subassemblies”](#) on page 92
- ◆ [“Replacing the power supplies”](#) on page 96
- ◆ [“Replacing the control panel subassembly”](#) on page 100

Field-replaceable unit overview

About FRUs

A FRU is a component in your appliance that you can replace if it fails. FRUs must be purchased through Network Appliance or from an authorized reseller.

Units you can replace

The following list specifies the FRUs in your appliance:

- ◆ Cable management bracket
- ◆ Motherboard tray, including PCB carrier
- ◆ Motherboard lithium system battery
- ◆ Memory card assembly
- ◆ DDR SDRAM DIMMs on the memory card assembly
- ◆ Expansion adapters
 - ❖ NVRAM 4 (nonvolatile random access memory) adapter
 - ❖ Gigabit Ethernet (GbE) network adapter
 - ❖ 10Base-T/100Base-TX/1000Base-T GbE network adapter
 - ❖ Remote management adapter
 - ❖ FC-AL adapters
 - ❖ Fibre Channel target mode adapter
 - ❖ DAFS network adapter
 - ❖ Fibre Channel tape back up adapter
 - ❖ SCSI tape backup adapter
 - ❖ IB cluster interconnect adapter
- ◆ Fan assembly
- ◆ Power supply assemblies
- ◆ Bezel
- ◆ Control panel assembly
- ◆ CompactFlash Card

What to do if the failed item isn't on the FRU list

If you need to replace a component that is not in the FRU list, call Network Appliance Customer Support for instructions.

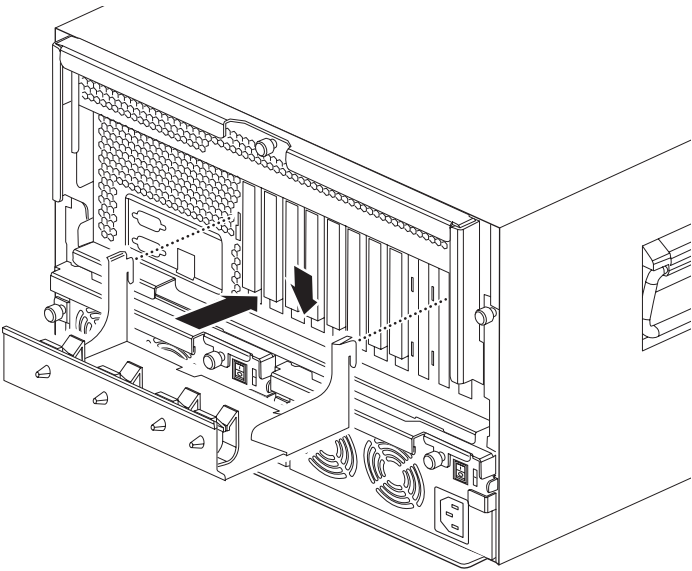
Replacing the cable management tray

About replacing the cable management tray

The cable management tray functions to direct all network cables away from the back of your appliance. You must remove it to replace FRUs inside the PCB carrier.

Removing the cable management tray

To remove the cable management tray, complete the following steps, using the figure for reference.



Step	Action
1	Remove all cables from the cable management tray.
2	Unhinge the cable management tray from the back of your appliance by lifting the tray, and then pulling out the tabs from the slots on the PCB carrier.

Installing the cable management tray

To install your cable management tray, complete the following steps.

Step	Action
1	Align the tabs on the tray with the slots on the back of your appliance.
2	Insert the tabs on the tray into the slots and secure it by gently lowering the hinges and locking the tabs into place.
3	After you connect all the cables to your appliance, secure them to your appliance through the tray cable holders.

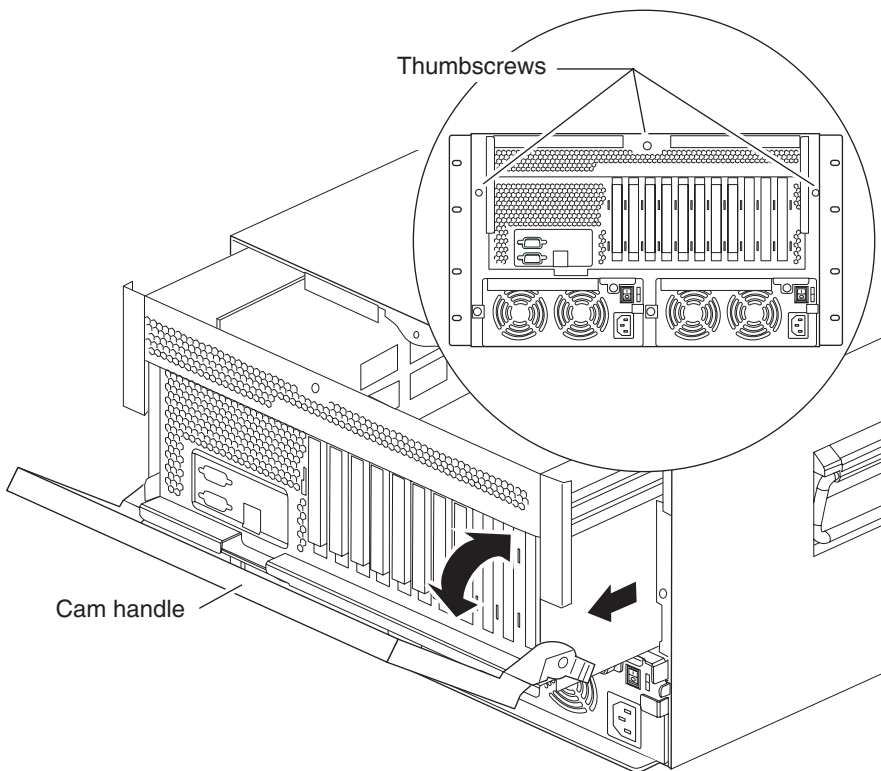
Opening the PCB carrier

Reasons to open the PCB carrier

You open the PCB carrier to access the motherboard tray, memory card assembly, expansion adapters, and other FRUs.

Opening the PCB carrier

To open the PCB carrier for access to the internal FRUs, complete the following steps, using the figure for reference.



Step	Actions
1	Shut down your 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. Note _____ You must perform a clean shutdown to replace components inside the PCB carrier of your appliance.
2	Turn off and disconnect the power to your appliance.
3	Put on the antistatic wrist strap and attach the grounding leash to the chassis.
4	Remove the cable management tray.
5	Loosen the three thumbscrews on the back panel of the PCB carrier.
6	Carefully pull the cam handle so that the PCB carrier slides out from the chassis until the carrier tabs click to lock the slide rails in place. The PCB carrier has a travel distance of approximately 19 inches (48.26 centimeters).

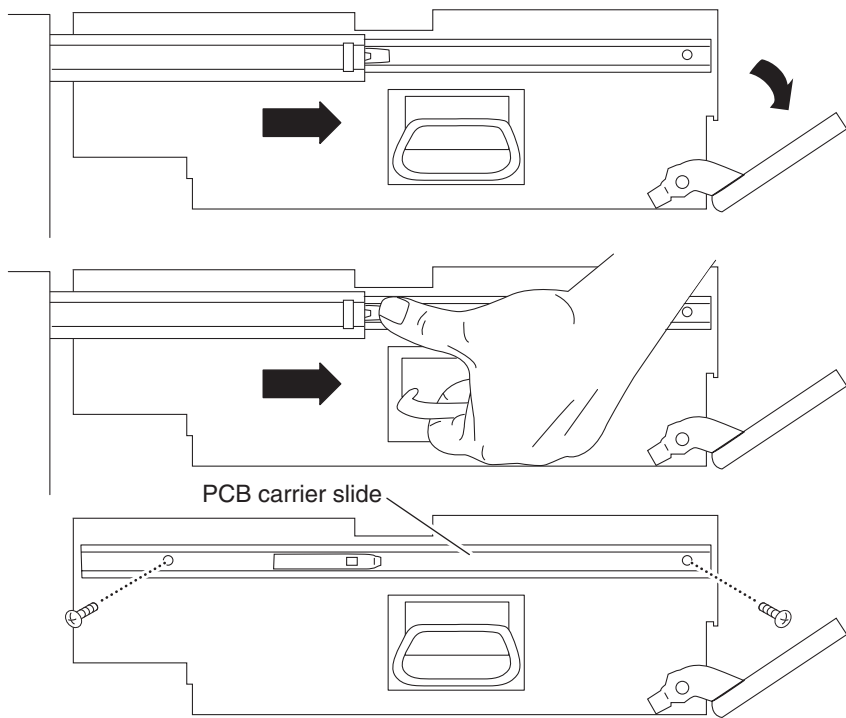
Removing the PCB carrier

Reasons for removing the PCB carrier

You must remove the PCB carrier from your appliance if you are replacing the motherboard tray. You can also remove the PCB carrier to replace components, such as the memory card assembly and expansion adapters.

Removing the PCB carrier

To remove the PCB carrier from your appliance, complete the following steps, using the figure for reference.



Step	Action
1	Open the PCB carrier by following the procedure described in “Opening the PCB carrier” on page 69.

Step	Action	
2	With the PCB carrier completely extended, press inward on the carrier tabs on each slide rail and pull and lift the PCB carrier out of the chassis. Make sure that you remove the slide rails on the PCB carrier before sending it for replacement.	
3	Support the PCB carrier with both hands, and set it aside.	
4	If you are...	Then...
	Replacing the motherboard tray	Go to “ Replacing the motherboard tray ” on page 73.
	Not replacing the motherboard tray, but you are replacing units on it	Go to the appropriate procedure for the unit you are replacing: ◆ “Replacing the motherboard lithium battery” on page 76 ◆ “Replacing the memory card assembly” on page 79 ◆ “Installing or replacing expansion adapters” on page 85

Replacing the motherboard tray

About replacing the motherboard tray

Replacing the motherboard consists of the following procedures:

- ◆ “[Removing the motherboard tray](#)” on page 73
- ◆ “[Installing the motherboard tray](#)” on page 74

Removing the motherboard tray

To remove the motherboard tray, complete the following steps.

Caution_____

To prevent shorting the NVRAM 4 battery, you must perform this procedure on a nonconductive surface. Shorting the NVRAM 4 battery causes data loss.

Step	Action
1	Shut down your appliance by entering the following command at the console: <code>halt</code>
2	Open the PCB carrier by following the procedure described in “ Opening the PCB carrier ” on page 69. Note _____
3	Remove all adapters by following Steps 2 through 6 of the procedure described in “ Removing an existing expansion adapter ” on page 86. If your PCI expansion adapters are secured by screws, set the screws and adapters aside for later use.
4	Remove the memory card assembly by following the procedure described in “ Replacing the memory card assembly ” on page 79.

Step	Action
5	Remove the PCB carrier from the chassis by following Steps 2 through 4 of the procedure described in “ Removing the PCB carrier ” on page 71.
6	Unscrew the slides from the PCB carrier using a #2 Phillips screwdriver and set them aside for your replacement motherboard tray. The motherboard tray includes the PCB carrier, empty of all other FRUs.

Installing the motherboard tray

To install the motherboard tray, complete the following steps.

Step	Action
1	Using a #2 Phillips screwdriver, secure the rails on the side of the PCB carrier.
2	Install the memory card assembly by following the procedure described in “ Replacing the memory card assembly ” on page 79.
3	Reinstall all other adapters into the expansion slots on the motherboard by following Steps 3 through 6 of the procedure described in “ Installing an expansion adapter ” on page 88.
4	Pull the inner slides from your appliance’s chassis to full extension, then carefully align the PCB carrier rails with the inner slides.
5	Slide the PCB carrier into your appliance chassis. Note_____ If the PCB carrier gets stuck while the inner slides are extended, reach inside your appliance chassis and hold the locking mechanism straight so that the slides are not obstructed. _____
6	Reconnect your appliance to your network.
7	Reconnect your appliance to AC power and power it on.

Step	Action
8	Go to the NOW site at http://now.netapp.com to download the latest firmware.
9	Run diagnostics for your system. See the <i>Diagnostics Guide</i> for more information.

Replacing the motherboard lithium battery

About replacing the motherboard lithium battery

Replacing the 3.3V lithium battery on the motherboard consists of the following procedures:

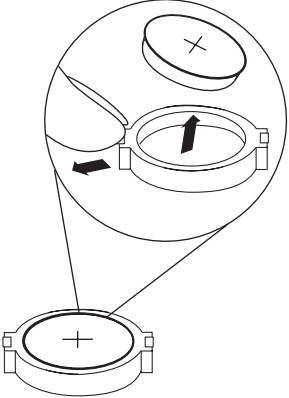
- ◆ “[Removing the motherboard lithium battery](#)” on page 76
- ◆ “[Installing the motherboard lithium battery](#)” on page 77

Removing the motherboard lithium battery

To remove the motherboard lithium battery, complete the following steps.

Caution—————
You must perform a clean shutdown before you replace your motherboard battery.

Step	Action
1	Open the PCB carrier. Follow the procedure in “Opening the PCB carrier” on page 69. Caution————— Put on an antistatic wrist strap and attach the grounding leash to your appliance chassis.

Step	Action
2	Carefully lift up the battery toward the open side of the battery holder, as shown. 

Installing the motherboard lithium battery

To install the motherboard lithium battery, complete the following steps.

WARNING

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to manufacturer's instructions.

AVERTISSEMENT

Il y a danger d'explosion s'il y a remplacement incorrect de la pile. Remplacer la pile seulement avec une pile du même type ou d'un type équivalent recommandé par le fabricant. Mettre au rebut les piles usagées selon les instructions du fabricant.

ACHTUNG

Explosionsgefahr bei unsachgemäßem Austausch der Batterie. Die Batterien nur durch denselben oder einen vom Hersteller empfohlenen gleichwertigen Typ ersetzen. Gebrauchter Batterien nach Angaben des Herstellers loswerden.

Step	Action
1	Turn the battery so that the positive side is up (marked with a “+”).
2	Push the battery through the open side of the battery holder so that it sits flush inside the battery holder.
3	Go to “ Closing the PCB carrier ” on page 91.

Replacing the memory card assembly

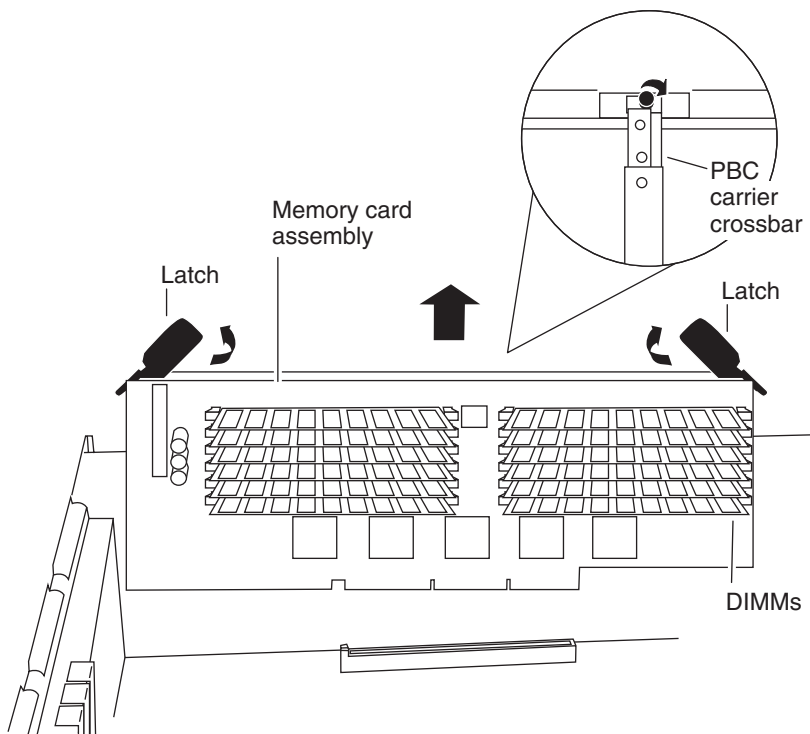
About replacing the memory card assembly

The memory card assembly contains the SDRAM DIMMs of your system and is connected to the motherboard. Replacing the memory card assembly consists of the following procedures:

- ◆ “[Removing the memory card assembly](#)” on page 79
- ◆ “[Installing the memory card assembly](#)” on page 80

Removing the memory card assembly

To remove the memory card assembly, complete the following steps, using the figure for reference.



Step	Action
1	Open the PCB carrier. Follow the procedure in “ Opening the PCB carrier ” on page 69.
2	Lift the PCB carrier crossbar from the top of the inside of the PCB carrier by loosening the thumbscrew above the memory card assembly.
3	Pull apart the latches on both sides of the memory card assembly to release it from the PCB carrier.
4	Carefully pull the memory card assembly from its riser slot.
5	Set the memory card assembly aside in an antistatic bag.

Installing the memory card assembly

To install the memory card assembly, complete the following steps.

Step	Action
1	Hold the memory card assembly by the sides to avoid damaging the components.
2	Carefully insert the memory card assembly straight into its riser slot. The memory card assembly fits tightly in the slot, but should go in easily. If not, realign the memory card assembly with its riser slot and try again. Caution _____ Visually inspect the memory card assembly to verify that it is evenly aligned and fully inserted into the slot; otherwise, the edge connector on the memory card assembly does not make complete contact with the slot.
3	Push carefully, but firmly on the top edge of the memory card assembly until the latches snap into place.
4	Lower the PCB carrier crossbar and secure it on top of the memory card assembly by tightening the thumbscrew.

Step	Action
5	Go to “ Closing the PCB carrier ” on page 91.
6	After turning on your appliance, run diagnostics on your new memory card assembly. See the <i>Diagnostics Guide</i> for more information.

Replacing SDRAM DIMMs on the memory card assembly

About replacing SDRAM DIMMs

This section provides the supported memory configurations for your appliance and describes the procedures for replacing the SDRAM DIMMs on the memory card assembly.

Replacing the SDRAM DIMMs on the memory card consists of the following procedures:

- ◆ “[Removing an SDRAM DIMM](#)” on page 82
- ◆ “[Installing an SDRAM DIMM](#)” on page 83

Supported memory configurations

The following table lists the supported memory configurations for your appliance.

Appliance model	DIMM slots	Required memory configuration
FAS940	J40, J43	3.3V, registered, 8 x 512 MB SDRAM DIMMs
FAS960	J40, J43	3.3V, registered, 12 x 512 MB SDRAM DIMMs

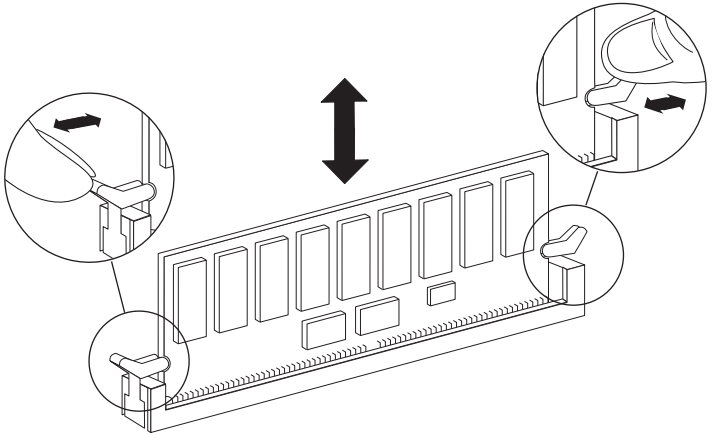
Caution

All DIMMs must be listed on the Network Appliance Approved Parts List. Contact Network Appliance Sales to obtain this list. Unapproved DIMMs have not been tested for reliability and might cause system downtime.

Removing an SDRAM DIMM

To remove an SDRAM DIMM, complete the following steps.

Step	Action
1	Open the PCB carrier. Follow the procedure in “ Opening the PCB carrier ” on page 69.

Step	Action
2	Remove the memory card assembly, as described in “ Removing the memory card assembly ” on page 79.
3	Locate the DIMM that you want to remove.
4	Push apart the latches on either side of the DIMM to release the DIMM from its slot, as shown. 
5	Pull the DIMM out of the slot.
6	Set the DIMM aside in an antistatic bag.

Installing an SDRAM DIMM

To install an SDRAM DIMM, complete the following steps.

Step	Action
1	Locate the DIMM slot for the DIMM you are installing.
2	Hold the DIMM by its top corners to avoid damaging the components.

Step	Action
3	Insert the DIMM straight into the slot. The DIMM fits tightly in the slot, but should go in easily. If not, realign the DIMM with the slot and try again. Caution_____ Visually inspect the DIMM to verify that it is evenly aligned and fully inserted into the slot; otherwise, the edge connector on the DIMM does not make complete contact with the slot. _____
4	Push carefully, but firmly on the top edge of the DIMM until the latches snap into place.
5	Install the memory card assembly, as described in “ Installing the memory card assembly ” on page 80.
6	Go to “ Closing the PCB carrier ” on page 91.
7	After turning on your system, run diagnostics on the SDRAM DIMMs. See the <i>Diagnostics Guide</i> for more information.

Installing or replacing expansion adapters

About installing or replacing expansion adapters

Replacing an expansion adapter or installing a new expansion adapter consists of one or both of the following procedures:

- ◆ “[Removing an existing expansion adapter](#)” on page 86
- ◆ “[Installing an expansion adapter](#)” on page 88

Expansion adapters used

Your appliance use the following expansion adapters:

- ◆ NVRAM 4 adapter
- ◆ FC-AL adapters or dual Fibre Channel adapters for disk storage
- ◆ Tape adapters
 - ❖ SCSI
 - ❖ FC-AL
- ◆ IB cluster adapter

Slot assignments for expansion adapters

If you are adding expansion adapters to your filer, the System Configuration Guide at <http://now.netapp.com> provides current configuration information for the following:

- ◆ Expansion slots that are available on your appliance
- ◆ Supported adapters
- ◆ Expansion slot assignments

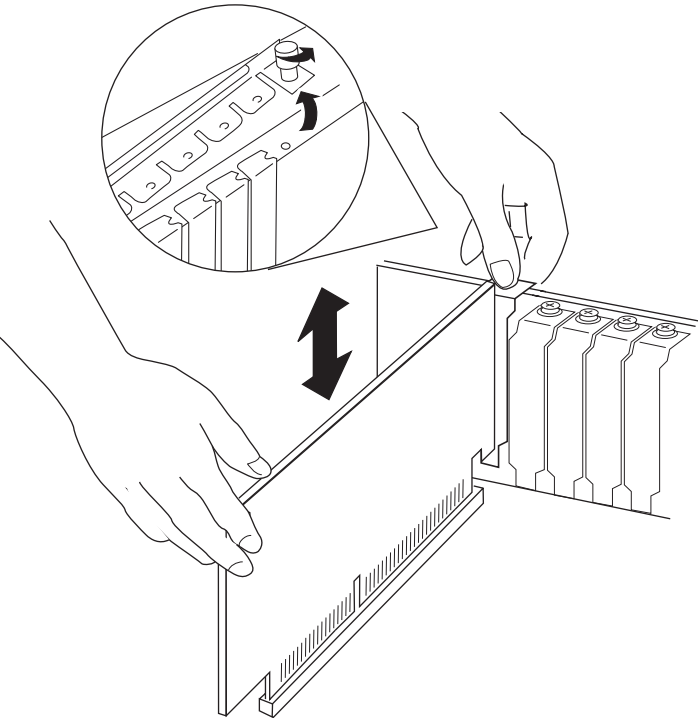
Caution

Install only supported expansion adapters in the assigned expansion slots. To ensure compatibility, performance, and reliability, you must obtain expansion adapters for your filer from Network Appliance or an authorized reseller.

Removing an existing expansion adapter

To remove existing expansion adapters, complete the following steps.

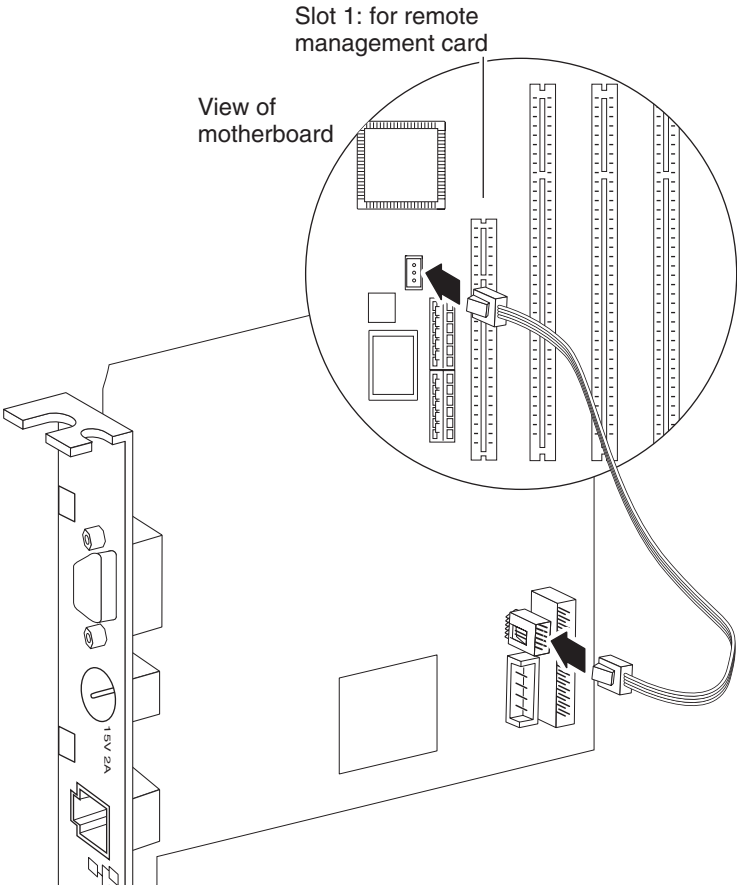
Step	Action	
1	Open the PCB carrier. Follow the procedure in “ Opening the PCB carrier ” on page 69.	
2	Unlatch the PCI clamp arm and pull it aside. Note _____ Your system might require that you screw down PCI expansion adapters. If so, remove and set aside any screws for PCI expansion adapters.	
3	Note which cables (if any) are connected to the connectors on the faceplate of the expansion adapter before disconnecting the cables. Caution _____ Do not disconnect or connect SCSI cables while your appliance is on. You could cause permanent damage to the hardware.	
4	If you are replacing the...	Then...
	NVRAM 4 adapter	Remove the PCB carrier crossbar by loosening the thumbscrew and lifting the crossbar away from the top of the PCB carrier. Caution _____ If you did not perform a clean shutdown using the <code>halt</code> command, disconnecting the NVRAM battery from the NVRAM 4 adapter results in data loss.
	Remote administration card	Carefully unplug the internal cable that connects to the motherboard.
5	Remove the PCI clamp-down bracket holding the expansion adapter faceplate to the back panel bracket and save it for reinstalling the adapter.	

Step	Action	
6	Pull upward on the top edge of the expansion adapter and lift it out of the chassis, as shown. 	
7	If you are...	Then...
	Not installing a replacement expansion adapter	Install a slot cover for the empty PCI slot.
	Installing a replacement expansion adapter	Go to “ Installing an expansion adapter ” on page 88.

Installing an expansion adapter

To install an expansion adapter, complete the following steps.

Step	Action	
1	If you are...	Then...
	Installing a new adapter	Take the adapter out of the antistatic bag and discard the bag.
	Installing a replacement adapter	Take the replacement adapter out of the antistatic bag and place the used adapter into that bag.
2	Reinstalling all other adapters	Go to Step 4. You reinstall adapters when you replace the motherboard.
3	Holding the adapter by its top edge, with the faceplate near the back of the machine, lower the adapter into the slot until its connector edge meets the grooves in the expansion slot. The faceplate of the adapter should be in position against the back panel, and should cover the endplate slot on the back panel.	
4	Press carefully on the top edge of the adapter until the edge connector is seated in the expansion slot.	
5	If applicable, replace the faceplate screw to secure the adapter to the back panel.	
6	Reconnect the cables to the external connectors on the replacement expansion adapter.	

Step	Action	
7	If you are...	Then...
	Replacing the NVRAM 4	Lock down the PCB carrier crossbar over the NVRAM 4, then secure the crossbar to the side of the PCB carrier by tightening the thumbscrew.
	Replacing the remote management card	Remove the connector from the motherboard, as shown in the following illustration.
 Slot 1: for remote management card View of motherboard		

Step	Action
8	Go to “ Closing the PCB carrier ” on page 91.
9	After turning on your appliance, run diagnostics on the expansion adapter you replaced. See the <i>Diagnostics Guide</i> for more information.

Closing the PCB carrier

Closing the PCB carrier

To close the PCB carrier, complete the following steps.

Step	Action
1	If you removed the PCB carrier, screw in the carrier rails on each side of the PCB carrier, and then carefully place it on the extended slides of your appliance chassis so that the tabs on the rails fit into the slots on the slides.
2	Using the cam handle, slide the PCB carrier into your appliance chassis. If the PCB carrier is locked in position, press inward on the carrier tabs on each carrier slide rail while pushing the PCB carrier into the chassis.
3	Tighten the three thumbscrews on the back of the chassis.
4	Reinstall the cable management tray by following the procedure described in “ Replacing the cable management tray ” on page 67
5	Reconnect any cables you removed from the back panel of your appliance.
6	Reconnect the power to your appliance, and if applicable, your disk shelves.
7	Turn on your disk shelves, your tape backup, and fibre channel switches, if applicable, and then your appliance.
8	Interrupt the boot process by pressing the Delete key during the memory test.
9	Run diagnostics by entering the following command at the ok> prompt: sys-diag See the <i>Diagnostics Guide</i> for more information.
10	Run the specific diagnostics that apply to the unit you installed or replaced.

Replacing fan subassemblies

About replacing fan subassemblies

Replacing a fan subassembly consists of the following procedures:

- ◆ “[Removing a subassembly](#)” on page 93
- ◆ “[Installing a subassembly](#)” on page 95

Identifying the subassembly to replace

Each of the three fan subassemblies secured to the front of the chassis contains two fans. If a problem occurs in a fan, the system console displays an error message identifying the specific fan that has the problem, rather than the subassembly it belongs to.

Note

You cannot replace the individual fan; you must replace the subassembly.

The following table lists the individual fan numbers that the console might display and their corresponding subassemblies.

Fan number (as indicated on your console)	Subassembly (as indicated on your chassis)
Baseboard fan 1	Subassembly 1
Baseboard fan 2	
Baseboard fan 3	Subassembly 2
Baseboard fan 4	
Baseboard fan 5	Subassembly 3
Baseboard fan 6	

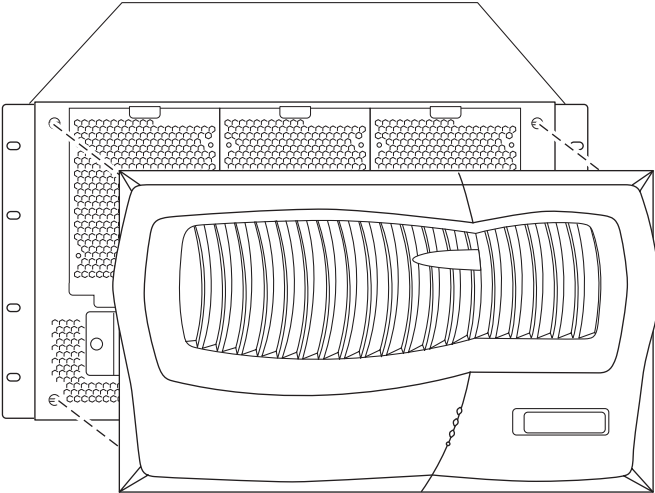
Note

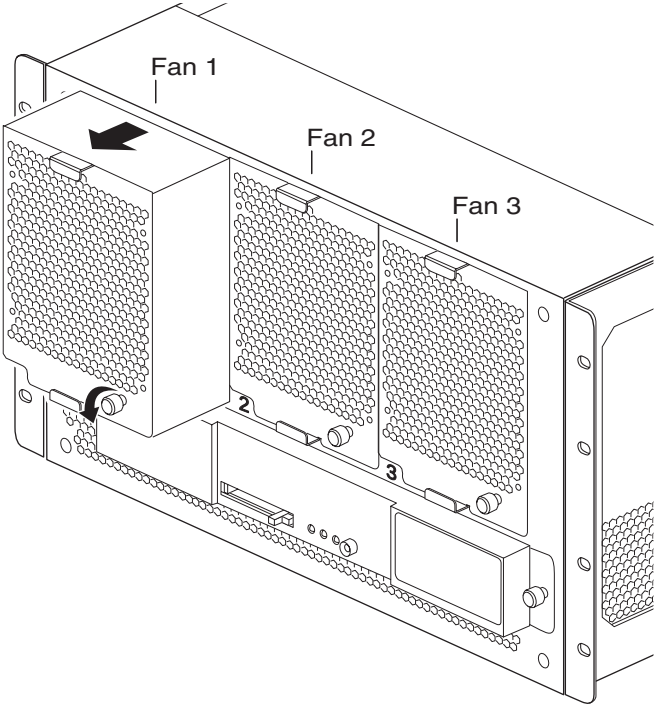
To maintain UL, CSA, and TUV safety certifications, you must obtain replacement fan subassemblies from Network Appliance. Using unapproved replacement fan subassemblies voids the safety certifications.

Removing a subassembly

To remove a subassembly, complete the following steps.

Note Because the three subassemblies are hot swappable, there is no need to shut down your appliance. There is a two-minute window for replacing fans.

Step	Action
1	From the console, note the identification of the fan that failed and identify the subassembly that it belongs to.
2	Pull the bezel straight off the front panel of your appliance by using the grooves on the left and right edges of the bezel. 
3	Using a #1 Phillips screwdriver, loosen the thumbscrews on the chassis fan subassembly that failed.

Step	Action
4	Using both the upper and lower lips, pull the subassembly out of your appliance chassis. The sheet metal below the subassemblies is silk-screened with the labels Fan 1, Fan 2, and Fan 3. Note——— If your appliance is running Data ONTAP™ software, it reports a failure for the removed fan subassembly. 
5	Set the subassembly aside.

Installing a subassembly

To install a subassembly, complete the following steps.

Step	Action
1	Slide the subassembly straight into your appliance chassis.
2	Tighten the subassembly thumbscrews.
3	Align the pins on the bezel with the holes on the front panel of your appliance, then push the bezel straight onto the front panel.
4	Reconnect and turn on the power to your appliance.
5	Interrupt the boot process by pressing the Delete key during the memory test.
6	Run diagnostics by entering the following command at the ok> prompt: sys-diag See the <i>Diagnostics Guide</i> for more information.
7	Run the diagnostics that apply to the unit you installed or replaced.

Replacing the power supplies

About replacing a power supply

Your appliance has two power supplies in two separate power supply bays at the back.

Note

Because you have two power supplies that are hot swappable, you do not have to shut down your appliance when you are replacing one of them.

Replacing a power supply consists of the following procedures:

- ◆ “[Removing a power supply](#)” on page 96
- ◆ “[Installing a power supply](#)” on page 98

Power supply compatibility

Be aware of the following caution regarding the compatibility between the two power supplies in your appliance.

Caution

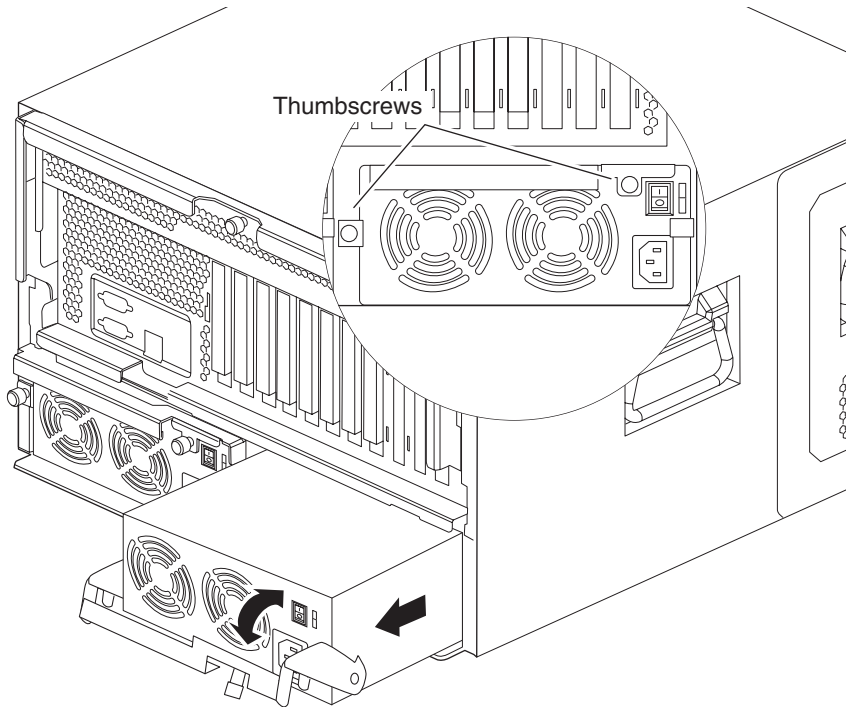
When replacing a power supply, be sure not to mix power supplies from different systems. The two power supplies in your appliance must have the same part number.

Removing a power supply

To remove a power supply, complete the following steps, using the figure for reference.

WARNING

To avoid an electric shock hazard, you must disconnect the power supply before removing it from your appliance.



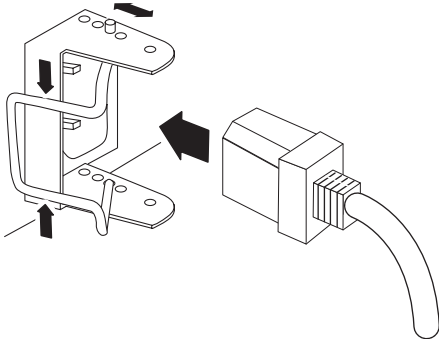
Step	Action
1	From the console or LCD screen, identify the failed power supply. Note _____ The power supply identifiers, PS1 and PS2, are silk-screened onto your appliance chassis.
2	Put on the antistatic wrist strap and grounding leash.
3	Turn off the switch on the power supply that you are replacing.
4	Lift up the clip lock and unplug the power cord from your appliance power supply.
5	Loosen the power supply thumbscrews by turning each thumbscrew counterclockwise.

Step	Action
6	Use the cam handle to slide the power supply out of the power supply bay. WARNING _____ The power supply is heavy. Support the bottom of the unit while removing the unit from its bay. _____
7	Set the power supply aside. Note _____ If your appliance is running Data ONTAP, it reports a failure for the removed power supply. _____

Installing a power supply

To install a power supply, complete the following steps.

Step	Action
1	Verify that the switch on the power supply is turned off.
2	Slowly and firmly push the power supply into the bay until the power supply is firmly seated in the bay.
3	Secure the power supply by turning the thumbscrew clockwise until it stops.

Step	Action
4	Plug the power cord into the power cord receptacle on the power supply and secure it with the adjustable clip lock, shown below.  The diagram illustrates the process of securing a power cord. On the left, a metal bracket with a sliding clip is shown. A black arrow points down to the clip, and another black arrow points up to the bracket's base. To the right, a power cord with a multi-pin connector is shown. A large black arrow points from the cord's connector towards the clip on the bracket, indicating the direction of insertion.
5	Turn on the power to the new power supply.

Replacing the control panel subassembly

About replacing the control panel subassembly

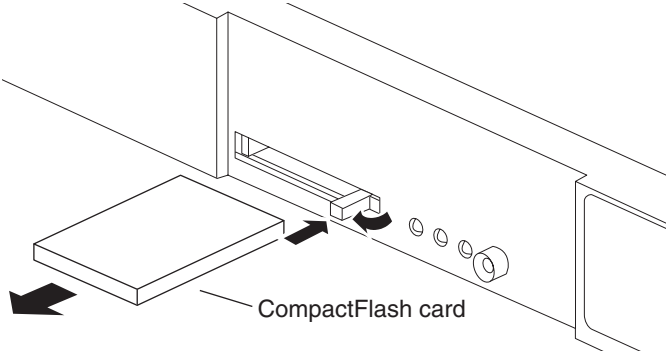
The control panel assembly includes your CompactFlash unit. Replacing the control panel subassembly consists of the following procedures:

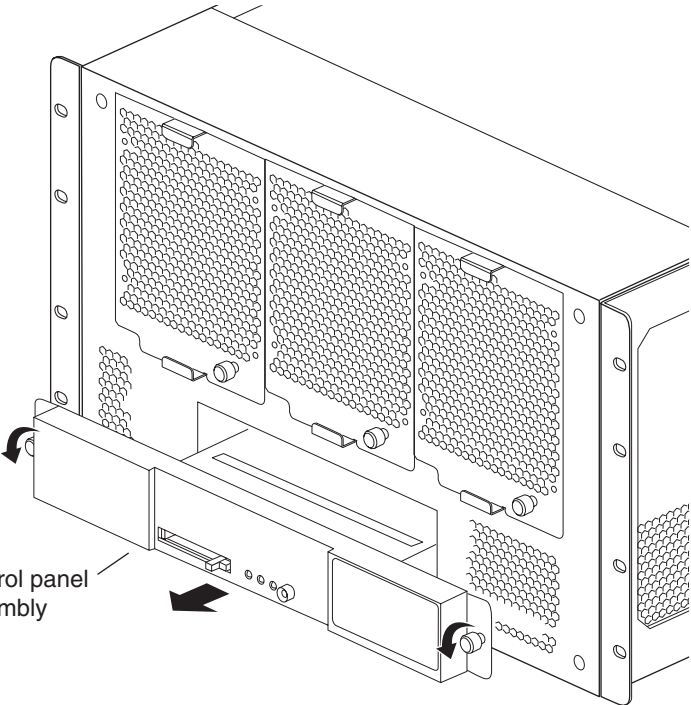
- ◆ “[Removing the control panel subassembly](#)” on page 100
- ◆ “[Installing the control panel subassembly](#)” on page 102

Removing the control panel subassembly

To remove the control panel subassembly, complete the following steps.

Step	Action
1	Shut down your appliance by entering the following command at the console: halt Caution _____ Always use the <code>halt</code> command to perform a clean shutdown of your appliance. If you do not perform a clean shutdown before removing the CompactFlash unit, your system panics.
2	Turn off and disconnect the power to your filer.
3	Put on the antistatic wrist strap and attach the grounding leash to your appliance chassis.

Step	Action
4	Remove the CompactFlash card by pulling the lever on the side of the CompactFlash bay and pushing to release the unit, as shown in the following illustration.  CompactFlash card
5	Loosen the two thumbscrews on each side of your control panel subassembly.

Step	Action
6	Pull the control panel subassembly out of the drive bay. 

Installing the control panel subassembly

To install the control panel subassembly, complete the following steps.

Step	Action
1	Slide the control panel subassembly into the drive bay.
2	Tighten the two thumbscrews to secure the control panel subassembly to the chassis.
3	Slide the CompactFlash unit into the slot on the front of the CompactFlash reader.

Step	Action
4	Reinstall the front bezel by aligning the pins on the bezel with the holes on the front panel of your appliance, and then pushing the bezel straight onto the front panel.
5	Reconnect and turn on the power to your appliance.
6	Interrupt the boot process by pressing the Delete key during the memory test.
7	Insert the CompactFlash unit and run diagnostics by entering the following command at the <code>ok></code> prompt: sys-diag See the <i>Diagnostics Guide</i> for more information.

About this appendix The information in this appendix discusses how to determine the power line lengths running from your 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 your 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.

Recommended conductor size

The following table lists the recommended conductor size for a 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 ft	12 AWG	10 AWG	8 AWG	8 AWG
50 ft	8 AWG	6 AWG	6 AWG	4 AWG
75 ft	6 AWG	4 AWG	4 AWG	2 AWG

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

Wire gauge approximates

The following table lists the approximate equivalent of American Wire Gauge (AWG) to Harmonized Cordage.

AWG	8	10	12
Harmonized, mm-mm	4.0	2.5	1.5

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 **CE** 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.

Declaration of Conformity

**Network Appliance, Inc.,
495 East Java Drive
Sunnyvale, California, 94089, U.S.A.,**

declare under our sole responsibility that the products

Type of equipment	Description	Model number	Year of manufacture
Network appliance	NetApp FAS940 and FAS960 appliance	FAS940 FAS960	2002

to which this declaration relates conform to the following standards:

EN 60950:1992, with A1-A4, A11, Information Technology Equipment
(Safety)

EN 55022:1998, Emissions Requirements for Information Technology
Equipment

EN 50024:1998, Immunity Requirements for Information Technology
Equipment

EN 60825-1, Safety of Laser/LED Equipment

EN 61000-3-2:1995 Limits for Harmonic Current Emissions

EN 61000-3-3:1995 Limitation of Voltage Fluctuations and Flicker in Low-
Voltage Supply Systems

following the provisions of the directives listed below:

73/23/EEC, Low Voltage Directive (Product Safety)

89/336/EEC, Electromagnetic Compatibility Directive

Date

Jerry Lopatin
Vice President, Platform Engineering

Part number: 210-00315

Index

Numerics

- 10Base-T/100Base-TX Ethernet network
 - cable description 16
 - connecting 17, 18
- 10Base-T/100Base-TX/1000Base-T Ethernet network
 - cable description 16
 - connecting 17, 18
- 12V power bad 40
- 12V power bad 40
- 3.3V power bad 40
- 5V power bad 40

A

- AC power
 - connecting 33
 - recommended power line sizes 106
- AC power connection 22
- adapters, expansion, ethernet types 16
- ASCII console
 - cable wiring 31
 - cabling to your system 32
- audience v

B

- boot error messages
 - Cannot initialize labels 46
 - Cannot read labels 46
 - Configuration exceeds max PCI space 48
 - Dirty shutdown in degraded mode 46
 - Disk label processing failed 46
 - Drive %s.%d not supported 46
 - FC-AL loop down, adapter %d 47
 - File system may be scrambled 47
 - Halted firmware too old 46
 - Halted illegal configuration 47
 - Invalid PCI card slot %d 47
 - No /etc/rc 45
 - No /etc/rc running setup 45
 - no disk controllers 46

- No disks 46
- No network interfaces 48
- No NVRAM present 48
- NVRAM #n downrev 48
- ServerNet wrong pci slot 48

C

- characteristics
 - electrical ratings 6
 - environmental requirements 5
 - physical requirements 4
 - space requirements 4
- connections
 - AC power 33
 - Fibre Channel switch 28
 - remote management card 22
 - SCSI tape backup device 26
- console
 - cabling 32
 - wiring 31
- control panel assembly
 - LEDs 54
- control panel subassembly
 - installing 102
 - removing 100
- conventions
 - command v
 - formatting vi
 - keyboard v

D

- DAFS network
 - cabling 21
 - connecting 21
 - LEDs on DAFS adapter 61
- documentation, required 3

E

- equipment racks
 - four-post 8

- two-post flush-mount 10
- two-post midmount 10
- equipment racks, components in 2
- error messages
 - POST error messages 39
 - See* boot error messages 45
 - See* operational error messages 51
- expansion adapters
 - ethernet types 16
 - FRU listing 66
 - installing 88
 - list of 85
 - removing 86
 - replacing 85

F

- Fan numbering 92
- fans
 - identifying 93
 - installing 95

- FC-AL HBA

- LEDs 56

- fiber optic cable with SC connector
 - on 1000Base-SX networks 14
- Fibre Channel switch, connecting 28
- FRUs

- See* expansion adapters 66

G

- GbE network 19, 20
 - cable description 16
 - connecting 19, 20
 - GbE NICs LEDs 59

I

- installation
 - about POST messages 36
 - flush-mount in a two-post rack 10
 - in a four-post equipment rack 8
 - mid-mount in a two-post rack 10
 - required manuals for 3
 - startup sequence 36
- installation of 67

- control panel subassembly 102
- expansion adapter 88
- fans 95
- memory card assembly 80
- motherboard lithium battery 77
- motherboard tray 74
- power supplies 98
- remote management card 89
- SDRAM DIMMs 83

L

- LEDs

- control panel assembly 54
 - DAFS adapter 61
 - FC-AL HB 56
 - GbE NIC 59
 - locations 53
 - remote management card 62
 - visible from the front 54

M

- maintenance, opening the PCB carrier 69
- memory card assembly
 - installing 80
 - removing 79
 - replacing 79
- messages
 - boot error messages 45
 - operational error messages 51
 - POST error messages 38
- motherboard lithium battery
 - installing 77
 - removing 76
 - replacing 76
- motherboard tray
 - installing 74
 - replacing 73

N

- network connections
 - 10Base-T/100Base-TX 17, 18
 - DAFS 21
 - Fibre Channel 14

GbE 19, 20
nonconductive surface 73

O

operational error messages
 Disk hung during swap 52
 Disk n is broken 51
 Dumping core 51
 Error dumping core 52
 Fans stopped 51
 Panicking 52
 Power supply degraded 51
 System too hot 52

P

PCB carrier
 opening 69
 removing 71
POST boot messages 36
POST error messages
 2.5 V power bad 40
 BMC disable 39
 boot device err 40
 Boot DeviceErr 40
 Clock batt dead 41
 Clock bogus date reset 41
 Clock dead 41
 Clock error 41
 Clock reset 41
 CPU count err 41
 CPU speed err 41
 CPU ucode err 41
 Env-A/B/C/D rupt err 42
 Env-A/B/C/D stat err 42
 Fan stopped 44
 FP button stuck 42
 inv boot device 40
 LCD cmd stall 42
 LCD cursor error 42
 LCD data error 42
 LCD won't open 42
 missing CF-card 40
 No power info! 42
 Onboard battery low 42

Overtemp alert 43
PCCRD format err 43
PCCRD head err 43
PCCRD init fail 43
PCCRD read err 43
PCCRD regerror 43
PCCRD seek err 43
PCCRD setup err 43
PCCRD track err 43
Post error. Rebooting... 44
pwr sup #1 bad 40
pwr sup #1 out 40
pwr sup #2 bad 40
pwr sup #2 out 40
SIO error 43
 unknown system 39, 44
 watchdog error 39
 Watchdog failed 43
power consumption ratings 6
power supplies
 connecting AC power to 33
 installing 98
 removing 96

R

racks
 four-post 8
 two-post flush-mount 10
 two-post midmount 10
recommended AC power line sizes 106
remote management card
 installing 89
 LEDs on 62
 network connection of 22
 replacing 89
removal of
 cable management tray 67
 control panel subassembly 100
 expansion adapter 86
 fans 93
 memory card assembly 79
 motherboard lithium battery 76
 PCB carrier 71
 power supplies 96

- SDRAM DIMMs 82
- replacement of
 - cable management tray 67
 - expansion adapters 85
 - memory card assembly 79
 - motherboard tray 73
 - remote management card 89
- SDRAM DIMMs 76
- requirements
 - electrical 6
 - environmental 5
 - physical 4
 - power consumption 6
 - space 4

S

- SCSI tape backup device, connecting 26
- SDRAM DIMMs
 - installing 83
 - removing 82
 - replacing 82
- slide rails
 - carrier tabs 70, 91

- PCB carrier 70
- travel distance of 70
- special messages vii
- system messages
 - boot 37
 - POST 37
- system startup 33

T

- tape backup devices 24
 - Fibre Channel switch 24
 - robotic loader 24
 - termination port on tape device 27
- terminology v
- tools and equipment
 - equipment rack parts 2
 - required tools 2
 - what you receive 2

W

- wire gauge approximates 106