

NetApp® Filers

F700 Series

Hardware Installation Guide

Network Appliance, Inc.
2770 San Tomas Expressway
Santa Clara, CA 95051, USA
Tel: +1 408 367-3000
Fax: +1 408 367-3151
Support tel: (888) 4-NETAPP
Support : <http://www.netapp.com/support/form.html>
Information email: info@netapp.com
Web: <http://now.netapp.com>

Part number 210-02345
March 1999

Copyright and trademark information

Copyright information

Copyright © 1999 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.

Portions of this product are derived from the Berkeley Net2 release and the 4.4-Lite-2 release, which are copyrighted and publicly distributed by The Regents of the University of California.

Copyright © 1980–1995 The Regents of the University of California. All rights reserved.

Portions of this product are derived from NetBSD, which is copyrighted and publicly distributed by Carnegie Mellon University.

Copyright © 1994, 1995 Carnegie Mellon University. All rights reserved. Author Chris G. Demetriou.

Permission to use, copy, modify, and distribute this software and its documentation is hereby granted, provided that both the copyright notice and its permission notice appear in all copies of the software, derivative works or modified versions, and any portions thereof, and that both notices appear in supporting documentation.

CARNEGIE MELLON ALLOWS FREE USE OF THIS SOFTWARE IN ITS “AS IS” CONDITION. CARNEGIE MELLON DISCLAIMS ANY LIABILITY OF ANY KIND FOR ANY DAMAGES WHATSOEVER RESULTING FROM THE USE OF THIS SOFTWARE.

Software derived from copyrighted material of The Regents of the University of California, Carnegie Mellon University, and Network Appliance are subject to the following license and disclaimer:

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notices, this list of conditions, and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notices, this list of conditions, and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. All advertising materials mentioning features or use of this software must display the following acknowledgment:
This product includes software developed by the University of California, Berkeley and its contributors.
4. Neither the name of the University nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE REGENTS AND CONTRIBUTORS “AS IS” AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE REGENTS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS

INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

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

Network Appliance, NetCache, Data ONTAP, SnapCopy, Snapshot, WAFL, Web Filer, FilerView, BareMetal, and SecureShare are trademarks of Network Appliance, Inc. FAServer, NetApp, and the Network Appliance logo are registered trademarks of Network Appliance, Inc.

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

Communications regulation information

Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the users will be required to correct the interference at their own expense.

Cables

To maintain compliance with applicable emission standards, use cables shielded with metallic RFI/EMI connector hoods on this device.

Canada notice

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the radio interference regulations of the Canadian Department of Communications.

Avis Canadien

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

BZT Hinweis

Hiermit wird bescheinigt, daß dieses Gerät in Übereinstimmung mit den Bestimmungen der BAPT-AmtsblVfg 243/1991 funktentstört ist. Der vorschriftsmäßige Betrieb mancher Geräte (z.B. Meßsender) kann allerdings gewissen Einschränkungen unterliegen. Beachten Sie deshalb die Hinweise in der Bedienungsanleitung.

Dem Bundesamt für Zulassungen in der Telekommunikation wurde das Inverkehrbringen dieses Gerätes angezeigt und die Berechtigung zur Überprüfung der Serie auf die Einhaltung der Bestimmungen eingeräumt.

Safety warnings

Failure to follow the directions contained in the following statements could result in bodily harm or loss of life.

- ◆ To reduce the risk of personal injury from hot surfaces, allow the internal components time to cool before touching or installing options.
- ◆ To reduce the risk of personal injury or damage to the equipment, 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 lithium batteries. There is a danger of explosion and risk of personal injury if the battery is incorrectly replaced or mistreated. Do not attempt to recharge the battery, disassemble it, or dispose of it in a fire.

DECLARATION OF CONFORMITY

We Network Appliance, Inc.,
2770 San Tomas Expressway
Santa Clara, California, 95051, USA

declare under our sole responsibility that the product(s)

Type of Equipment	Description	Part No.	Year of Manufacture
Network File Server	NetApp F700 Series Filer	F720, F740, F760	1998
Web Caching Appliance	NetCache Appliance C700 Series	C720, C720s, C760	1998

to which this declaration relate(s) is in conformance with the following standards:

EN 60950:1992, Information technology equipment (safety)
EN 55022:1987, Emissions requirements for Information technology equipment
EN 50082-1:1992, Generic immunity
IEC 801-2:1984, Immunity to Electrostatic Discharge
IEC 801-3:1984, Immunity to radiated RFI/electromagnetic fields
IEC 801-4:1988, Immunity to Electrical fast transients bursts

following the provisions of the directives listed below:

73/23/EEC, Low Voltage Directive (product safety)
89/336/EEC, Electromagnetic Compatibility Directive

1/22/99
Date


Helen Bradley
Officer of the Company

Part number:
210-02328

Table of Contents

	Preface	ix
	About this guide	ix
Chapter 1	Introducing the NetApp F700 Series Filers	1
	About NetApp F700 series filers	1
	Standard and optional features	2
	Components in a complete system	16
Chapter 2	Installing a Filer System	17
	Overview of the basic installation	17
	Preparing for the installation	19
	Installing the filer in a rack	22
	Connecting the filer to a disk shelf	27
	Connecting the filer to a tape backup device	38
	Connecting the filer to the network.	40
	Establishing a terminal connection to the filer	48
	Connecting the system to a power source	50
Chapter 3	Troubleshooting the F700 Series Hardware	53
	Using LED indicators and LCD messages	53
	LEDs on the front and back panels	55
	LEDs on the Ethernet network cards	59
	LEDs on the FDDI network cards	62
	LEDs on the ATM network card	64
	LEDs on the SCSI adapter	65
	LCD messages	67
	Index	87

Preface

About this guide

This guide describes how to install a NetApp® F700 series filer in a rack, connect it to a disk storage shelf and tape backup device, and start up the system.

Audience

This guide is for system administrators who are familiar with Network Appliance™ filers and how the Network File System (NFS), Common Internet File System (CIFS), and Hypertext Transfer Protocol (HTTP) protocols are used to share and transfer files.

Terminology

This guide uses the following terms:

- ◆ *Filer* refers to a NetApp F700 series filer.
- ◆ *System* refers, at a minimum, to a filer and a connected disk storage shelf. A tape backup device can also be a component of the system, but is not required.
- ◆ *Disk shelf* refers to a single disk shelf or a loop of daisy-chained disk shelves.

Formatting conventions

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

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

Special messages

This guide contains special messages that are described as follows.

Note_____

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

Caution_____

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

WARNING_____

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

About NetApp F700 series filers

What is a filer?

A filer is a dedicated, special-purpose network data server that provides fast and reliable file service to network clients connected to Ethernet, Fiber Distributed Data Interface (FDDI), and Asynchronous Transfer Mode (ATM) networks.

Filer models in the F700 series

The NetApp F720, F740, and F760 are filer models in the NetApp F700 series. Their differences are based on performance, capacity, and networking.

Chapter contents

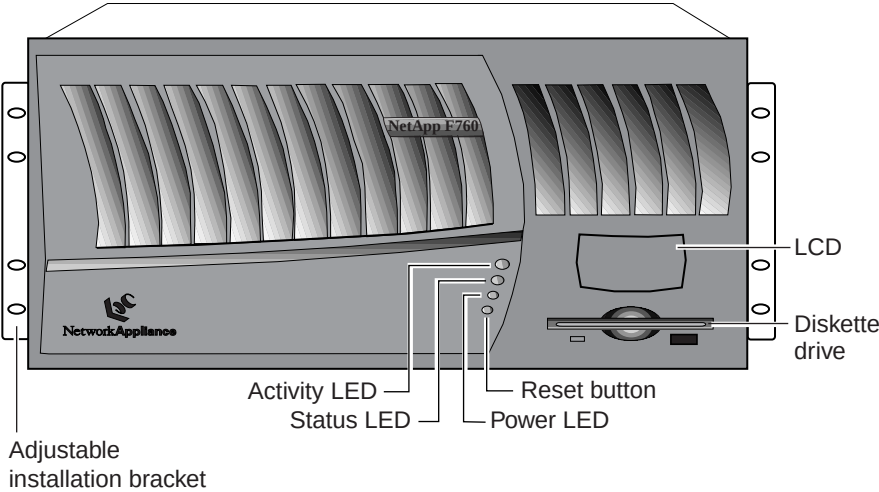
This chapter discusses the topics listed in the following table.

Read...	To learn about...
“Standard and optional features” on page 2	◆ The standard features offered by all models, such as the built-in Ethernet and fibre channel interfaces. ◆ The optional features, such as the expansion cards and adapters you can order for additional network and storage capability. ◆ The NetApp NOW Web page, which gives detailed information about the current cards, adapters, and configurations supported by the F700 series.
“Components in a complete system” on page 16	What the hardware components are of a complete system.

Standard and optional features

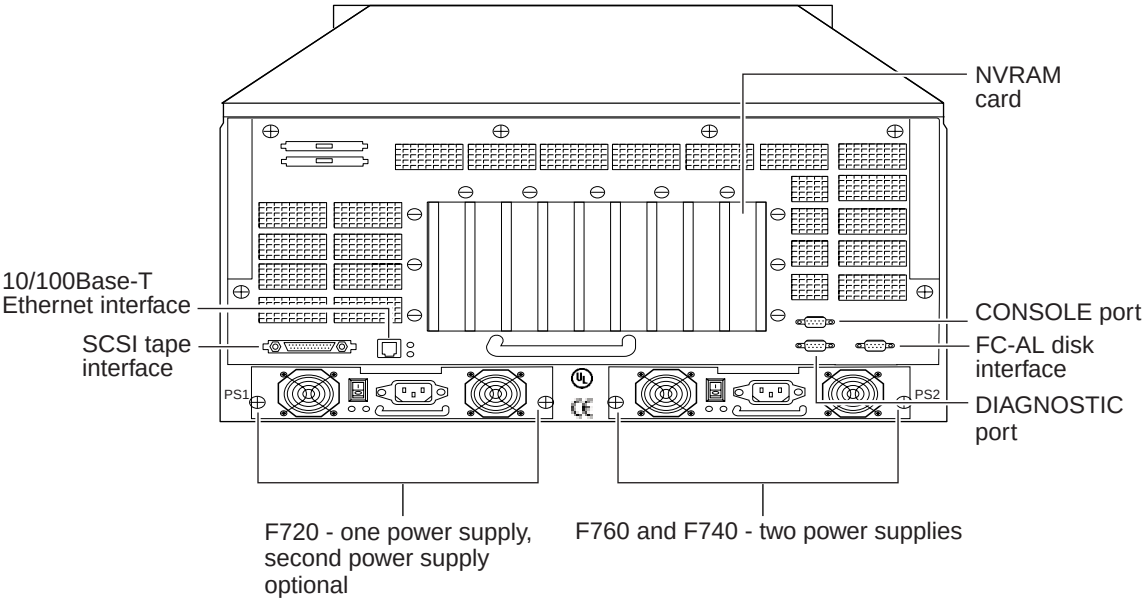
Standard features The filer standard features are described in three parts—those that you can see from the front panel and those that you can see from the back panel.

Standard features that you can see from the front panel: The following illustration shows the standard features that you can see from the front panel. The table following the illustration describes the features.



Standard feature	Benefits
Adjustable installation brackets	When you install the filer in an equipment rack, you attach its installation brackets to the front rails of the rack. The filer has the following three positions on its sides for the adjustable brackets. One front-install position—The brackets are attached to the sides, parallel to the front panel. The filer is shipped with the brackets in this position (see page 24). Two mid-install positions—The brackets are attached to the filer sides 4.75 or 9.5 inches (mid-way) from the front panel (see page 25 and 26). In each mid-install position, the filer extends forward from the rack. This position is used in telco racks. It is also used to provide more space behind the filer.
LEDs (Light Emitting Diodes)	The LEDs on the front panel report system status and network activity. A glance at these LEDs lets you know right away whether the filer requires troubleshooting. The LEDs are described on pages 55 through 65.
Reset button	This button is housed in a recessed hole so that you cannot reset the filer inadvertently. It enables you to reset the filer in those rare cases when the system fails or you upgrade the software. To reset the filer, insert a straightened paper clip into the hole and push the button.
Diskette drive	This drive enables you to boot the system from a diskette when the system fails to start from the hard disk. You also use this drive to run diagnostics using the diagnostics diskette.
LCD (Liquid Crystal Display)	The LCD displays status, error, and diagnostic messages up to 32 characters long. The LCD messages are described on pages 67 through 85.

Standard features that you can see from the back panel: The following illustration shows the standard features that you can see from the back panel. The table following the illustration describes the features.



Standard features	Benefits
10/100Base-T Ethernet interface	The built-in interface provides a 10Base-T or 100Base-T Ethernet connection. The interface automatically determines the medium type (10Base-T or 100Base-T). Two LEDs report on the status of the interface (see page 58). You do not need to order an Ethernet Network Interface Card (NIC).
SCSI tape interface	The built-in, wide differential SCSI (Small Computer System Interface) interface provides a connection to a SCSI tape backup device.

Standard features	Benefits
Power supplies	The F720 comes with one autoranging power supply; the F740 and F760 come with two autoranging power supplies. The first power supply, on the left side, is labeled PS 1; the second is labeled PS 2. Each power supply provides +5V, +3.3V, +12V, and -12V output DC power. Two LEDs report on its status. A retaining clip enables you to secure the power cord to the filer. Two power supplies provide ◆ Redundancy—When one power supply fails, the other takes over and provides power for the filer until you replace the failed power supply. ◆ Hot swapping—You can replace one power supply while the second is running without disrupting service.
Two serial ports	◆ CONSOLE port—Provides a console connection from which you can monitor and manage the filer. After you install the filer in a rack, you configure it for network operation from the console. Later, you can use the console to access and manage the filer when a remote connection is not available. ◆ DIAGNOSTIC port—When one or more Dual SCSI StorageShelves 2 are connected to the filer, you connect the master Environmental Monitoring Unit (EMU) to this port. Otherwise, this port is used for internal NetApp diagnostics.
FC-AL disk interface	The built-in interface provides an FC-AL (Fibre Channel Arbitrated Loop) connection to the following disk shelves: ◆ Fibre Channel StorageShelf FC7—With 9-Gigabyte (GB) disks only ◆ Fibre Channel StorageShelf FC8—With 18-GB disks only You can have both types of disk shelves on the same loop.
NVRAM card	This card provides Non-Volatile Random Access Memory. It stores in-transit data before the data is permanently written to disk. In the event of an accidental shutdown or loss of power, the card's replaceable batteries retain the data that you can retrieve later.

Optional features

An optional feature is a feature that you can use or order for your system to supplement the standard features.

The optional features fall into five categories:

- ◆ Cluster support
- ◆ Additional NICs
- ◆ Additional FC-AL adapters
- ◆ Additional SCSI adapters
- ◆ Combined FC-AL and SCSI disk storage
- ◆ A second power supply for redundancy for the F720

Your filer is shipped with the optional features you select installed. You can also order optional features later.

Cluster support: The F740 and F760 support clusters.

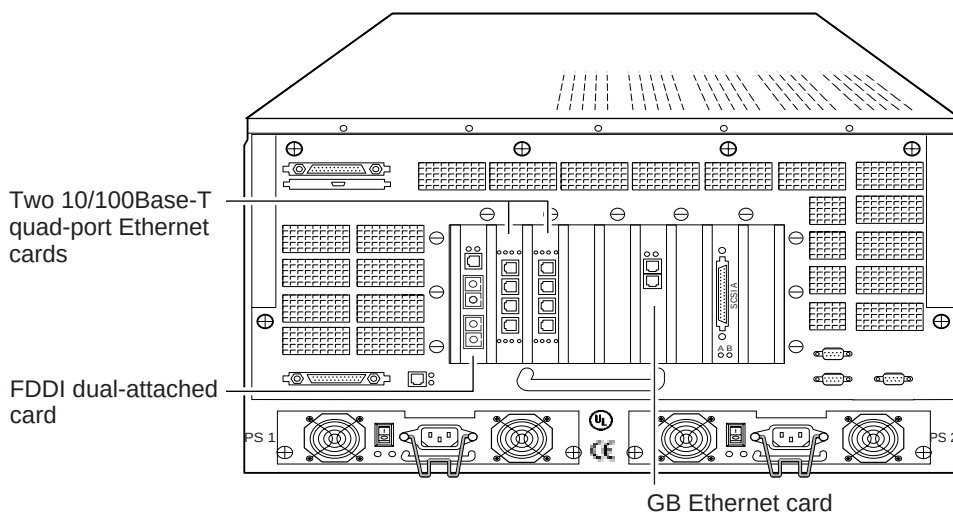
A cluster consists of a pair of filers that are connected and configured in a special way to provide fault tolerance. When one filer in a cluster undergoes a system failure and can't reboot, the partner filer in the cluster can take over the failed filer's functions and serve the data on the failed filer's disks.

For more information, refer to Chapter 2 in the *First-Time Configuration Guide*.

Additional NICs: The following table lists the available NICs you can order for additional network connectivity.

Network	Available NICs
Ethernet	◆ Single-port 10/100Base-T ◆ Quad-port 10/100Base-T ◆ Gigabit
FDDI	◆ FDDI-TP single-attached ◆ FDDI single-attached fiber ◆ FDDI-TP dual-attached fiber
ATM	◆ Single-port ATM

A typical installation does not have a filer connected to three types of networks (Ethernet, FDDI, and ATM). The following illustration of the back panel shows a filer with Ethernet and FDDI network connections. An FDDI dual-attached fiber card is in slot 1, two quad-port 10/100Base-T Ethernet cards are in slots 2 and 3, and a GB Ethernet card is in slot 6. An example of an ATM card appears on page 47.



Additional FC-AL disk adapters: You can order an FC-AL adapter for additional fibre channel disk storage.

The following table shows how much fibre channel disk storage capacity each filer model supports. The number of loops includes the loop connected to the built-in FC-AL interface.

F700 model	Max. number of additional FC-AL adapters	Max. number of loops	Max. number of drives		Max. storage
			9-GB	18-GB	
F720	None	One	56	28	0.5 TB
F740	One	Two	112	56	1.0 TB
F760	Two	Three	168	84	1.5 TB

Note

By connecting two or three loops to the filer you can spread the storage load over several interfaces. You must, however, observe the disk storage limit.

The following table describes the two types of fibre channel disk shelves that you can connect to the filer.

Fibre channel disk shelf	Contains
Fibre Channel StorageShelf FC7	9-GB disks only, 200W power supplies
Fibre Channel StorageShelf FC8	18-GB disks only, 260W power supplies

Note

If you have a loop of 9-GB and 18-GB fibre channel disk shelves, the disk shelf connected to the filer (disk shelf ID 0) must be a 9-GB disk shelf.

Additional SCSI disk adapters: You can connect a SCSI disk shelf pair (SCSI Dual StorageShelf 1 or 2) to a filer by ordering one or two two-port, wide differential SCSI adapters.

You can order a Dual SCSI StorageShelf 2 for the filer. Connectivity for a Dual SCSI StorageShelf 1 is available only as a disk shelf upgrade.

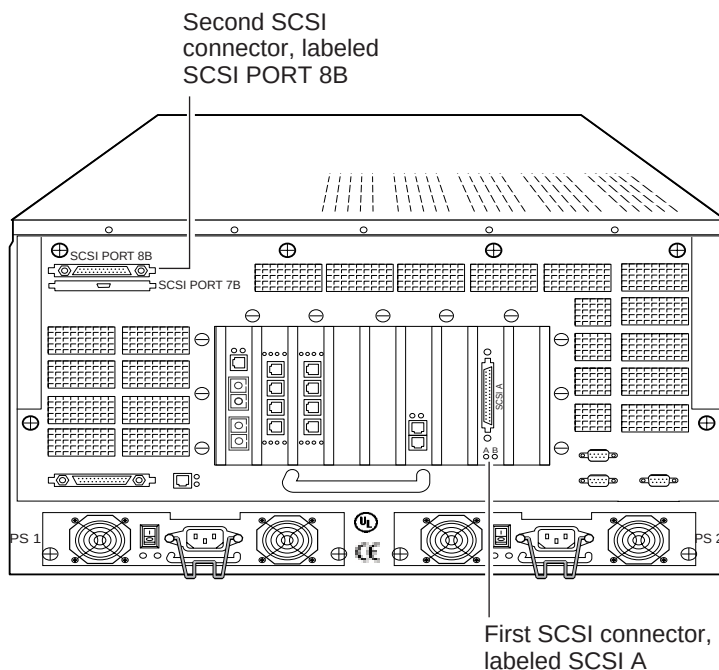
Each connector on the two-port, wide differential SCSI adapter enables you to connect one SCSI disk shelf pair.

- ◆ The adapter's first connector fits in the opening of slot 8 or 7 and is labeled SCSI A
- ◆ The adapter's second connector fits in a slot on the chassis drawer, which is labeled SCSI PORT 8B or SCSI PORT 7B, depending on the slot the adapter is occupying.

The following table shows the available SCSI disk storage capability on each filer model.

F700 model	Max. number of SCSI adapters	Number of SCSI disk shelf pairs	Max. storage
F720	One	Two	0.5 TB
F740, F760	Two	Four	1.0 TB—F740 1.5 TB—F760

The following illustration shows the first SCSI adapter installed in slot 8. Its first connector is labeled SCSI A, its second connector is in the chassis slot labeled SCSI PORT 8B. If you had a second SCSI adapter installed, it is in slot 7. Its first connector is labeled SCSI A, its second connector is in the chassis slot labeled SCSI PORT 7B.



A second power supply for the F720: The standard F720 is powered by a single power supply, installed on the left side and labeled PS 1. You can order a second power supply for redundancy.

Additional information is on the Web page

The F700 series supports a variety of cards, adapters, and configurations. To obtain more information about what each model supports, go to the NOW Web page at <http://now.netapp.com>.

Combined FC-AL and SCSI disk storage: You can connect FC-AL and SCSI disk shelves to an F740 or F760 at the same time. (Cluster systems use only FC-AL disk shelves.)

You must observe the disk storage limit in this configuration, which is 1.0 TB and 1.5 TB on the F740 and F760, respectively.

The following configurations of combined FC-AL and SCSI connections are available.

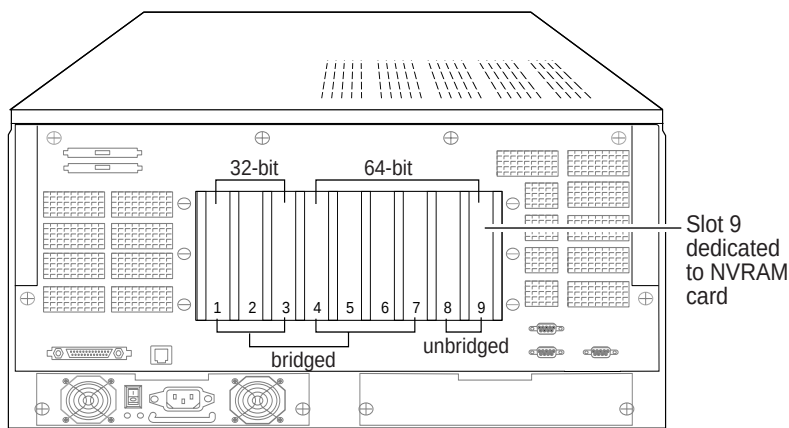
Combined FC-AL and SCSI connections	
F740 and F760	F760 only
◆ 1 FC-AL and 1 SCSI	◆ 2 FC-AL and 1 SCSI
◆ 1 FC-AL and 2 SCSI	◆ 2 FC-AL and 2 SCSI

Special slot assignments for a combined SCSI Dual StorageShelf 1, SCSI Dual StorageShelf 2, and two Fibre Channel StorageShelves configuration: The following table lists the slots that you must use when you have a Dual StorageShelf 1, Dual StorageShelf 2, and two Fibre Channel StorageShelves connected to the F760 at the same time.

Special slot assignments for a configuration of two SCSI disk shelves and two FC-AL disk shelves
◆ Dual StorageShelf 1—Slot 7 ◆ Dual StorageShelf 2—Slot 8 ◆ First Fibre Channel StorageShelf—Built-in interface ◆ Second Fibre Channel StorageShelf—Slot 4

About the expansion slots: The filer has nine expansion slots on the motherboard. Slot 9 is dedicated to the NVRAM card. The remaining eight expansion slots are for additional cards and adapters that enable you to expand your network connectivity and disk storage capacity.

The connectors of the cards and adapters installed in the slots fit through the slot openings in the filer's back panel. The following illustration shows the expansion slots as viewed from the back panel.



Note

The configuration information in this manual reflects the configurations supported as of January, 1999. NetApp periodically adds to and enhances the configuration options. To obtain information about the current configurations, go to the NOW Web page at <http://now.netapp.com>.

Slot assignments: The following table shows what slots are available on each filer. The diamond (◆) indicates an available slot. Shaded boxes indicate unavailable slots.

Filer model	Available slots								
	1	2	3	4	5	6	7	8	9
F720	◆	◆						◆	NVRAM
F740	◆	◆	◆			◆	◆	◆	
F760	◆	◆	◆	◆	◆	◆	◆	◆	

F720 slot assignments: The following table gives the slot assignments for the available three slots on the F720 (not including slot 9).

Supported cards and adapters	max no.	Available slots								
		1	2	3	4	5	6	7	8	9
Single-port 10/100Base-T Ethernet card	(2)	◆	◆							
Quad-port 10/100Base-T Ethernet card	(2)	◆	◆							
Gigabit (GB) Ethernet	(1)								◆	
FDDI-TP single-attached card	(2)	◆	◆							
FDDI single-attached fiber card	(2)	◆	◆							
FDDI dual-attached fiber card	(2)	◆	◆							
ATM card	(1)	◆	◆						◆	
Two-port wide differential SCSI adapter #1 ^a	(1)									
NVRAM card	(1)									◆

a. SCSI adapter #1 is installed in slot 8 on the F720.

F740 slot assignments: The following table gives the slot assignments for the available six slots on the F740 (not including slot 9).

Supported cards and adapters	max no.	Available slots								
		1	2	3	4	5	6	7	8	9
Single-port 10/100Base-T Ethernet card	(3)	◆	◆	◆						
Quad-port 10/100Base-T Ethernet card	(3)	◆	◆	◆						
GB Ethernet	(3)						◆	◆	◆	
FDDI-TP single-attached card	(2)	◆	◆	◆						
FDDI single-attached fiber card	(2)	◆	◆	◆						
FDDI dual-attached fiber card	(3)	◆	◆	◆						
ATM card	(3)	◆	◆	◆						
FC-AL adapter	(2)						◆	◆		
Two-port wide differential SCSI adapter #1 ^a	(1)							◆	◆	
Two-port wide differential SCSI adapter #2	(1)							◆	◆	
NVRAM card only	(1)									◆

- a. On the F740, SCSI adapter #1 is installed in slot 8, SCSI adapter #2 is installed in slot 7. The ribbon cables on the two adapters differ in length. Cluster systems do not use SCSI disk storage.

F740 cluster slot assignments: The following table gives the slot assignments for the F740 in a cluster.

Supported cards and adapters	max no.	1	2	3	4	5	6	7	8	9
Cluster interface adapter	(1)								◆	
GB Ethernet	(2)						◆	◆		
ATM card	(2)		◆	◆						
FC-AL adapter	(3)	◆	◆							

F760 Slot Assignments: The following table gives the slot assignments for the available seven slots on the F760 (not including slot 9).

Supported cards and adapters	max no.	Available slots								
		1	2	3	4	5	6	7	8	9
Single-port 10/100Base-T Ethernet card	(3)	◆	◆	◆						
Quad-port 10/100Base-T Ethernet card	(3)	◆	◆	◆						
GB Ethernet card	(4)					◆	◆	◆	◆	
FDDI-TP card	(3)	◆	◆	◆						
FDDI single-attached fiber card	(3)	◆	◆	◆						
FDDI dual-attached fiber card	(3)	◆	◆	◆						
ATM card	(3)	◆	◆	◆						
FC-AL adapter	(2)				◆			◆		
Two-port wide differential SCSI adapter #1 ^a	(1)								◆	
Two-port wide differential SCSI adapter #2	(1)							◆		
NVRAM card only	(1)									◆

- a. On the F760, SCSI adapter #1 is installed in slot 8, SCSI adapter #2 is installed in slot 7. The ribbon cables on the two adapters differ in length. Cluster systems do not use SCSI disk storage.

F760 cluster slot assignments: The following table gives the slot assignments for the F760 in a cluster.

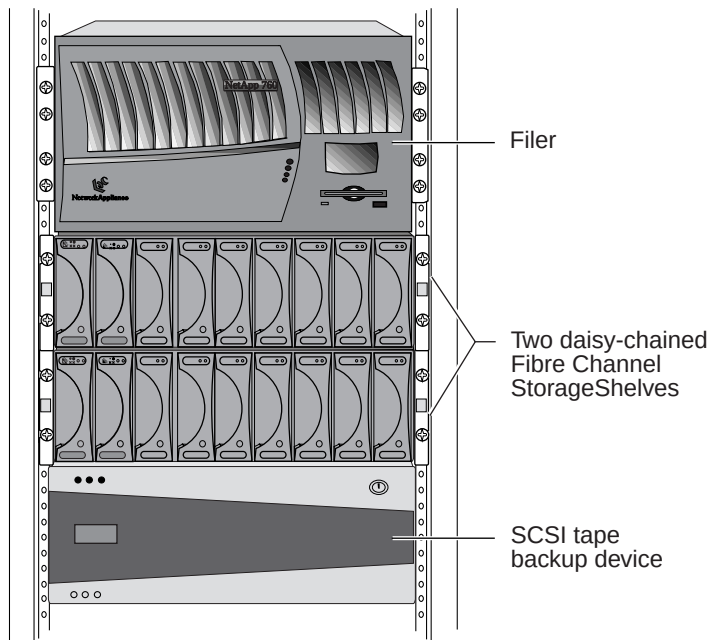
Supported cards and adapters	max no.	1	2	3	4	5	6	7	8	9
Cluster interface adapter	(1)								◆	
GB Ethernet card	(2)					◆	◆			
ATM card	(2)		◆	◆						
FC-AL adapter	(3)	◆			◆			◆		

Components in a complete system

The filer is part of a system

As a data server, the function of the NetApp filer is to move data over the network in response to a client request. The filer uses Data ONTAP™ software to do so. The data is stored on storage disks that reside in disk storage shelves connected to the filer. In addition, a SCSI tape backup device is recommended for regular backups to protect your data. Therefore, a complete system consists of a filer connected to one or more disk storage shelves, plus a recommended tape backup device.

Illustration of a system: The following illustration shows a filer installed in a rack above two daisy-chained Fibre Channel StorageShelves and a tape backup device.



Overview of the basic installation

Procedures in the installation

The following table provides an overview of the procedures you perform to install the filer and the rest of the units in the system.

Order	Procedures	Page
1	Install the filer in a rack.	22
2	Connect the filer to a disk storage shelf.	26
3	Connect the filer to a tape backup device.	38
4	Connect the filer to one or more networks.	40
5	Connect a terminal to the filer.	48
6	Connect the filer to a power source and proceed to the <i>Getting Started Guide</i> to configure the filer.	50

Chapter contents

This chapter provides instructions for installing the filer and connecting the disk shelves and backup tape device for the first time in a noncluster configuration.

Note

This chapter does not provide instructions for installing the disk shelves or tape backup device. For instructions about those topics, refer to the hardware guide that came with them.

For instruction about installing a cluster system, refer to the *First-Time Configuration Guide*.

This chapter contains the topics described in the following table.

Read...	To learn about...
“Preparing for the installation” on page 19	The environmental, electrical, space, and location requirements.
“Installing the filer in a rack” on page 22	How to front-install and mid-install the filer in a rack.
“Connecting the filer to a disk shelf” on page 27	How to connect the filer to a fibre channel disk shelf or a SCSI disk shelf pair.
“Connecting the filer to a tape backup device” on page 38	How to connect the filer to a SCSI tape backup device.
“Connecting the filer to the network” on page 40	How to connect the filer to one or more networks, such as Ethernet, FDDI, and ATM.
“Establishing a terminal connection to the filer” on page 48	How to establish a terminal connection to the filer to display system messages that appear when the system is started and to prepare for system configuration.
“Connecting the system to a power source” on page 50	How to connect all units in the system to a power source.

Preparing for the installation

Check the installation requirements

Before you install your system, make sure that you meet the following tools, equipment, environmental, electrical, space, and location requirements.

Caution—————
Your system might not operate properly if you do not meet the requirements.

Tools and equipment requirements: You need the following tools and equipment to install the filer.

Tools and equipment	Description
19-in rack	You can use a freestanding rack or a rack in a cabinet. If you do not install the system components in a rack, you must provide additional grounding.
#1 and #2 Phillips screwdrivers	Note ————— If the provided screws do not fit the rack holes, obtain the appropriate screws.

Environmental requirements: The environmental requirements are listed in the following table.

Environmental condition	Operating condition	Nonoperating condition
Temperature range	50° F to 104° F (10° C to 40° C)	-4° F to 149° F (-20° C to 65° C)
Relative humidity	10% to 90% (noncondensing)	5% to 90% in original shipping container (noncondensing) Otherwise, 50% (noncondensing)

Electrical requirements: A power cord is supplied for each power supply. The following table lists the electrical requirements.

Condition	Requirement
Power supply	90 to 250V AC single phase
Maximum current	4A at 90V AC (RATED)
Frequency	47 to 63 Hz

Power	Rating
Watts	300 max. (with Power Factor)
BTU/hr	1025 max.

Space and location requirements: The following table gives the filer's dimensions and weight.

Dimensions and weight			Rack units
Height	8.75 in	22.23 cm	5 U (1.75 in. = 1 U)
Width	17 in	43.18 cm	
Depth	25.25 in	64.14 cm	
Weight	64 lbs.	28.8 kg.	

The following table describes the recommended minimum clearance for the filer.

Recommended minimum clearance		
Front clearance	22.86 cm	9.0 in.
Rear clearance	170.2 cm	67 in.
Additional work space in rear	60.96 cm	24 in.
Vertical rack space	22.23 cm	8.75 in.
Top clearance, only in rear	3.81 cm	1.5 in.

Check the shipment package

Make sure that your shipment package includes

- ◆ One or more filers with the expansion cards you ordered installed in the filer
- ◆ Cables for connecting the filer to the disk shelves
- ◆ One or more NetApp System Cabinets if your system order has more than eight disk shelves
- ◆ This *F700 Series Hardware Installation Guide*
- ◆ A disposable ESD (electrostatic discharge) wrist strap and grounding leash

Collect other documentation

In addition to this guide, make sure that you have the following documentation:

- ◆ The *Fibre Channel StorageShelf Hardware Guide*, for installing the Fibre Channel StorageShelf FC7 or the Fibre Channel StorageShelf FC8
- ◆ The *Hardware Guide for the NetApp StorageShelf 2*, for installing the Dual StorageShelf 2
- ◆ The *Hardware Guide for the Digital Disk Shelves*, for installing the Dual StorageShelf 1
- ◆ The *Getting Started Guide*, for configuring the filer after you install the system

Installing the filer in a rack

Rack installation requirements

Observe the requirements in the following table when you install the filer.

Condition	Explanation
The rack must have	◆ Front installation rails compliant with EIA standard RS-310-C. ◆ A front panel 19 in. wide (48.26 cm).
If you install a device above the filer	Leave at least 1.5 in. (4 cm) of space directly above the ventilation holes for air circulation. You can install equipment directly on the filer's unvented area as long as it does not extend over and block the filer's ventilation holes.
Wear an ESD wrist strap	WARNING — You must wear an ESD wrist strap when you handle electronic equipment. If you do not, you can damage the equipment by discharging ESD voltages that accumulate on you as you move about. The ESD wrist strap discharges the ESD voltage.
Work with another person	WARNING — The filer weighs up to 64 lbs. (27.22 kg). To avoid injuring yourself or damaging the filer, you must work with at least one other person when you install the filer in the rack.

WARNING

When using more than eight disk shelves in a Fibre Channel Arbitrated Loop, you must install the entire system in a NetApp® System Cabinet to meet FCC emission requirements. Network Appliance does not guarantee the performance of a system with more than eight disk shelves if it is not installed in a NetApp System Cabinet.

Front-installing or mid-installing the filer in the rack

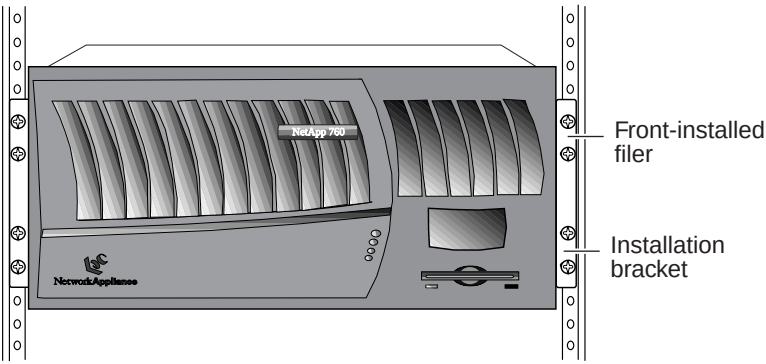
You can install the filer in a 19-in.equipment rack or telco rack.

The filer has adjustable installation brackets that can be in one of the following three positions.

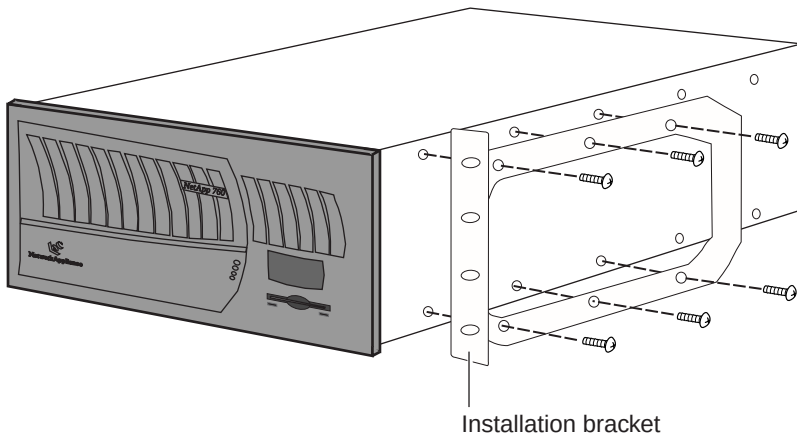
- ◆ One position for front-installing—The brackets are attached to the filer's sides, parallel to the front panel. The filer is shipped with the brackets in this position.
- ◆ Two positions for mid-installing—You attach the brackets 4.75 or 9.5 in. from the front panel.

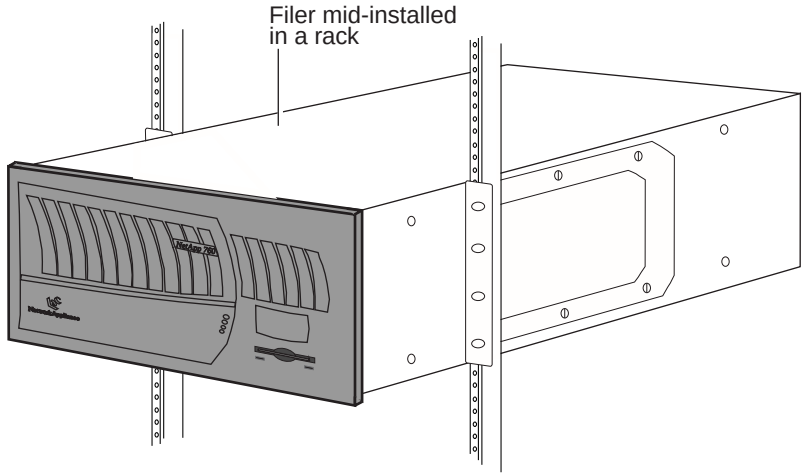
The following sections describe how to front-install and mid-install the filer.

How to front-install the filer: To front-install the filer in a 19-in. rack, follow these steps.

Step	Action	Description
1	Select four holes on each front rack rail.	These holes should have the same spacing as the holes on the filer's brackets.
2	Align the rack holes with the filer's bracket holes.	Work with one side bracket at a time. The person assisting you should stand behind the rack to help support the weight of the filer.
3	Insert and tighten the screws in the bottom hole on each side first.	It is important that you fasten the bottom screws first. (With a standard #2 Phillips driver, using a #10 steel screw, you use a torque of 27 in. lbs.) After these screws are fastened, you don't need help with the filer.
4	Tighten all the screws.	The following illustration shows the filer front-installed in a 19-in. rack. 

How to mid-install the filer: To mid-install the filer in a rack, follow these steps.

Step	Action	Description
1	Remove the installation brackets attached to each side of the filer.	Use a #2 Phillips screwdriver to remove the screws that fasten the brackets, as shown in the illustration.
 Installation bracket		
2	Select a mid-install position on each side of the filer (4.75 or 9.5 in. from the first hole) and align the bracket holes with the holes on the filer sides.	Work with one bracket at a time.
3	Attach the brackets.	Insert the screws into the bracket and filer holes and tighten them.
4	Select four holes on each front rack rail.	These holes should have the same spacing as the holes on the filer's brackets.
5	Align the rack holes with the filer's bracket holes.	The person assisting you should stand behind the rack to help support the weight of the filer.

Step	Action	Description
6	Insert and tighten the screws in the bottom hole on each side first.	It is important that you fasten the bottom screws first. (With a standard #2 Phillips driver, using a #10 steel screw, you use a torque of 27 in. lbs.) After these screws are fastened, you don't need help with the filer.
7	Tighten all the screws.	The following illustration shows the brackets attached at mid-point on the filer and the filer's front section extending forward from the rack. 

Connecting the filer to a disk shelf

About connecting more than eight disk shelves

If you are connecting more than eight disk shelves to the filer, you must install the entire system in NetApp System Cabinets. For more information, refer to the *System Cabinet Installation Guide*

Connecting the filer to a fibre channel disk shelf

To connect the filer to a fibre channel disk shelf (single disk shelf or loop of disk shelves) you use the filer’s built-in FC-AL (DB-9) interface.

The following table lists the two fibre channel disk shelves and the hardware guide for both. You can mix the two disk shelves in a daisy-chain.

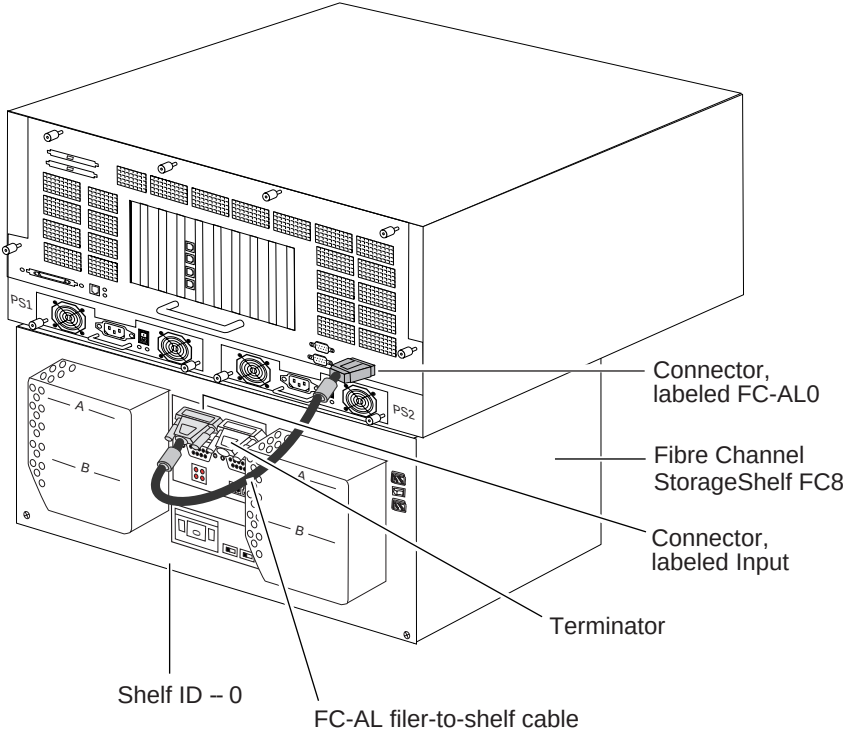
Fibre channel disk shelf	Hardware guide
Fibre Channel StorageShelf FC7 with 9-GB disks only	<i>Fibre Channel StorageShelf Hardware Guide</i>
Fibre Channel StorageShelf FC8 with 18-Gb disks only	

To connect a second or third loop of fibre channel disk shelves to the filer, you need an FC-AL adapter installed in the filer for each loop. If you order the adapter after your initial order, you must install it yourself.

About combining 9-GB and 18-GB fibre channel disk shelves in a loop: If you are connecting 9-GB and 18-GB fibre channel disk shelves in the same loop, you must ensure that the disk shelf connected to the filer is a 9-GB disk shelf.

How to connect a fibre channel disk shelf: To connect the filer to the first fibre channel disk shelf (single or daisy-chain loop), follow these steps.

Step	Action	Description
1	Connect the FC-AL filer-to-shelf cable to the Input connector on the disk shelf. Tighten the locking screws on the cable's DB-9 connector.	With a daisy-chain configuration, make sure that the ID on the disk shelf connected to the filer is set to 0.
2	Plug the cable's DB-9 connector into the filer's DB-9 socket connector, labeled FC-AL0.	FC-AL0—Fibre Channel Arbitrated Loop 0 (zero).

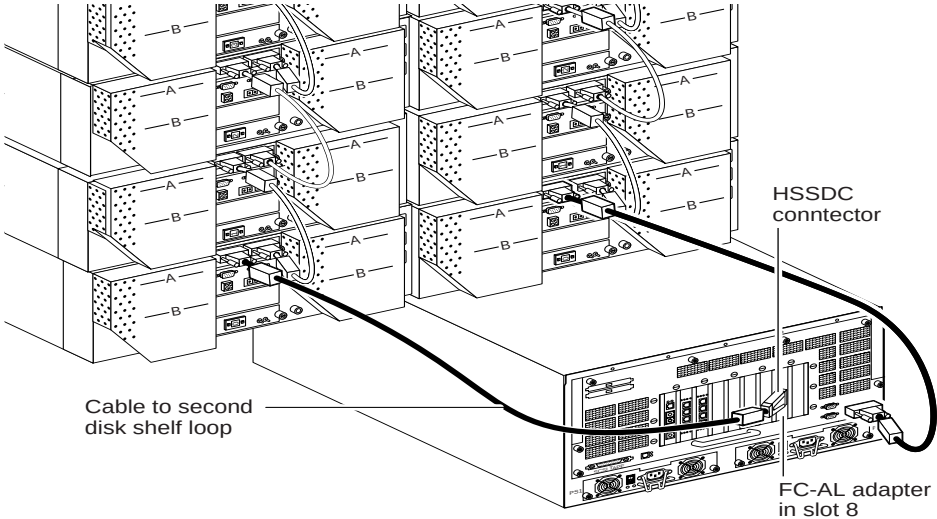
Step	Action	Description
3	Make sure that you have a terminator on the last disk shelf.	The following illustration shows the FC-AL cable connected to the filer connector labeled FC-AL0 and to the Fibre Channel StorageShelf FC8 connector labeled Input. The terminator is on the connector labeled LRC Output/Terminator on the disk shelf. The disk shelf in this example is an 18-GB disk shelf.  The diagram illustrates the connection of an FC-AL cable between a filer and a disk shelf. The filer is a large rectangular unit with multiple drive bays and connectors. The disk shelf is a smaller unit with two shelves labeled A and B. The FC-AL cable is connected to the filer's FC-AL0 connector and the disk shelf's Input connector. A terminator is shown on the LRC Output/Terminator connector on the disk shelf. Labels with leader lines identify the following components: Connector, labeled FC-AL0; Fibre Channel StorageShelf FC8; Connector, labeled Input; Terminator; Shelf ID -- 0; and FC-AL filer-to-shelf cable.

How to connect a second or third loop of disk shelves: The F740 and F760 support two and three FC-AL disk shelf loops, respectively (in a noncluster configuration). Connecting more than one loop enables you to spread the storage load. You must observe the 1.0 TB and 1.5 TB storage limit for the F740 and F760, respectively.

The first loop of disk shelves is connected to the filer's built-in FC-AL interface. You need an FC-AL adapter installed in the filer for each additional loop of disk shelves. The disk shelves in each loop are numbered from 0 to 7.

To connect the filer to a second or third loop of fibre channel disk shelves, follow these steps.

Step	Action	Description
1	Make sure that you have an FC-AL adapter installed in the filer for each additional loop.	Network Appliance installs the adapter in the disk shelf if you order it during initial purchase. You need to install it yourself if you order it at a later time. Refer to pages 14 and 15 to learn the correct slot number on the F740 and F760, respectively.
2	Connect one end of the FC-AL filer-to-shelf cable to the LRC Input connector on disk shelf 0 in loop 2.	The second loop of disk shelves is called loop 2.

Step	Action	Description
3	Connect the HSSDC end of the FC-AL filer-to-shelf cable to the FC-AL adapter connector in slot 8.	In the following illustration, the first loop is connected to the FC-AL0 interface of an F760. The second loop is connected to the FC-AL adapter in slot 8 on the filer. The configuration in this illustration has more than eight disk shelves. Such a configuration should be installed in a NetApp System Cabinet. The cabinet is not shown in the illustration. (This is a noncluster configuration.) 
4	To connect the filer to a third loop, use the same procedure.	

Connecting the filer to a SCSI disk shelf

You can connect the filer to a Dual StorageShelf 1 and a Dual StorageShelf 2. At initial purchase, you order one or two (depending on your model) SCSI two-port, wide differential adapters to provide the connectivity. The filer supports a differential SCSI interface only.

Note

To learn the available configurations for your filer, go to the NOW Web page at <http://now.netapp.com>.

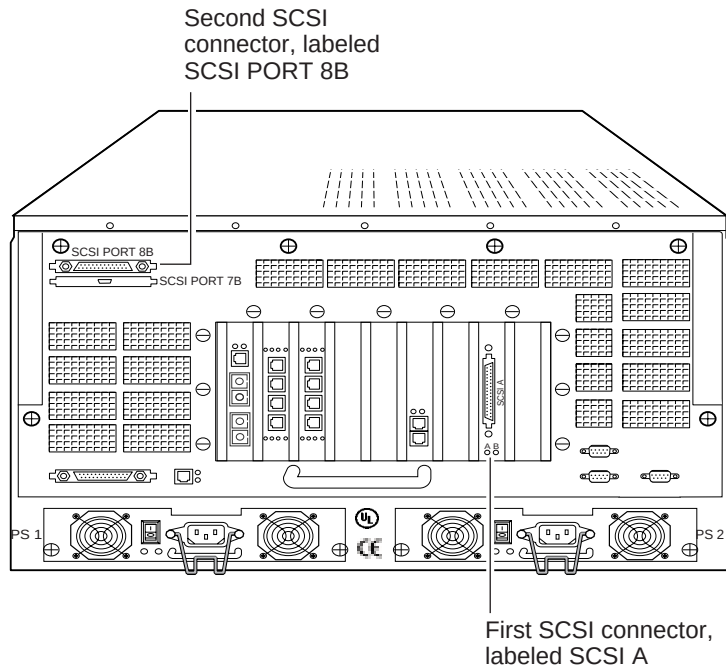
One SCSI adapter can connect two disk shelves: The SCSI adapter's two ports enable you to connect two SCSI disk shelf pairs. Therefore, with two SCSI adapters, you can connect up to four SCSI disk shelf pairs.

The following table shows how to connect the SCSI disk shelves to the filer.

To connect this SCSI disk shelf pair	Use the SCSI adapter	And this connector
First Second	In slot 8	SCSI A SCSI PORT 8B
Third Fourth	In slot 7	SCSI A SCSI PORT 7B

Special slot assignments when combining Dual StorageShelf 1, Dual StorageShelf 2, and two Fibre Channel StorageShelves: If you are connecting a Dual StorageShelf 1, Dual StorageShelf 2, and two Fibre Channel StorageShelves to the filer at the same time, you must connect each disk shelf to a specified connector. Refer to "Special slot assignments for a combined SCSI Dual StorageShelf 1, SCSI Dual StorageShelf 2, and two Fibre Channel StorageShelves configuration" on page 11.

The following illustration shows the location of the first and second SCSI connectors, labeled SCSI A and SCSI PORT 8B.



About the Dual StorageShelf 2. To install the Dual StorageShelf 2, refer to the *Hardware Guide for the NetApp StorageShelf 2*.

Before you connect the Dual StorageShelf 2 to the filer, make sure that

- ◆ The disk shelves are connected in pairs.
- ◆ Disk shelf 0, in the first disk shelf pair, is connected to the filer. If a second disk shelf pair is installed, disk shelf 2 is connected to the filer (see the illustration on page 35).
- ◆ The Environmental Monitor Units (EMUs) in the individual disk shelves are connected to each other and the master EMU (EMU ID 0) is on disk shelf 0 (see the illustration on page 35).

How to connect the filer to the Dual StorageShelf 2: To connect the filer to the Dual StorageShelf 2, follow these steps.

Step	Action	Description
1	Connect the SCSI cable to the SCSI disk shelf connector labeled To/From Filer.	Use the connector on the first SCSI disk shelf in the dual configuration.
2	Connect the cable's other end to the adapter connector in slot 8.	This port A connector is labeled SCSI A.
3	To connect the second SCSI disk shelf pair, connect a SCSI cable to the connector labeled To/From Filer on the second disk shelf pair and to the filer's adapter connector on the chassis drawer labeled SCSI PORT 8B.	Caution_____ Make sure that you connect the first SCSI disk shelf pair to port A of the SCSI adapter in slot 8 (not slot 7) and the second disk shelf pair to port B on the same adapter. _____ The illustration on page 35 shows the filer connected to two Dual StorageShelf 2 pairs. The disk shelf IDs should be set as shown in this illustration.
4	Connect the master EMU (labeled EMU ID 0) to the filer's connector labeled DIAGNOSTIC.	Make sure all EMU addresses are unique. Use the provided RS-232 cable. This EMU connection allows the filer to log problems related to the disk shelf temperature, fans, and power supplies. For more information, refer to the <i>Hardware Guide for the NetApp StorageShelf 2</i>.

Step	Action	Description
5	Make sure that each Dual StorageShelf 2 is terminated.	Each Dual StorageShelf 2 is terminated on the first disk shelf in the dual disk shelf configuration.

Second SCSI connector, labeled SCSI PORT 8B

First SCSI connector, labeled SCSI A

Connector, labeled DIAGNOSTIC

Terminator

Connector, labeled TO/FROM FILER

RS-232 cable

First Dual StorageShelf 2

Second Dual StorageShelf 2

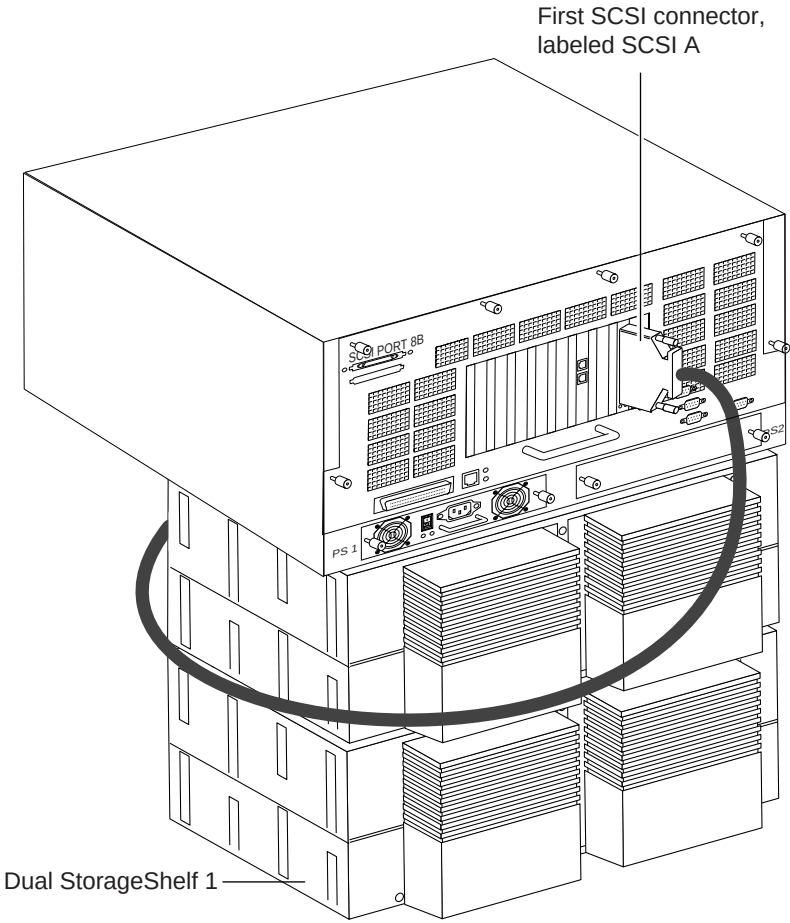
Connector, labeled TO/FROM FILER

Terminator

How to connect the filer to the Dual StorageShelf 1: To install the Dual StorageShelf 1, refer to the *Hardware Guide for the Digital Disk Shelves*.

To connect the filer to the Dual StorageShelf 1, follow these steps.

Step	Action	Description
1	Make sure that the SCSI cable is connected to the disk shelf SCSI connector.	Use the connector on the first disk shelf in the dual-shelf configuration. The SCSI connector is on the front of the disk shelf.
2	Connect the cable's other end to the filer's first SCSI connector, labeled SCSI A.	

Step	Action	Description
3	Secure both connectors by tightening the thumbscrews on the connectors.	 First SCSI connector, labeled SCSI A Dual StorageShelf 1

Connecting the filer to a tape backup device

The built-in SCSI interface is for backup

The F700 series filer has a built-in wide differential SCSI tape interface for connecting an external tape backup device.

Caution

Check the NOW Web page at <http://now.netapp.com> to make sure that your external SCSI tape backup device is supported. An unsupported tape backup device might cause the filer to halt.

Required cabling

The following cabling is required.

SCSI cable	Maximum length
68-pin SCSI	17 ft. (5m)

How to connect the filer to a tape backup device

To install the tape backup device, refer to the documentation shipped with the tape device.

To connect the filer to a tape device, follow these steps.

Step	Action	Description
1	Make sure that the filer is shut down.	If it is not, execute the halt command, then turn off the power on the power supply. If the filer has two power supplies, turn off both power supplies.
2	Set the SCSI ID on the tape backup device	Refer to the documentation for the tape backup device. If you have a robotic loader on the tape backup device, set its SCSI ID also.
3	Turn off the power on the tape backup device.	Caution _____ The power must always be off on the tape device when you connect it to or disconnect it from the filer. If it is not, you might damage the filer's SCSI controller. _____

Step	Action	Description
4	Connect the SCSI cable to the SCSI connector on the tape device and the built-in SCSI connector on the filer, labeled SCSI TAPE.	Use the SCSI cable provided with the tape backup device. Caution _____ Do not use any other SCSI connector on the filer.
5	Terminate the SCSI bus at the tape backup device.	Use an active SCSI terminator. For information about terminating the SCSI bus, refer to the documentation for your tape backup device. The following illustration shows a SCSI cable connected to the tape backup device and to the connector, labeled SCSI TAPE.

The diagram illustrates the physical connection of a SCSI cable between a filer and a tape backup device. The filer (top unit) has a connector labeled 'SCSI TAPE'. A SCSI cable runs from this connector down to the SCSI tape backup device (bottom unit), where it is connected to a SCSI terminator. The middle unit is the Fibre Channel StorageShelf. Labels with leader lines identify the 'Connector, labeled SCSI TAPE', 'SCSI cable', 'SCSI terminator', 'Filer', 'Fibre Channel StorageShelf', and 'SCSI tape backup device'.

Connecting the filer to the network

Available network connections

You can connect the filer to multiple networks.

This section describes how to connect your filer to an Ethernet, FDDI, or ATM network.

During your initial purchase, you order the NICs you need. The filer is shipped with the NICs installed. You can also order additional NICs later.

The NICs’ connectors fit through the slot openings in the filer’s back panel.

The following table gives a summary of all available network connectivity.

Standard network connectivity	Optional network connectivity
Built-in 10/100Base-T Ethernet	◆ Additional 10/100Base-T and GB (1000Base-T) Ethernet ◆ FDDI ◆ ATM Note_____ For specific information about the cards supported by your filer, see the NOW Web page at http://now.netapp.com.

Connecting to an Ethernet network

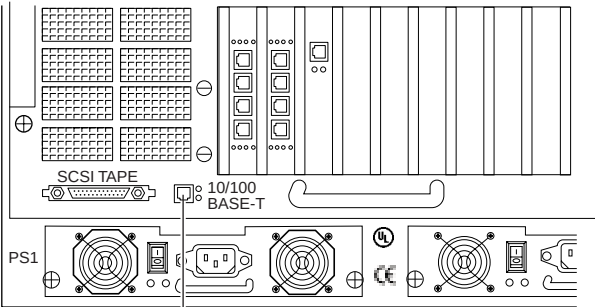
The F700 series supports three types of Ethernet NICs: a single-port 10/100Base-T, a quad-port 10/100Base-T, and a GB Ethernet.

Ethernet cabling requirements: The cabling requirements for Ethernet connections are listed in the following table.

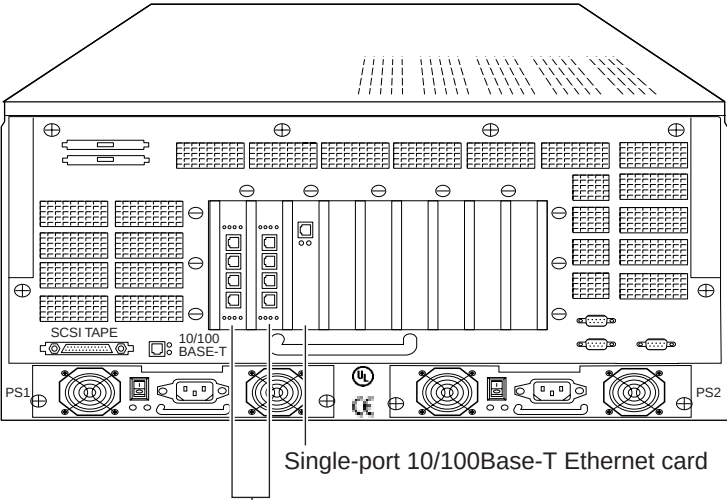
Ethernet connector	Cabling requirements
10Base-T	Category 3 or 5 unshielded twisted-pair (UTP) cable. ^a
100Base-TX	Category 5 UTP cable. ^a
GB Ethernet	Fiber cable.

a. Do not exceed the maximum cable length specification.

How to connect the filer to a 10/100Base-T Ethernet network: To connect the filer to a 10/100Base-T Ethernet network, follow this step.

Step	Action	Description
1	Push the twisted-pair cable connector into the filer’s built-in RJ-45 connector, labeled 10/100Base-T, until it clicks and locks into place.	Use category 3 (10Base-T only) or category 5 (10/100Base-T) unshielded twisted-pair (UTP) cable. The following illustration shows the built-in Ethernet connector. 

How to connect the filer to other Ethernet networks: To connect the filer to other Ethernet networks, follow this step.

Step	Action	Description
1	Connect the appropriate cable to the Ethernet card's connector.	The following illustration shows two quad-port 10/100Base-T cards in slots 1 and 2 and one single-port card in slot 3.  Single-port 10/100Base-T Ethernet card Two quad-port 10/100Base-T Ethernet cards

Connecting to an FDDI network

You can connect the filer to one of three available FDDI network configurations.

The following table describes the three FDDI configurations you can use.

Single-attached FDDI configuration	Dual-attached FDDI configuration	Optical bypass configuration
Single-attached FDDI TP card ^a	Dual-attached FDDI fiber card	Dual-attached FDDI fiber card

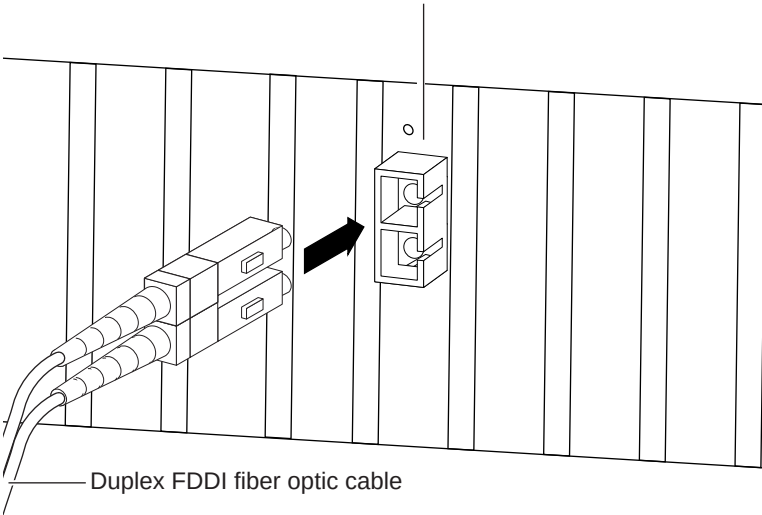
- a. In this configuration, you can also use the single- and dual-attached FDDI fiber cards (one port only with the latter).

FDDI cabling requirements. The FDDI cabling requirements are listed in the following table.

FDDI card	Cabling requirements
FDDI-TP (single-attached)	Category 5 unshielded twisted-pair (UTP) or Category 5 sheath-shielded, 100-ohm twisted-pair (TP) cable with a TP-MIC plug. ^a RJ-45 connector.
FDDI fiber (single-attached or dual-attached)	Duplex 62.5/125 micron or 50/125 micron multimode fiber optic cable with SC connectors. ^a Duplex SC connector.

- a. Do not exceed the maximum cable length specifications in the appropriate FDDI ANSI (American National Standards Institute) standard.

How to connect the filer to a single-attachment FDDI network: To connect the filer to a single-attachment FDDI network, follow this step.

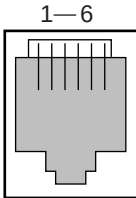
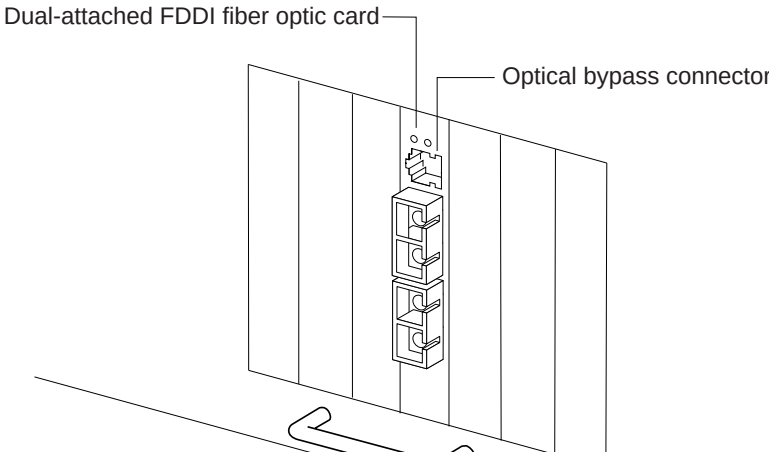
Step	Action	Explanation
1	With a single-attached FDDI-TP or fiber card, push the cable connector into the card's connector until it clicks and locks into place.	Use the appropriate cable for the FDDI card (FDDI-TP or FDDI fiber). You can connect to an FDDI single-attachment station or a concentrator. The following illustration shows a duplex FDDI fiber optic cable connecting to a single-attached FDDI fiber card.
Single attached FDDI fiber card  Duplex FDDI fiber optic cable Note You can use a dual-attached FDDI fiber card with a single-attachment FDDI network. Push the cable connector into the card's top connector (port B) until it clicks and locks into place. Leave the card's bottom connector unused.		

How to connect the filer to a dual-attachment FDDI network: To connect the filer to a dual-attachment FDDI network, follow these steps.

Step	Action	Explanation
1	To connect port A, push a duplex FDDI fiber optic cable connector into the card's bottom connector (port A) until it clicks and locks into place.	The following illustration shows port A and port B on the dual-attached FDDI fiber card and two duplex FDDI fiber optic cables.
2	To connect port B, push a cable connector into the card's top connector (port B) until it clicks and locks into place.	(Use port B, if you want to connect only a single port.)

The diagram illustrates the physical connection of two duplex FDDI fiber optic cables to a dual-attached FDDI fiber card. The card is shown with two ports, Port A (bottom) and Port B (top). Two duplex FDDI fiber optic cables are shown being inserted into the ports. A label 'Dual-attached FDDI fiber card' points to the card itself. A label 'Two duplex FDDI fiber optic cables' points to the cables. Labels 'Port B' and 'Port A' point to their respective ports. A small metal bracket is shown below the card.

How to connect the filer using an optical bypass switch: To connect the filer to an FDDI network using a bypass switch, follow these steps.

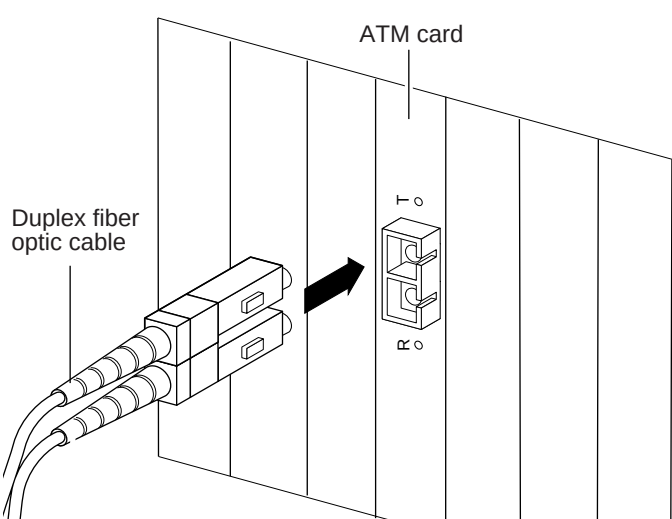
Step	Action	Explanation								
1	Make sure that the pin settings on the card's RJ-12 modular connector (optical bypass connector) match the settings in the table on the right.	RJ-12 modular connector 								
		RJ-12 pin settings <table><tr><th>Pin</th><th>Function</th></tr><tr><td>1 and 2</td><td>Relay drive: +5.0 V DC</td></tr><tr><td>3 and 4</td><td>Bypass_enable</td></tr><tr><td>5</td><td>Bypass_present</td></tr><tr><td>6</td><td>Return: grounded internally</td></tr></table>	Pin	Function	1 and 2	Relay drive: +5.0 V DC	3 and 4	Bypass_enable	5	Bypass_present
Pin	Function									
1 and 2	Relay drive: +5.0 V DC									
3 and 4	Bypass_enable									
5	Bypass_present									
6	Return: grounded internally									
2	Connect the cable to the card's RJ-12 connector and to the bypass switch.	Refer to the documentation for the bypass switch for information about cabling. The following illustration shows the RJ-12 connector on the dual-attached FDDI fiber card. 								

Connecting to an ATM network

ATM cable requirements: The ATM cable requirements are listed in the following table.

ATM cabling requirements	Description
Duplex 62.5/125 micron multimode fiber optic cable with SC connector.	Observe the maximum cable length specifications listed in the appropriate ATM Forum UNI (User Network Interface) standard.

How to connect the filer to an ATM network: To connect the filer to an ATM network, follow this step.

Step	Action	Explanation
1	Push the duplex fiber optic cable connector into the card's connector until it clicks and locks into place. 	The following illustration shows a duplex fiber optic cable connecting to the ATM card. Note— The Transmit port on the ATM card is labeled T and the Receive port is labeled R.

Establishing a terminal connection to the filer

After the filer is connected to the network

At this point, the filer, disk shelves, and tape backup device are connected and the filer is connected to the network.

You are ready to power on the system. Before you do so, it is a good idea to establish a terminal connection to the filer so that you can observe the system responses on the terminal screen when the system is started. You also need a terminal to set up the filer after you start it.

Connecting an ASCII terminal

You can establish a connection to the filer from an ASCII terminal, serial concentrator, or communications server.

This section describes how to connect an ASCII terminal (also referred to as an *ANSI terminal*) to the filer and how to verify the filer and disk shelf installations.

Cable requirements: A DB-9-to-DB-9 straight-through serial cable for an ASCII terminal connection is provided with your filer. If this cable is not compatible with your terminal connector, use a null modem cable.

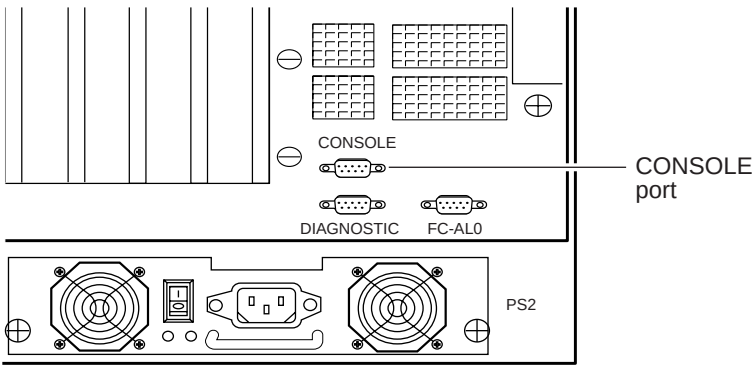
The filer’s DB-9 serial port supports only DTE devices, not DCE devices such as modems. Most terminals are wired as DTE devices.

Note _____
To use a serial concentrator or communications server, refer to the documentation for those devices.

CONSOLE port pin settings: The following table lists the pin settings for the DB-9 CONSOLE port.

DB-9 pin	Function	DB-9 pin	Function
1	Data Carrier Detect	5	Ground
2	Receive Data	6	Data Set Ready
3	Transmit Data	7	Request to Send
4	Data Transmit Ready	8	Clear to Send

How to connect an ASCII terminal to the filer: To connect an ASCII terminal to the filer, follow these steps.

Step	Action	Description
1	Make sure that the terminal settings match the filer's.	The filer and terminal settings must be as follows: 9600 baud, 8 data bits, no parity, 1 stop bit. Refer to the documentation for your terminal. Note_____ The terminal does not work properly if its settings do not match. _____
2	Connect the cable's socket end to the filer's plug connector, labeled CONSOLE.	Use the provided DB-9-to-DB-9 serial cable. The following illustration shows the location of the CONSOLE port.  The diagram illustrates the rear panel of the filer. On the left, there are five vertical slots. To the right of these slots are four DB-9 connectors arranged in a 2x2 grid. The top-left connector is labeled 'CONSOLE' with a line pointing to it. Below the DB-9 connectors are two other connectors labeled 'DIAGNOSTIC' and 'FC-AL0'. To the right of the DB-9 connectors is a vertical line with a circle and a plus sign, labeled 'CONSOLE port'. At the bottom of the panel, there are two large circular fans, a central power jack labeled 'PS2', and two circular ports with concentric circles.

About connecting from a remote site: If you are connecting an ASCII terminal from a remote site, be sure that you do not have a local terminal connected to the filer's CONSOLE port.

Connecting the system to a power source

Powering on all units in the system

You power on the units in the system in this order:

- ◆ Disk shelves and tape backup device (any order)
- ◆ Filer last

Caution

It is important that the filer is the last unit that you power on.

The disk storage shelves and disk drives require time to power on, reset, and prepare to respond to the filer. The filer expects them to be ready for input/output when it powers on and does its reset and self-test.

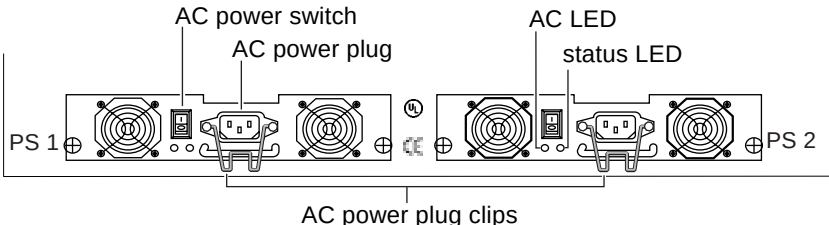
The power-on process automatically

- ◆ Checks all connections to the filer
- ◆ Starts the `setup` program

This section uses a system with three units as an example—filer, disk storage shelf, and tape backup device. Assume that you have these three units installed and connected in a rack and are ready to power them on.

How to power on the disk shelves and tape backup device: To power on the disk shelves and tape backup device, refer to the documentation for those products.

How to power on the filer: To connect the filer to a power source, follow these steps.

Step	Action	Description
1	Make sure that the power switch on each power supply is in the Off position.	
2	Connect the socket end of the power cord to the recessed power plug on the power supply.	
3	Secure the AC cord with the retaining clip.	Each power supply has a retaining clip for securing the AC power cord. The following illustration shows two power supplies.  The diagram shows two power supply units, labeled PS 1 and PS 2. Each unit has a fan on the left, a power switch in the center, and an LED indicator on the right. A power plug is shown inserted into a recessed socket on the front of each unit. A retaining clip is shown securing the power plug. Labels with leader lines point to the 'AC power switch', 'AC power plug', 'AC LED status LED', and 'AC power plug clips'.
4	Plug the other end of the power cord into a grounded electrical outlet.	
5	Repeat Steps 1 through 4 if you have a second power supply.	Caution _____ Make sure that you connect the second power supply to a separate AC circuit. _____
6	Turn the power switch on the power supplies to the On position.	The system verifies the filer hardware and loads the operating system.

Step	Action	Description
7	Make sure that the LEDs on the front panel and the AC LED on the power supplies illuminate, as indicated in the Description column.	LEDs on front panel Power Turns green. Status Turns yellow, then turns off when the filer starts. AC LED on power supply Yellow First turns yellow to indicate that AC power is present. Green Then turns green to indicate that all outputs are good. If this does not happen, call Network Appliance Technical Support.
8	Check the startup messages as they appear on the console or LCD. At the end of the initial startup, the default host name prompt <i>toaster></i> appears on the console screen.	The startup messages are described on page 68. The filer is ready to be configured.
9	Proceed to the <i>Getting Started Guide</i> .	To install a cluster system, refer to the <i>First-Time Configuration Guide</i> .

Using LED indicators and LCD messages

What this chapter covers

This chapter provides information about how to troubleshoot the F700 series hardware based on the filer's LED indicators and system error messages displayed on the LCD. It also provides a description of the startup messages that appear when you first start up the system. Some corrective actions require you to open the system chassis, reseal expansion cards, or replace hardware components. Refer to the *F700 Series Field Service Guide* or contact Network Appliance Technical Support for more information.

What this chapter does not cover

This chapter does not describe system problems related to software configuration, NFS, CIFS, or HTTP. Refer to the *Data ONTAP System Administrator's Guide* for information about troubleshooting software problems.

Chapter contents

This chapter contains the topics described in the following table.

Read...	To learn about...
“LEDs on the front and back panels” on page 55	Which LEDs are on the front panel and which are on the back panel.
“LEDs on the Ethernet network cards” on page 59	What the LEDs on the Ethernet cards indicate.
“LEDs on the FDDI network cards” on page 62	What the LEDs on the FDDI cards indicate.
“LEDs on the ATM network card” on page 64	What the LEDs on the ATM cards indicate.
“LEDs on the SCSI adapter” on page 65	What the LEDs on the SCSI adapters indicate.
“LCD messages” on page 67	The LCD messages that report system status, events, and errors.

How the LEDs and LCD work

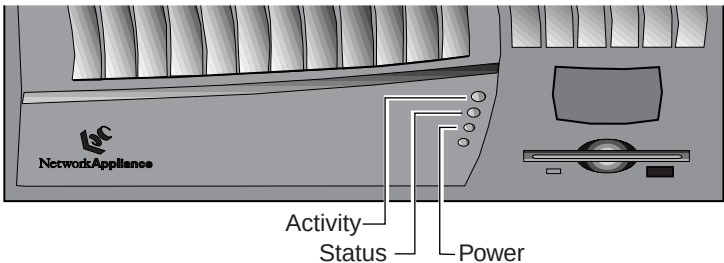
The LEDs and LCD are controlled by a built-in environmental controller/sensor on the motherboard that functions as the interface between them and the processor. This controller/sensor monitors environmental conditions, such as the temperature and fan status, and displays signals on the LEDs and messages on the LCD.

Should any corrective action be required, the LCD displays a message. Refer to “LCD messages” pages 67 to page 71 to determine what corrective action is required for a particular message.

LEDs on the front and back panels

Front panel LEDs

The following illustration shows the LEDs on the front panel.

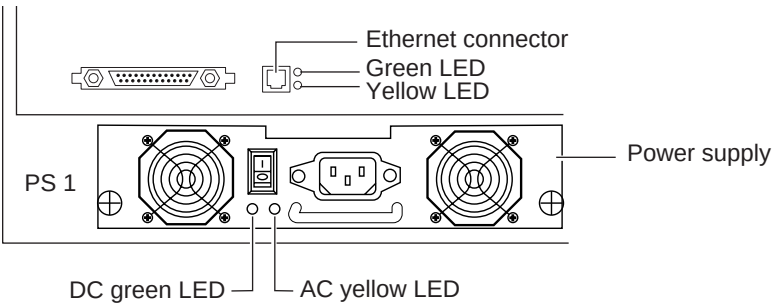


The following table describes the three LEDs on the front panel.

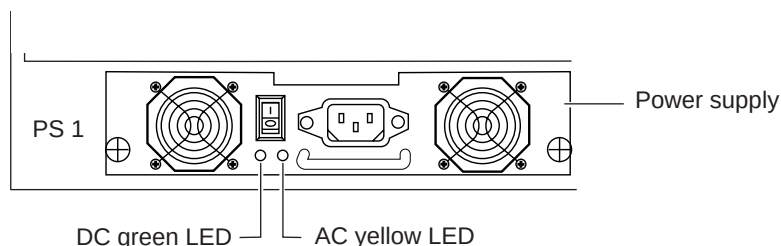
LEDs	State	Indicates
Activity	Green	Operation/activity is normal.
	Flashing	CPU or network activity detected.
	Off	No activity detected.
Status	Green	The system is operating normally.
	Yellow	A fault has occurred or the system has halted. The system requires service. Refer to the LCD message for a description of the system problem. The LCD message STDBY/SERV means the filer is in standby mode—a product feature to be implemented in a future software release. NOTE: The Status LED turns yellow when you turn on the filer and stays lit while the operating system is loading. It turns off when the filer starts.
Power	Green	On—The system is on.
	Off	Off—The system is down.

Back panel LEDs

The following illustration shows the Ethernet connector and power supply LEDs on the back panel.



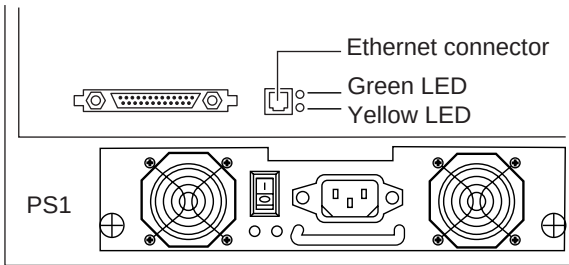
Power supply LEDs: The following illustration shows the power supply LEDs.



The following table describes the power supply LEDs.

LEDs	State	Indicates
DC	Green	On—DC output power is good. Off—DC output power is not good. If the DC green LED is off, replace the power supply. If your filer has two power supplies and one power supply fails, the message, Power supply degraded . . . appears on the LCD. A similar message appears on the system console telling you which power supply failed. The message, Power good, also appears on the LCD and console, indicating that the second power supply is maintaining the filer.
AC	Yellow	On—AC signal is good. Off—AC signal is not good. If the AC LED is off and your filer has only one power supply, it means that your filer has no power. (The power LED on the front panel is also off.) If your filer has two power supplies, the second power supply takes over and maintains the filer. In either case ◆ Make sure that the power supply is fully installed and locked into place. ◆ Make sure that the power switch is in the On position. ◆ Check the power source. ◆ If the preceding actions do not correct the problem, contact Network Appliance Technical Support for help.

Built-in Ethernet connector LEDs: The built-in 10/100BASE-T Ethernet connector has two LEDs, as shown in the following illustration.



The following table describes the LEDs for the built-in 10/100BASE-T Ethernet connector.

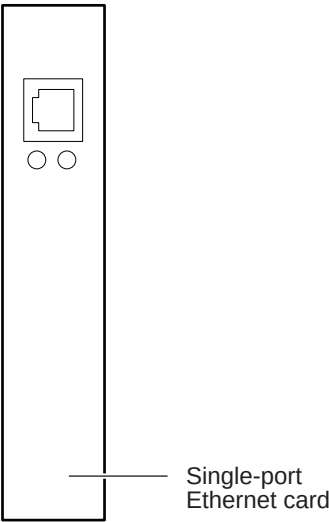
LEDs	State	Indicates
Top	Green	On—Ethernet connection is ready. Off—No Ethernet connection is present.
Bottom	Yellow	On—Traffic is passing on the network. Off—No traffic on the network.

LEDs on the Ethernet network cards

Single-port and quad-port Ethernet card LEDs

The filer supports a single-port 10/100BASE-T and a quad-port 10/100BASE-T Ethernet card.

Single-port 10/100BASE-T card LEDs: The single-port 10/100BASE-T Ethernet card has one connector and two LEDs, as shown in the following illustration.

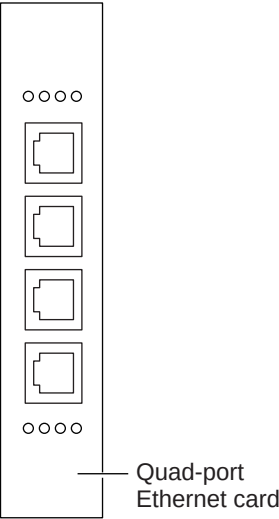


The following table describes the LEDs on the single-port Ethernet card.

LEDs	State	Indicates
Left	Yellow	On—Traffic is flowing through the card. Off—No traffic is present.
Right	Green	On—Link to the network is valid. Off—No link to the network is present.

Quad-port 10/100BASE-T card LEDs: The quad-port Ethernet card has four connectors for four channels, with the top connector assigned to the first channel. Each connector has a corresponding yellow and green LED.

The four LEDs at the top are for the first and second channel. The four LEDs at the bottom are for the third and fourth channel, as shown in the following illustration.

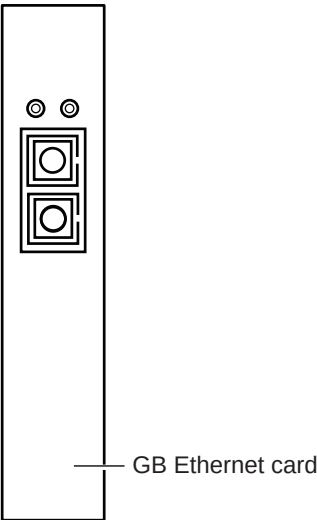


The following table describes the pair of yellow and green LEDs for a single channel.

LEDs	State	Indicates
First	Yellow	On—Traffic is flowing through the card. Off—No traffic is present.
Second	Green	On—The link to the network is valid. Off—No link to the network is present.

GB Ethernet card LEDs

The GB Ethernet card has one connector and two LEDs, as shown in the following illustration.



The following table describes the LEDs on the GB Ethernet card.

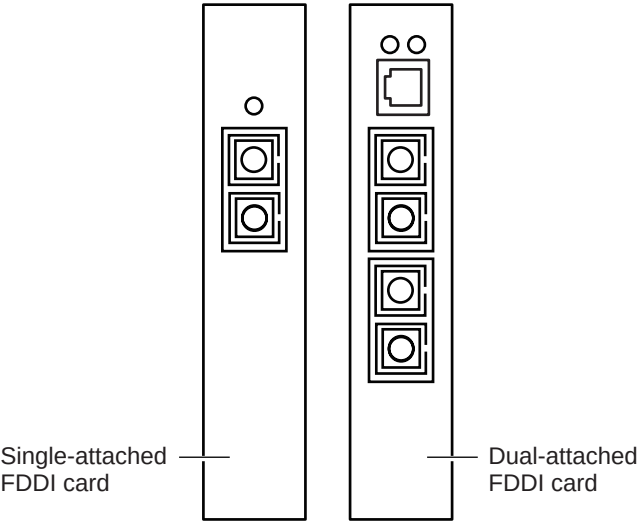
LEDs	State	Indicates
Network activity	Yellow	On—The network is active. Off—The network is not active.
TP (twisted-pair) link	Green	On—The link is operating properly. Off—The link has failed.

LEDs on the FDDI network cards

Single- and dual-attached FDDI card LEDs

The single-attached FDDI TP and fiber cards have a single green LED for its single duplex connector; the dual-attached FDDI card has a green LED for each of its two connectors. The following illustration shows the FDDI single-attached and dual-attached fiber cards.

During normal operation, the green LED is on.



The following table describes the possible problems that the LED might signal and corrective action for each problem.

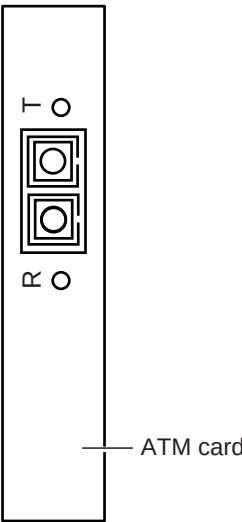
LED	Problem	Corrective action
Flashes green	A cable connected to the card is faulty.	Try another FDDI cable.
	One or more fiber optic cables are connected incorrectly to the FDDI card.	Make sure that the top Transmit port on the card is connected to the Receive port on the other FDDI device and that the bottom Receive port on the card is connected to the top Transmit port on the other FDDI device.
	The concentrator is faulty.	Connect the card to another concentrator.
Stays yellow	A problem exists on the network.	1. Disconnect the card from the network. If the LED flashes green, the card is functional. 2. Reconnect the card to the network using the same cable, then using a new cable; or, connect the card to another concentrator. If the LED is still yellow, the card is not functional. 3. Restart the filer to clear the problem. If the LED is still yellow, replace the card.
Flashes yellow	The card is connected to an invalid network configuration.	Use the card in a proper network configuration.
Cycles sequentially from yellow, to green, then back to yellow	The cable between the card port and the concentrator is faulty. If the problem persists, the card or the concentrator might have a problem.	Replace the cable.
Stays off		Caution_____ Contact Network Appliance Technical Support to determine the cause of the problem. _____

LEDs on the ATM network card

The ATM card

The ATM card has a single duplex connector and two LEDs, as shown in the following illustration.

Note—
The position of the LEDs might be different on your card.



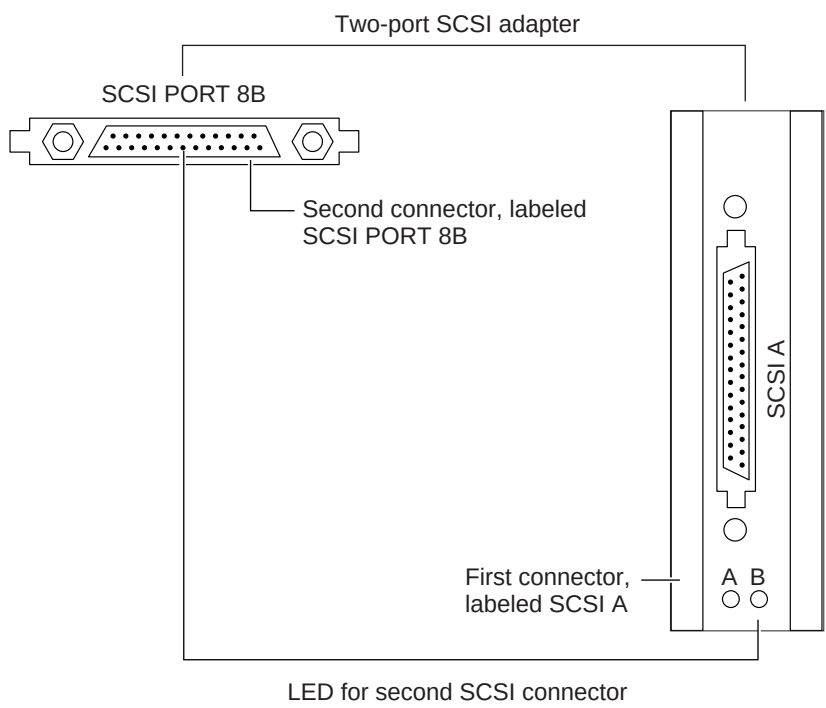
The following table describes the LEDs on the ATM card.

LED	Color	Function
Top Transmit	Green	On—The card is transmitting traffic. Off—The card is not transmitting traffic.
	Yellow	The receiving device has a problem. A SONET (Synchronous Optical Network) alarm condition has been declared.
Bottom Receive	Green	On—The card is receiving traffic. Off—The card is not receiving traffic.
	Red	The card’s connection to the carrier is lost.

LEDs on the SCSI adapter

The SCSI disk adapter

The two-port, wide differential SCSI adapter for SCSI disk storage has two connectors and an LED for each connector. The following illustration shows the adapter’s first connector, labeled SCSI A, in slot 8, and the second connector on the chassis drawer labeled SCSI PORT 8B.



The following table describes the two LEDs, which behave the same way.

LEDs	Color	Function
Left LED—A port Right LED—B port	Green	Lights and blinks when the card detects activity on the corresponding SCSI bus.

**About the built-in
SCSI tape adapter**

The filer has a single-port, wide differential SCSI adapter for tape backup on the back panel. This adapter has no LEDs.

LCD messages

Types of LCD messages

The system reports its status, error, and diagnostic messages on the LCD and system console.

Most LCD messages are truncated versions of console messages that provide more information about the error condition than the LCD messages.

The LCD messages can be grouped into four types.

Type of LCD Message	Description
Startup messages	Indicate the results of the POSTs (power-on self-tests) and the status of the boot process.
Error messages at startup	Appear when the system is starting.
Informational or error messages	Appear when the system is operating.
Error messages when halting	Show the system has halted or is restarting because of system problems

About this section

This section identifies and describes the different types of messages on the LCD and suggests corrective actions for problems associated with the message.

Some of the corrective actions require you to open the system chassis, reseal expansion cards, install or remove SIMMs, or replace hardware components. Refer to the F700 Series Field Service Guide for information about how to do these things or contact Network Appliance Technical Support.

The system console messages are logged to /etc/messages. If you contact Network Appliance Technical Support for service, report both the LCD and the console message.

Startup messages

When the system is powered on, it verifies the hardware, loads the operating system, and displays the startup messages on the LCD and console, if the console is connected.

The console startup messages are described on pages 71 through 78.

When starting up from a system boot diskette: If you are starting the system from a system boot diskette, the system does not display the system prompt after it is started. Instead, it asks you for input. The LCD displays the following message: Waiting for user input

For more information about starting the system boot diskette, refer to the *Data ONTAP System Administrator's Guide*.

Types of startup messages: You see two types of startup messages.

Startup Messages	Appear
POST messages	Immediately after you power on the filer.
Boot messages	When the filer is loading the operating system.

POST messages: When you turn on the power, the filer checks the hardware on the system board by running a series of POST tests from a PROM (Programmable Read-Only Memory).

The following list is a sample of messages that appear on the system console when the POSTs are running. The exact messages that appear on your system console depend on your system configuration.

Alpha Open Firmware by FirmWorks

Copyright 1995-1998 FirmWorks, Network Appliance. All Rights Reserved.

Firmware release 2.0_a2

Memory size is 512 MB

Testing SIO

Testing LCD

Probing devices

Testing 512MB

Complete

Finding image...

Starting

If you do not have a system console connected to the filer, you can observe the POST messages on the LCD.

Sample POST messages on the LCD: The following list is a sample of POST messages that appear on the LCD.

Checking sensors
Testing clock
Testing floppy
Testing watchdog
Testing 256MB
Complete
Probing devices

POST Error message on the LCD: The following list gives the possible error messages on the LCD if the filer encounters errors during the POSTs.

Startup failed
ok>

If this error message appears, contact Network Appliance Technical Support. The ok> prompt accepts debugging commands, which are reserved for authorized service personnel only.

*SIO error	*FLPY seek err
*Watchdog failed	*FLPY track err
*L2 parity error	*FLPY head err
*Fan(s) stopped	*FLPY format err
*CPU fan stopped	*FLPY read error
*Overtemp alert	*FLPY setup err
*PS #1 failed	*LCD won't open
*PS #2 failed	*LCD cmd stall
*No power info!	*LCD cursor err
*Clock bogus. Date reset	*LCD data error
*Env-A stat err	*Clock error
*Env-B stat err	*Clock dead
*Env-C stat err	*Clock reset
*Env-A rupt err	
*Env-B rupt err	
*Env-C rupt err	
*FP button stuck	
*FLPY init fail	
*FLPY reg error	

Boot messages: If the hardware passes all POSTs, the filer begins to load the filer software and display the boot messages.

The following table shows a sample message that appears on the system console when the filer is successfully started. The exact boot messages that appear on your system console depend on your system configuration.

Note

If you are starting the system from a system boot diskette, some messages might be different from the following messages. Refer to the *Data ONTAP System Administrator's Guide* for information about how the filer is started from a system boot diskette.

Boot Messages
NetApp Release /n/rufus/users/fiona/test/0528rroman: Fri May 29 14:57: 51 PDT 1998
System ID: 0016777216 ()
slot 0: System Board
Memory Size: 512 MB
slot 0: Fibre Channel adapter
Version 1.12
Host Loop Id 119
Cache Line size 8 FC Packet size 2048
7 Disks: 60.2GB
1 shelf with Eurologic EDM
SCSI Host Adapter 0b
In-Band Enclosure Services
slot 0: Ethernet Controller e0
MAC Address: 00:c0:94:00:13:12 (auto-100tx-fd-up)
slot 3: Ethernet Controller e3
MAC Address: 00:a0:92:f7:62:56 (tp-down)
slot 9: NVRAM
Memory Size: 32 MB
Please enter the new hostname []:

Error messages at startup

If the system detects an error when starting, it displays one of the following error messages on the LCD.

Error Message	Description
Add at least xMB more memory	x—The amount of memory you need to add to the system. The system has too little memory for the amount of disk space installed. For information about system memory requirements for the F700 series filers, refer to NOW at http://now.netapp.com .
Cannot initialize labels	When it tries to create a new file system, the system cannot initialize the disk labels. Usually, you do not need to create and initialize a file system; do so only after consulting Network Appliance Technical Support.
Cannot read labels	This error occurs only when the filer tries to initialize a new file system. The message indicates that the filer has a problem reading disk labels it wrote to the disks. This error occurs because ◆ The system fails to read the size of a disk. ◆ The written disk labels were not valid. Usually, you don't need to create and initialize a file system; do so only after consulting Network Appliance Technical Support.

Error Message	Description
Can't open /etc/rc	The /etc/rc file is corrupted. Run setup by entering setup at the hostname> prompt. The setup program prompts you to enter the necessary system configuration information. Answer the system prompts using the information you recorded in the filer configuration information form in the <i>Getting Started Guide</i>. For more information about the filer setup program, refer to the <i>Data ONTAP System Administrator's Guide</i>.
Dirty shutdown in degraded mode	The file system might be inconsistent because you did not shut down the system cleanly when it was in degraded mode. Contact Network Appliance Technical Support for instructions about repairing the file system.
Configuration exceeds max PCI space	Memory space for mapping in PCI cards has been exhausted, because either ◆ Too many PCI cards are in the system ◆ A card is demanding too many resources Make sure that all expansion cards in the filer are supported cards. Contact Network Appliance Technical Support for help. Have a list ready of all expansion cards installed in the filer.
Disk labels scrambled!	The disk labels are corrupted. Contact Network Appliance Technical Support for help.

Error Message	Description
Drive <i>m.n</i> not SCSI-2	<i>m</i>—The drive SCSI number; <i>n</i>—The drive SCSI ID number. The system detects a disk or tape drive that does not support the SCSI-2 protocol. Replace the drive with one that supports the protocol. To determine the SCSI adapter number and the disk or tape drive number, refer to the <i>Data ONTAP System Administrator's Guide</i>.
Drive <i>m.n</i> not supported	<i>m</i>—The disk number (FC-AL or SCSI); <i>n</i>—the disk ID number. The system detects a disk or tape drive that is not supported by Network Appliance. Check the Network Appliance price list to verify that the disk or tape is supported by the filer.
EMU rev x not qualified	The EMU revision level is not recognized. Contact Network Appliance Technical Support for help.
Drive placement ha x shelf y	ha—host adapter, x— host adapter number, y—disk shelf number. The specified drives are incorrectly placed in the disk shelf. For more information, refer to the manual for the specific disk shelf.
EMU y not supported	The EMU firmware revision or part number is not valid. Contact Network Appliance Technical Support for help.

Error Message	Description
File system may be scrambled	One of the following errors causes the file system to be inconsistent: ◆ An unclean shutdown when the filer is in degraded mode and when NVRAM is not working. Contact Network Appliance Technical Support to learn how to start the system from a system boot diskette and repair the file system. ◆ 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. Make sure that all disks on the system are properly installed in the disk shelves. ◆ The system encounters a read error while reconstructing parity. Contact Network Appliance Technical Support for help. ◆ A disk failed at the same time as the system crashed. Contact Network Appliance Technical Support to learn how to repair the file system.
Invalid PCI card slot <i>n</i>	<i>n</i>—The card's expansion slot number. The system detects an expansion card that is not supported by Network Appliance. Replace the unsupported card with a card that is included in the Network Appliance price list.

Error Message	Description
No disks!	The system can detect SCSI controllers but not the disks. Verify that ◆ All disks are installed properly in the disk shelf. ◆ If the disk shelf is the first disk shelf in a daisy chain, both ends of the long SCSI cable connecting the disk shelf to the system chassis are secure. If the disk shelf is the second shelf in a daisy chain, that the ends of the short SCSI cables connecting the second disk shelf to the first disk shelf are secure. If the problem persists, use another SCSI cable, then power-cycle (turn the power off, then on again) the disk shelf and reseal the SCSI card. If you still have the problem, contact Network Appliance Technical Support because the SCSI card might be faulty.
No <i>/etc/rc</i> , running setup	The system cannot find the <i>/etc/rc</i> file. It automatically starts setup and prompts you to enter the necessary system configuration information. Answer the prompts on the system console. Use the information you recorded in the filer configuration information form in the <i>Getting Started Guide</i> to answer the setup prompts. Refer to the <i>Data ONTAP System Administrator's Guide</i> for more information about filer setup.

Error Message	Description
No network interfaces!	The system cannot detect any network interfaces. Turn off the system and verify that all network cards are seated properly in the appropriate expansion slots. If the problem persists, contact Network Appliance Technical Support.
No NVRAM present	The system cannot detect the NVRAM card. Make sure that the NVRAM card is securely installed in expansion slot 9.
No FC-AL or SCSI disk controllers!	The system cannot detect any FC-AL or SCSI controllers. Turn off the power on the filer and verify that all network cards are properly seated in the appropriate expansion slots.
No SES on shelf <i>x</i> ha <i>y</i>	ha—host adapter. Occurs if the Enclosure Services in the FC-AL drive racks have not initialized or have problems.
NVRAM <i>#n</i> downrev!	<i>n</i> —The serial number of the NVRAM card. The NVRAM card is an early revision that cannot be used with the system. See the corresponding message on the console for information about which revision of the NVRAM card is required. Replace the NVRAM card.
NVRAM test failed	The system NVRAM produces an error when the system is starting. Contact Network Appliance Technical Support if this message appears.
Replace NVRAM batteries!	The system is in degraded mode and both batteries on the NVRAM card are low or discharged. Replace both batteries immediately.

Error Message	Description
Unsupported NVRAM size xMB	x—The amount of memory on the NVRAM card. The specified size is not supported. Verify that the system has 8 MB, 16 MB, or 32 MB of NVRAM.
Unsupported SES shelf x, ha y	ha—host adapter. The system detects unsupported Enclosure Services hardware.

Informational or error messages

After the system has started, the LCD displays a number followed by a bar graph to indicate how many operations per second the system has processed.

If the system is not operating correctly, the LCD displays one of the following messages. Some of the errors described also cause the service LED on the system front panel to illuminate.

Error Message	Description
CIFS service disabled!	This message appears only if you have licensed CIFS. One of the following errors causes CIFS service to fail: ◆ The filer's <i>/etc/passwd</i> and <i>/etc/group</i> files are missing. To learn how to create new filer, refer to the <i>Data ONTAP System Administrator's Guide</i>. ◆ The filer failed to register its WINS host name and workgroup name with the WINS server. Using the <code>cifs setup</code> command, enter the host name and workgroup name. ◆ The WINS server has a problem. Refer to the documentation for your WINS server for information about troubleshooting the server. If the problem persists, contact Network Appliance Technical Support.

Error Message	Description
Data disk <i>n</i> <i>x</i> % rebuilt	<i>n</i>—The RAID group disk number; <i>x</i>—amount of data reconstruction completed. This shows how much data reconstruction has been completed on the spare disk after the system entered degraded mode. If an error occurs when the reconstruction is in progress, the error message overrides this message. Refer to the <i>Data ONTAP System Administrator's Guide</i> for information about how to locate a disk based on the RAID group disk number.
Disk <i>n</i> is broken	<i>n</i>—The RAID group disk number. The solution depends on whether you have a hot spare installed in the system. Refer to the <i>Data ONTAP System Administrator's Guide</i> for information about how to locate a disk based on the RAID group disk number and how to replace a faulty disk.
Fans stopped; replace them!	This message appears if the fan assembly of the filer stops functioning. Replace the fan assembly as soon as possible.
Fault on shelf <i>n</i>	<i>n</i>—The disk shelf number. This message appears when the system detects an error on one or more disk shelves. Check the LEDs of the specified disk shelf to see whether the fan or power supply needs to be replaced. Replace the faulty fan or power supply on the shelf, if needed.
Maintenance mode	The system is running in maintenance mode. Refer to the <i>Data ONTAP System Administrator's Guide</i> for more information about maintenance mode.

Error Message	Description
Non Maskable interrupt	This message is usually generated by a correctable (nonfatal) memory error, but might signal other conditions. If this message appears repeatedly, it might indicate a defective memory module (DIMM). Refer to the console messages or to the <i>/etc/messages</i> file for detailed information. Report the problem to Network Appliance Technical Support.
NFS service not enabled	This message appears only if you have licensed NFS. NFS service has been disabled either because the system failed to enable it when it started, or because you disabled it with the <code>nfs off</code> command.
Parity disk is broken	The parity disk is not operating and the system is in degraded mode. The solution depends on whether a hot spare is installed in the system. Refer to the <i>Data ONTAP System Administrator's Guide</i> for information about replacing a faulty disk.
Parity disk x% rebuilt	The system shows the amount of completed data reconstruction on the spare disk after the system entered degraded mode. x—Amount of data reconstructed. If an error occurs during reconstruction, the error message overrides this message.

Error Message	Description
Power supply degraded!	One of the power supply units is down. For more information about this error message, check the messages on the console. The power supply unit (1 or 2) generating the alarm is identified on the console message.
Replace NVRAM batteries!	This message appears in these situations: ◆ An NVRAM card battery is low or discharged. Replace both batteries as soon as possible. ◆ Both batteries on the NVRAM card are low or discharged. The system will shut down every 24 hours to encourage you to replace the batteries as soon as possible. To set the time that the system runs before it automatically shuts down, use the <code>raid.timeout</code> option with the <code>options</code> command. Refer to the <i>Data ONTAP System Administrator's Guide</i> for more information. ◆ Both NVRAM card batteries are low or discharged and the system is in degraded mode. The system shuts down immediately. You must replace the batteries.
Reporting SNMP traps and Setting up SNMP trap host	These messages appear briefly when the filer is reporting to the SNMP management host on SNMP trap conditions. Refer to the <i>Data ONTAP System Administrator's Guide</i> for information about SNMP administration and setting up SNMP management parameters.

Error Message	Description
Setting time from remote host	This message appears briefly when the filer is resetting its Time-of-Day Clock from a remote time source. For more information, see the <code>rdate</code> command in the <i>Data ONTAP System Administrator's Guide</i> .
<i>x</i> default route <i>x</i> route to <i>y</i>	These messages appear briefly when the routing software is configuring the routing table. For more information, refer to the <i>Data ONTAP System Administrator's Guide</i> .

Note

The following SES error messages might also appear during system operation:
 Drive placement ha *x* shelf *y*, No SES on shelf *x* ha *y*, Unsupported SES shelf *x*,
 ha *y*.

Error messages when halting

If a system problem has caused the system to halt or restart, the LCD displays one of these messages.

Error Message	Description
CPU fan has failed	The filer's CPU fan has stopped functioning. The system automatically shuts down. Replace the CPU fan before you restart the system.
Dumping core	The system is dumping core after a system crash. Write down the system crash message on the system console and report the problem to Network Appliance Technical Support. For information about core files, refer to the <i>Data ONTAP System Administrator's Guide</i>.
Disk hung during swap!	A disk error has occurred as you were hot swapping a disk. To recover from this error, disconnect the disk shelf from the power supply and wait 15 seconds to allow all disks to spin down. Reconnect the power source to the disk shelf and enter boot to restart the system.
Error dumping core	The system cannot dump core during a system crash; the system restarts without dumping core. Report the problem to Network Appliance Technical Support.
Halted	This message appears after you enter a halt command or after the system is halted automatically because of a problem. If an error message appears during the restart, follow the instructions suggested in this chapter to fix the problem, or contact Network Appliance Technical Support.

Error Message	Description
ISA IOCHK	Contact Network Appliance Technical Support for help and report the machine check code.
Panicking	The system is crashing. If the system does not hang while crashing, the message, Dumping core , appears.
Rebooting	The system is restarting. The boot messages follow.
Replace NVRAM batteries!	Both NVRAM batteries are discharged. The system automatically shuts down. Replace both batteries before you restart the system.
System error: errsts%x	%x—An error code representing a specific error condition. The system detects a hardware error, such as a parity error, that cannot be corrected. To clear the error condition, the system restarts. Record the error code and report the problem to Network Appliance Technical Support.
System too hot	The temperature sensor indicates that the system temperature is too high. Make sure 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 Technical Support for help.
Uncor proc mchk: code x	Contact Network Appliance Technical Support for help and report the machine check code.
Uncor sys mchk: code x	Contact Network Appliance Technical Support for help and report the machine check code.

Index

Symbols

/etc/group file 79
/etc/messages file 67
/etc/passwd file 79

Numerics

10/100Base-T Ethernet
 built-in interface 4, 40, 41
 card slot assignments 13 to 15
 connecting the filer 41, 42
 LEDs 58 to 60
9-GB and 18-GB fibre channel disk shelves 5, 8
 combined on same loop 5, 8, 27

A

activity LED on the front panel 55
Add at least xMB more memory message 72
ANSI terminal
 see terminal connection
ASCII terminal
 see terminal connection
Asynchronous Transfer Mode (ATM)
 available network connectivity 40, 47
 card LEDs 64
 card slot assignments 13 to 15
 connecting to the network 47
audience for this manual ix

B

back panel of the filer 4
batteries on the NVRAM card 77, 82, 85
boot command 84
brackets
 see installation brackets

C

cabinet
 see NetApp System Cabinet

cabling requirements
 ATM network 47
 Ethernet network 41
 FDDI network 43
 SCSI Dual StorageShelf 1 36
 SCSI Dual StorageShelf 2 34
 SCSI tape backup device 38
 terminal connection 48
cabling requirementsfibre channel disk shelf 28
Can't open /etc/rc message 73
Cannot initialize labels message 72
Cannot read labels message 72
CIFS service disabled! message 79
cifs setup command 79
Clock bogus. Date reset message 70
clusters 6
 First Time Configuration Guide 18, 52
combining 9-GB and 18-GB fibre channel disk shelves 8, 27
combining SCSI and FC-AL disk shelves 11, 32
commands
 boot 84
 cifs setup 79
 halt 38, 84
 nfs off 81
 setup 73
communications server, connecting the filer 48
Configuration exceeds max PCI space message 73
configuration information 12 to 15
CONSOLE port 5
 connecting a terminal 49
 DB-9-to-DB-9 serial cable 48
 pin settings 48
CPU fan has failed message 84
CPU fan stopped message 70

D

Data disk n x% rebuilt message 80
Data ONTAP, filer software 16
DB-9-to-DB-9 straight-through serial cable 48
degraded mode

- Data disk x% rebuilt message 80
- Dirty shutdown in degraded mode message 73
- Parity disk is broken message 81
- Parity diskx% rebuilt message 81
- Power supply degraded! message 82
- Replace NVRAM batteries! message 77
- DIAGNOSTIC port
 - connecting the Dual StorageShelf 2 5, 34
- Dirty shutdown in degraded mode message 73
- Disk hung during swap! message 84
- Disk labels scrambled! message 73
- Disk n is broken message 80
- disk shelf
 - connecting FC-AL loop to the filer 30
 - connecting to the filer 27 to 37
- disk storage 8, 9, 30
- disk storage limits 8
- diskette
 - see system boot diskette
- diskette drive 3
- Drive m.n not SCSI-2 message 74
- Drive m.n not supported message 74
- Drive placement ha x shelf y message 74
- Dual StorageShelf 1 and 2
 - see SCSI
- Dumping core message 84

E

- EIA standard RS-310-C, for rack rails 22
- electrical requirements 20
- electrostatic discharge (ESD) wrist strap and grounding leash 21
- EMU rev x not qualified message 74
- EMU y firmware y not supported message 74
- Env-A/B/C rupt err message 70
- Env-A/B/C stat err message 70
- Environmental Monitoring Unit (EMU)
 - connecting the Dual StorageShelf 2 5, 34
 - error messages 74
- environmental requirements 19, 20
- equipment rack
 - see rack, for installing the filer
- equipment requirements 19
- Error dumping core message 84

- error messages at startup
 - Add at least xMB more memory 72
 - Can't open /etc/rc 73
 - Cannot initialize labels 72
 - Cannot read labels 72
 - Configuration exceeds max PCI space 73
 - Dirty shutdown in degraded mode 73
 - Disk labels scrambled! 73
 - Drive m.n not SCSI-2 74
 - Drive m.n not supported 74
 - Drive placement ha x shelf y 74
 - EMU rev x not qualified 74
 - EMU y firmware y not supported 74
 - File system may be scrambled 75
 - Invalid PCI card slot n 75
 - No /etc/rc, running setup 76
 - No disks! 76
 - No FC-AL or SCSI disk controllers! 77
 - No network interfaces! 77
 - No NVRAM present 77
 - No SES on shelf x ha y 77
 - NVRAM #n downrev! 77
 - NVRAM test failed 77
 - Replace NVRAM batteries 77
 - Unsupported NVRAM size xMB 78
 - Unsupported SES shelf x, ha y 78
- error messages when halting
 - CPU fan has failed 84
 - Disk hung during swap! 84
 - Error dumping core 84
 - Halted 84
 - ISA IOCHK 85
 - Panicking 85
- error or informational messages
 - CIFS service disabled! 79
 - Data disk n x% rebuilt 80
 - disk n is broken 80
 - Fans stopped; replace them! 80
 - Fault on shelf n 80
 - maintenance mode 80
 - NFS service not enabled 81
 - Non Maskable interrupt 81
 - Parity disk is broken 81
 - Parity disk x% rebuilt 81
 - Power supply degraded 82

- Replace NVRAM batteries! 82
- Reporting SNMP traps 82
- Setting time from remote host 83
- Setting up SNMP trap host 82
- x default route 83
- x route to y 83
- ESD wrist strap
 - see electrostatic discharge wrist strap
- Ethernet
 - available network connectivity 4, 40 to 42
 - built-in 10/100Base-T Ethernet interface 4
 - cabling requirements 41
 - card LEDs 59 to 61
 - connecting the filer 41 to 42
 - types of cards 41
- expansion slots
 - see slot assignments

F

- F700 series
 - additional information on the Web page 10
 - optional features 6 to 10
 - slot assignments 12 to 15
 - standard features 2 to 12
- fans
 - *CPU fan stopped message 70
 - *Fans stopped message 70
 - CPU fan has failed message 84
 - Fans stopped; replace them! message 80
- Fault on shelf n message 80
- fault tolerance and clusters 6
- FC-AL
 - see Fibre Channel Arbitrated Loop
- FDDI
 - see Fiber Distributed Data Interface
- fiber cable, GB Ethernet 41
- Fiber Distributed Data Interface (FDDI)
 - available network connectivity 43 to 46
 - card slot assignments 13 to 15
 - connecting to the filer 43 to 46
 - LEDs on cards 63
- fiber optic cables
 - ATM NIC 47
 - FDDI NIC 43

- Fibre Channel Arbitrated Loop (FC-AL)
 - adapter 8, 31
 - adapter slot assignments 14 to 15
 - available network connectivity 7
 - combining 9-GB and 18-GB disk shelves 8, 27
 - combining with SCSI disk shelves 11, 32
 - connecting a second or third loop 30 to 31
 - disk storage capacity 8
 - FC-AL filer-to-shelf cable 28
 - filer-to-shelf cable 28, 30, 31
 - ID of FC-AL disk shelf 29
 - interface 5, 41
 - two types of FC-AL disk shelves 5, 8
- Fibre Channel StorageShelf FC7 5, 8
- Fibre Channel StorageShelf FC8 5, 8
- File system may be scrambled message 75
- FLPY messages
 - *FLPY format err message 70
 - *FLPY head err message 70
 - *FLPY init fail message 70
 - *FLPY reg error message 70
 - *FLPY seek err message 70
 - *FLPY setup err message 70
 - *FLPY track err message 70
- FP button stuck message 70
- frequency, electrical requirements 20
- front panel of the filer 2
- front-installing the filer 24

G

- GB Ethernet card 7
 - cabling requirements 41
 - LEDs 61
 - slot assignments 13 to 15
- grounding 19
 - using wrist strap and grounding leash 21

H

- halt command 38, 84
- Halted message 84
- height of filer 20
- <http://now.netapp.com>, see Web page
- humidity, environmental requirements 19

I

- informational messages
 - see error and informational messages
- installation brackets 3, 25, 26
- installing the filer 17 to 52
 - connecting to a disk storage shelf 27 to 37
 - connecting to a power source 50 to 52
 - connecting to a tape backup device 38 to 39
 - connecting to the network 40 to 47
 - establishing a terminal connection 48 to 49
 - in a rack 22 to 26
 - preparing for the installation 19 to 21
- Invalid PCI card slot n message 75
- ISA IOCHK message 85

L

- L2 parity error message 70
- LCD
 - see Liquid Crystal Display
- LEDs
 - see Light Emitting Diodes
- Light Emitting Diodes (LEDs) 3, 55 to 65
 - 10/100Base-T Ethernet cards 59 to 60
 - activity LED on the front panel 55
 - ATM card 64
 - back panel 56
 - built-in Ethernet interface 58
 - front panel 55
 - power LED on the front panel 55
 - power supply 57
 - quad-port 10/100Base-T Ethernet card 60
 - SCSI disk adapter 65
 - status LED on the front panel 55
- Liquid Crystal Display (LCD) 3
- Liquid Crystal Display (LCD) messages 67 to 85
 - Data disk n x% rebuilt 80
 - Disk hung during swap! 84
 - Disk labels scramble! 73
 - Disk n is broken 80
 - Fault on shelf n 80
 - Maintenance mode 80
 - NFS service not enabled 81
 - No FC-AL or SCSI disk controllers! 77
 - Non Maskable interrupt 81

- Parity disk is broken 81
- Parity disk x% rebuilt 81
- POST error messages 70
- Power supply degraded! 82
- Replace NVRAM batteries! 82
- Reporting SNMP traps 82
- Setting time from remote host 83
- Setting up SNMP trap host 82
- STDBY/SERV 55
- Unsupported NVRAM size xMB 78
- x default route 83
- x route to y 83

M

- Maintenance mode message 80
- maximum current, for the filer 20
- messages
 - *Clock bogus. Date reset 70
 - *Clock dead 70
 - *Clock error 70
 - *Clock reset 70
 - *CPU fan stopped 70
 - *Env-A rupt err 70
 - *Env-A stat err 70
 - *Env-B rupt err 70
 - *Env-B stat err 70
 - *Env-C rupt err 70
 - *Env-C stat err 70
 - *Fans stopped 70
 - *FLPY format err 70
 - *FLPY head err 70
 - *FLPY init fail 70
 - *FLPY read error 70
 - *FLPY reg error 70
 - *FLPY seek err 70
 - *FLPY track err 70
 - *FP button stuck 70
 - *L2 parity error 70
 - *LCD cmd stall 70
 - *LCD cursor err 70
 - *LCD data error 70
 - *LCD won't open 70
 - *No power infor! 70
 - *Overtemp alert 70

- *PS #1 failed 70
- *PS #2 failed 70
- *SIO error 70
- *Watchdog failed 70
- Add at least xMB more memory 72
- boot messages on system console 71
- Can't open /etc/rc 73
- Cannot initialize labels 72
- Cannot read labels 72
- Checking sensors 70
- CIFs service disabled! 79
- Configuration exceeds max PCI space 73
- CPU fan has failed 84
- Data disk n x% rebuilt 80
- Dirty shutdown in degraded mode 73
- Disk hung during swap! 84
- Disk labels scrambled! 73
- Disk n is broken 80
- Drive m.n not supported 74
- Dumping core 84
- EMU rev x not qualified 74
- Error dumping core 84
- Fans stopped; replace them! 80
- Fault on shelf n 80
- File system may be scrambled 75
- Finding image... 69
- Firmware release 2.0_a2 69
- Halted 84
- Invalid PCI card slot n 75
- ISA IOCHK 85
- Maintenance mode 80
- Memory size is 512 MB 69
- NFS service not enabled 81
- No /etc/rc, running setup 76
- No disks! 76
- No FC-AL or SCSI disk controllers! 77
- No network interfaces! 77
- No NVRAM present 77
- No SES on shelf x ha y 77
- Non Maskable interrupt 81
- NVRAM #n downrev 77
- NVRAM test failed 77
- Panicking 85
- Parity disk is broken 81
- Parity disk x% rebuilt 81

- Power supply degraded! 82
- Probing devices 69, 70
- Rebooting 85
- Replace NVRAM batteries! 77, 82, 85
- Reporting SNMP traps 82
- Setting time from remote host 83
- Setting up SNMP trap host 82
- Starting 69
- Startup failed 70
- System error:errsts%x 85
- System too hot 85
- Testing 256MB 70
- Testing 512MB 69
- Testing clock 70
- Testing floppy 70
- Testing LCD 69
- Testing SIO 69
- Testing watchdog 70
- Uncor proc mchk: code x 85
- Uncor sys mchk: code x 85
- Unsupported NVRAM size xMB 78
- Unsupported SES shelf x, ha y 74, 78
- x default route 83
- x route to y 83
- mid-installing the filer 25 to 26
- mixing fibre channel disk shelves
 - see combining 9-GB and 18-GB fibre channel disk shelves
- mixing SCSI and FC-AL disk shelves
 - see combining SCSI and FC-AL disk shelves 11
- multimode fiber optic cables
 - ATM NIC 47
 - FDDI NIC 43

N

- NetApp System Cabinet 21, 27, 31
- network connectivity 1, 40
 - built-in 10/100Base-T Ethernet 4
 - expansion slots 12
- Network Interface Cards (NICs) 40 to 47
 - connecting the filer to the network 40
- nfs off command 81
- NFS service not enabled message 81

NICS

see Network Interface Cards

No /etc/rc, running setup message 76

No disks! message 76

No FC-AL or SCSI disk controllers! message 77

No network interfaces! message 77

No power info! message 70

No SES on shelf x ha y message 77

Non-Volatile Random Access Memory (NVRAM)
card 5

File system may be scrambled message 75

No NVRAM present message 77

NVRAM #n downrev message 77

NVRAM test failed message 77

Replace NVRAM batteries! message 77, 85

Unsupported NVRAM size xMB
message 78

NOW Web page

see Web page

null modem cable, for serial console 48

number 74

NVRAM card

see Non-Volatile Random Access Memory

O

ok> prompt 70

optical bypass switch, FDDI network card 46

Overtemp alert message 70

P

Parity disk is broken message 81

Parity disk x% rebuilt message 81

power LED on the front panel 55

power source

connecting the filer 50 to 51

power supplies 5

hot-swappable 5

redundant 5

Power supply degraded! message 82

power-on self-test (POST) messages 69, 70

error messages on the LCD 70

PS #1/#2 failed message 70

Q

quad-port 10/100Base-T Ethernet card

slot assignments 13 to 15

R

rack, for installing the filer 22 to 23

appropriate screws 19

EIA standard RS-310-C 22

Rebooting message 85

Replace NVRAM batteries! message 77
requirements

documentation 21

electrical 20

environmental 20

rack installation 20, 22

tools and equipment 19

Reset button on the front panel 3

robotic loader, on tape backup device 38

S

SCSI

adapter labeled SCSI A 10

adapter labeled SCSI PORT 8B 10

adapter slot assignments 13 to 15

adapter, differential only 32

adapters labeled SCSI PORT 8B/7B 10

and FC-AL disk storage 9

combining Dual StorageShelf 1, 2, and Fibre
Channel StorageShelf 32

combining SCSI and fibre channel disk
shelves 6, 11

connecting disk shelves 27 to 37

connecting the StorageShelf 1/2 33 to 37

disk storage capacity 9

disk storage combined with FC-AL 11

Dual StorageShelf 1/2 5

ID of EMUs on Dual StorageShelf 2 34

ID of tape backup 38

ID of tape device 38

SCSI-2 protocol error message 74

tape backup device 16, 38

tape backup interface 4

SCSI-2 protocol 74

- serial cable
 - DB-9-to-DB-9 straight-through 48
 - pin settings 48
- serial concentrator, connecting to the filer 48
- serial port
 - CONSOLE port 5
 - DIAGNOSTIC port 5
 - for connecting the ASCII terminal 49
- setup command 73
- setup program, error message 76
- shipment package, contents 21
- SIO error message 70
- slot assignments 12, 12 to 15
 - on the Web page 10, 12
- Small Computer System Interface
 - see SCSI
- SNMP error messages 82
- software on filer, Data ONTAP 16
- space and location requirement 20
- special messages used in this manual x
- starting the system
 - from the system boot diskette 68, 75
- startup messages 68 to 70
- status LED on the front panel 55
- STDBY/SERV message 55
- system boot diskette
 - POST error messages 70
 - starting the system 68
- system components 16
- system console messages
 - logged in /etc/messages 67

T

- tape backup device 16
 - connecting the filer 38 to 39
 - robotic loader 38
 - SCSI ID 38

- temperature
 - environmental requirements 19
 - System too hot message 85
- terminal connection, to the filer 48 to 49
- terminating
 - Dual StorageShelf 2 35
 - fibre channel disk shelf loop 29
 - SCSI bus at the tape device 39
- terminology used in this manual ix
- thermal rating 20
- tool requirements 19, 20
- TP-MIC plug for FDDI 43
- troubleshooting, using LEDs and LCD
 - messages 53 to 85
- two-port, wide differential SCSI adapter #1 and #2
 - see SCSI adapter

U

- UTP cable
 - for Ethernet card 41
 - for FDDI single-attached card 43

V

- ventilation
 - *CPU fan stopped message 70
 - *Fans stopped message 70
 - CPU fan has failed message 84
 - Fans stopped; replace them message 80
 - holes for air circulation 22

W

- Watchdog failed message 70
- Web page (NOW) 10
- weight, of filer 22
- WINS server 79

