

NetApp® Filers F700 Series Hardware Guide

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Part number 210-02673
March 2001

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Preface

About this guide

This guide describes how to install a NetApp® F700 series filer in a rack; connect it to a SCSI disk storage shelf, SCSI tape backup device, and network; power on the system; verify the fibre channel disk shelf installation; and troubleshoot the hardware.

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.
- ◆ *Filer system* or *system* refers, at a minimum, to a NetApp filer and a connected disk storage shelf. A tape backup device can also be a component of the system, but is not required.
- ◆ *Loop* refers to a filer connected to one or more 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.

Safety Information

Safety rules

You must follow these safety rules when working with this equipment:

WARNING

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

- ◆ When installing disk shelves and a filer/NetCache Appliance into a movable cabinet or rack, install the equipment from the bottom up for best stability.
- ◆ To reduce the risk of personal injury from hot surfaces, allow the internal components time to cool before touching them 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. If the battery is mistreated or incorrectly replaced, the danger of explosion and risk of personal injury exists. Do not attempt to recharge the battery, disassemble it, or dispose of it in a fire.

Warning for units with two power supplies

If your filer, NetCache Appliance, or disk shelf has two power supplies and you need to turn the unit off, heed the following warning:

WARNING

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

AVERTISSEMENT

Cet appareil comporte plus d'un cordon d'alimentation. Afin de prévenir les chocs électriques, débrancher tous les cordons d'alimentation avant d'effectuer le dépannage.

ACHTUNG

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

About this chapter

This chapter describes the site and preparation requirements for a first-time noncluster installation of an F700 series filer system.

Topics in this chapter

This chapter discusses the following topics:

- ◆ [“Preparing your site”](#) on page 2
- ◆ [“Planning and organizing the installation”](#) on page 5

Preparing your site

Environmental requirements

Your site must meet the following temperature range and relative humidity requirements.

	Temperature range	Relative humidity
Operating state	50° F to 104° F (10° C to 40° C)	10% to 90% (noncondensing)
Nonoperating state	50° F to 104° F (10° C to 40° C)	5% to 90% in original shipping container (noncondensing) Otherwise, 50% (noncondensing)

Space requirements

The following table gives the filer dimensions.

Filer dimensions	U.S.	Metric
Height	8.75 in. 5 rack units (1 U=1.75 in.)	22.23 cm
Width	17 in.	43.18 cm
Depth	25.25 in.	64.14 cm

The following table gives the recommended minimum clearances.

Recommended min. clearance	U.S.	Metric
Front clearance	9.0 in.	22.86 cm
Rear clearance	47 in.	170.2 cm
Additional work space in rear	24 in.	60.96 cm
Vertical rack space	8.75 in.	22.23 cm
Top clearance, only in rear	1.5 in.	3.81 cm

Electrical requirements

You can order your filer for AC or DC power.

AC filer: The following table lists the electrical requirements for AC power.

Condition	Requirement
AC 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.

DC filer: The following table lists the electrical requirements for DC power.

Condition	Requirement
DC power supply	-40V DC to -60V DC
Nominal current per DC input	7.5A at -48V 8.6A at -40V
DC power source	A DC bus for each DC power supply. The buses should be backed up by heavy battery banks, which, in turn, should be backed up by a diesel/electric generator.

Equipment requirements

You install the system in a freestanding rack or NetApp® System Cabinet.

Freestanding rack: The freestanding rack must have

- ◆ A front panel 19 inches wide (48.26 cm)
- ◆ Front installation rails compliant with EIA standard RS-310-C

NetApp System Cabinets: The following table lists the number of FC-AL disk shelves permitted per NetApp System Cabinet.

Number of FC-AL disk shelves	Number of NetApp System Cabinets
1 to 8	One
9 to 16	Two
17 to 24	Three

NetApp System Cabinets are shipped to you only when you specifically order them or when your order consists of nine or more FC-AL disk shelves.

If you are installing a filer system in a NetApp System Cabinet, use this guide together with the *System Cabinet Installation Guide*.

Tool requirements

You need the following tools.

- ◆ Disposable ESD (electrostatic discharge) wrist strap and grounding leash (provided by Network Appliance)

Caution

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.

- ◆ #1 and #2 Phillips screwdrivers
- ◆ #10 steel screws for fastening the filer to the rack

Note

If the provided screws do not fit the rack holes, you need to obtain appropriate screws.

Planning and organizing the installation

Preparing for the installation

Before you begin the installation, you need to create a plan and organize your resources.

About this section

This section discusses the following topics:

- ◆ [“Gathering system components”](#) on page 6
- ◆ [“Installation rules and restrictions”](#) on page 8
- ◆ [“Understanding the entire system installation process”](#) on page 11

Gathering system components

About system components

A filer system, at a minimum, consists of a filer and a connected disk shelf. In addition, a SCSI tape backup device is recommended for regular backups to protect your data.

To gather all the hardware components for your system, you need to

- ◆ Check the contents of your shipment package
- ◆ Gather the other components that complete your system

Checking shipment package contents

Make sure that your shipment package includes

- ◆ One or more filers with expansion cards installed in the filer for additional network connectivity or storage capacity, as ordered
- ◆ AC or DC power cords for the AC or DC filer, respectively
- ◆ Cables for connecting the filer to the disk shelves
- ◆ A disposable ESD (electrostatic discharge) wrist strap and grounding leash
- ◆ A braided copper cable and Phillips head screws (provided with the filer by Network Appliance) for
 - ❖ Grounding a second or third fibre channel loop
 - ❖ Grounding the filer to disk shelf 0 in the first loop when the distance between the filer and disk shelf 0 exceeds .8m.
- ◆ Two or three NetApp System Cabinets if your order includes nine or more Fibre Channel Arbitrated Loop (FC-AL) disk shelves
- ◆ This F700 Series Hardware Guide.

About using other components

You can use previously purchased fibre channel and SCSI disk shelves with your new F700 series filer.

The following table lists the three FC-AL and two SCSI disk shelves that you can connect to the filer.

Disk shelf model	Contains
<i>Fibre Channel StorageShelf FC9</i>	18-GB and 36-GB FC-AL disks
<i>Fibre Channel StorageShelf FC8</i>	18-GB FC-AL disks only
<i>Fibre Channel StorageShelf FC7</i>	9-GB FC-AL disks only
<i>Dual StorageShelf 2</i>	9-GB SCSI disks only
<i>Dual StorageShelf 1</i>	4-GB and 9-GB SCSI disks

About using old expansion cards: If you want to use a previously purchased card or adapter in the filer, you need to check the NOW Web page at <http://now.netapp.com> to see that it is still supported and in what slot it belongs.

Installation rules and restrictions

Rules and restrictions

You need to observe the following rules and restrictions when installing a NetApp filer system.

- ◆ You must ground the fibre channel disk shelves to the filer.
All instructions for grounding are in the disk shelf guide.
- ◆ The number of disk shelves you can install in one system is determined by the storage limit for your filer model.
Go to the NOW Web page to learn what the current storage limit is for your model.
- ◆ Before you begin the installation, obtain additional current information on the NOW Web page at <http://now.netapp.com>.
For configuration information, go to the System Configuration Guide on the Web page.
- ◆ If you have a DC system, you must cover the terminal block on each power supply with the provided metal cover.

WARNING

To protect yourself from possible electric shock, it is important that the terminal blocks are covered when the filer is connected to the DC power source.

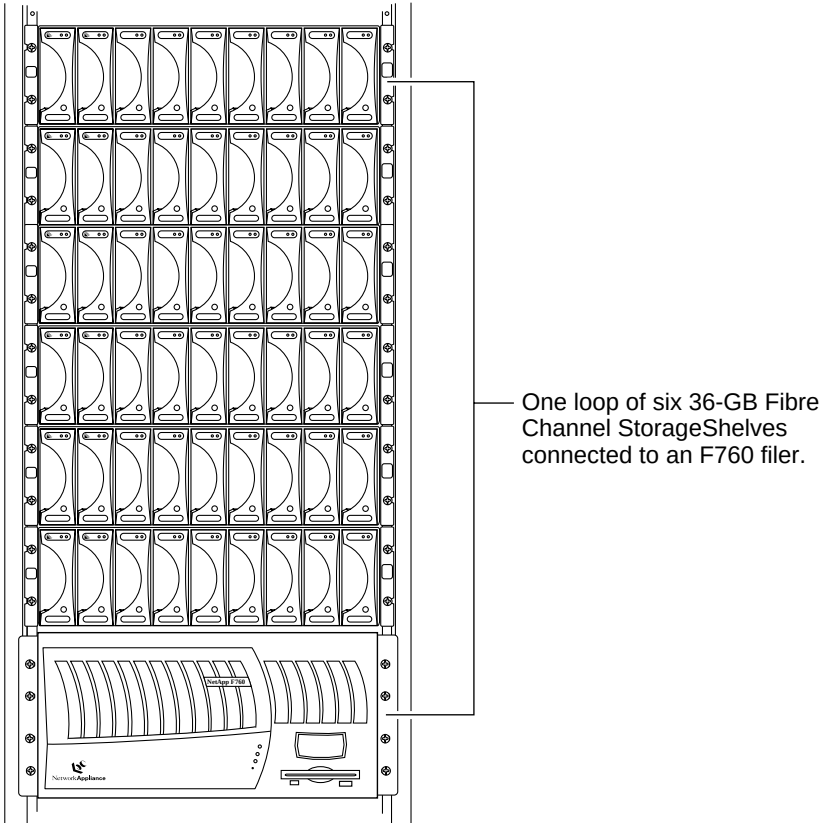
- ◆ To install additional expansion cards, go to the *F700 Series Field Service Guide* for instructions. Also check the NOW Web page, to confirm that the cards are supported and to learn their assigned slots.

Rules for arranging the components in the racks

You need to observe the following rules when arranging the system components in the rack:

- ◆ In a freestanding rack, install either the filer or a Telco shelf at the bottom of the rack. Installing the filer or Telco shelf at the bottom of the rack adds support for the disk shelves.
- ◆ The fibre channel disk shelves must be installed and connected in the freestanding rack in sequential order (starting from 0 through 7). (A *loop* consists of the filer connected to one or more disk shelves.)
- ◆ Disk shelf 0 must be connected to the filer.
- ◆ If you have two or three loops, the filer is connected with a 2m cable to disk shelf 0 of each loop.
For more information, see your disk shelf hardware guide.
- ◆ In the NetApp System Cabinet, the filer is always in the middle.
See the *System Cabinet Installation Guide* for more information.
- ◆ The third-party SCSI tape backup device can be installed in the same rack or nearby. The SCSI cable provided with the backup device determines the distance between the filer and the device.

The following illustration shows an F760 filer and six Fibre Channel StorageShelf FC9 disk shelves installed in a 19-inch rack. A third-party SCSI tape backup device is not shown in this example.



Understanding the entire system installation process

Overview of the installation and documentation sources

The entire system installation process can be simple or complex, depending on your specific system needs.

Use the overview in the following table as a guide to understanding the system installation process. It lists what you need to do to install a complete hardware system and the documentation required for each stage in the process.

Stage	Procedure	For instructions, go to	
1	Install the filer in a freestanding rack or a NetApp System Cabinet.	Chapter 2 “Filer Installation.” Note — With a NetApp System Cabinet, first go to the <i>System Cabinet Installation Guide</i> to prepare the cabinet.	
2	Install the disk shelves in the rack.	If disk shelves are	Then go to
		Fibre channel	<i>Fibre Channel StorageShelf FC9 Hardware Guide</i> or <i>Fibre Channel StorageShelf FC7/8 Hardware Guide</i>
		SCSI	<i>Hardware Guide for the NetApp StorageShelf 2</i> or <i>Hardware Guide for the Digital Disk Shelves</i>
3	Connect the disk shelves to the filer.	If disk shelves are	Then go to
		Fibre channel	Disk shelf hardware guide.
		SCSI	Chapter 3 “Connecting SCSI disk shelf pairs to the filer.”

Stage	Procedure	For instructions, go to
4	Ground the fibre channel disk shelves and filer.	<i>Fibre Channel StorageShelf FC9 Hardware Guide</i> or <i>Fibre Channel StorageShelf FC7/8 Hardware Guide</i>
5	Install the SCSI tape backup device (optional).	Hardware guide for the third-party SCSI tape backup device.
6	Connect the SCSI tape backup device to the filer (optional).	Chapter 3 “Verifying the Fibre Channel Disk Shelf Installation.”
7	Connect the filer to the network.	Chapter 5 “Connecting the Filer to a Network.”
8	Power on the system.	Chapter 6 “Powering On the System.”
9	Verify the fibre channel disk shelf installation.	Chapter 7 “Verifying the Fibre Channel Disk Shelf Installation.”
10	Proceed to configure the system.	<i>First-Time Configuration Guide Using the Setup Wizard</i> or the <i>First-Time Configuration Guide Using the Setup Command</i> .

About this chapter This chapter describes how to install a filer in a freestanding 19-in. rack or a NetApp System Cabinet.

Topics in this chapter This chapter discusses the following topics:

- ◆ [“Installing the filer in a rack”](#) on page 14

Installing the filer in a rack

Where you can position your filer

The filer has adjustable installation brackets that enable you to install it in one of three horizontal positions in the rack.

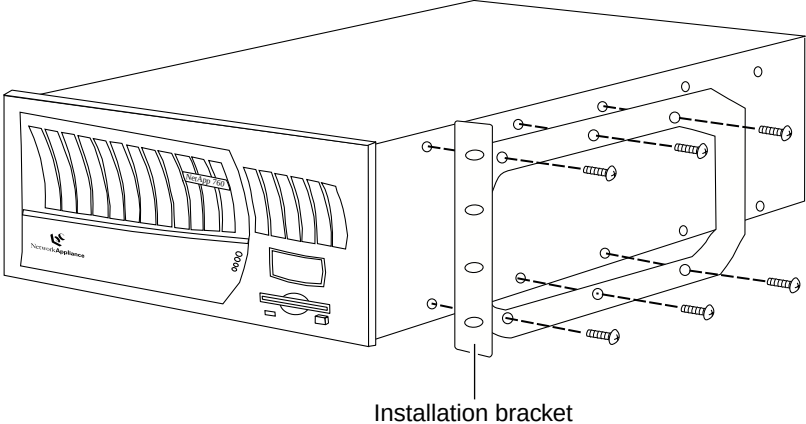
- ◆ Front-installed position—The brackets lie flush with the filer front panel. The filer is shipped with the brackets in this position.
- ◆ Two mid-installed positions—You can move the brackets to extend the filer 4.75 in. or 9.5 in. in front of the rack, providing more room to service the system in the back.

Note—
You cannot adjust the brackets on the filer if you are installing it in a NetApp System Cabinet.

Moving the brackets for a mid-install position

If you want to mid-install the filer in a rack, you first need to move the brackets to a position on the sides of the filer 4.75 or 9.5 in. from the original position. To move the brackets, complete the following steps.

Step	Action
1	Put on an ESD strap and grounding leash.

Step	Action
2	Remove the installation brackets attached to each side of the filer using a #2 Phillips screwdriver, as shown in the illustration.  Installation bracket
3	Select a position for a bracket 4.75 or 9.5 in. from the first hole on one side of the filer and align the bracket holes with the filer holes.
4	Attach the bracket to the filer by inserting screws into the bracket and filer holes and tightening the screws.
5	To attach the other bracket to the other side of the filer, repeat Steps 3 and 4.

Installing the filer

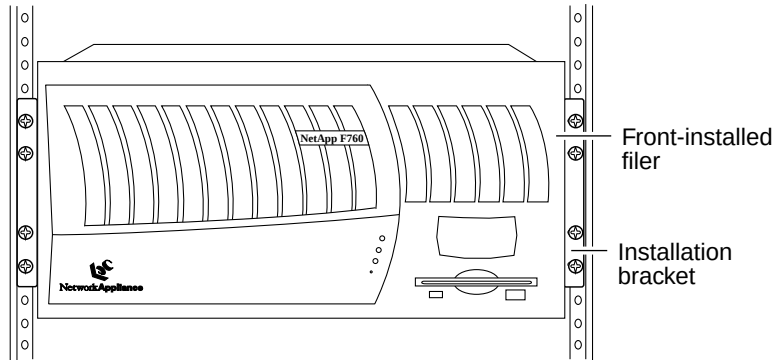
To install the filer in a rack, complete the following steps.

WARNING

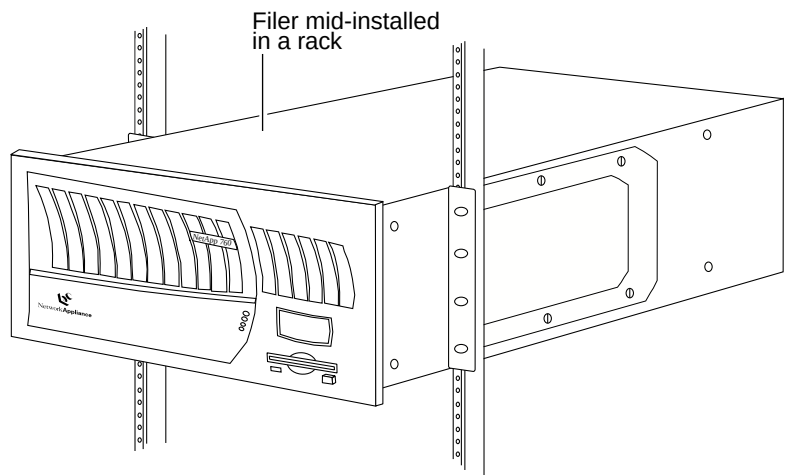
To avoid injuring yourself or damaging the filer, you must work with at least one other person when you install the filer in the rack.

Step	Action
1	Put on an ESD strap and grounding leash.
2	Select four holes on each front rack rail. These holes should have the same spacing as the holes on the filer brackets.
3	Align the rack holes with the filer bracket holes. The person assisting you should stand behind the rack to help support the weight of the filer.
4	Insert the screws in the bottom holes on each side first and tighten the screws using a #2 Phillips driver and a torque of 27 in. lbs. Note The rack can support the weight of the filer when the filer is attached by the bottom screws. You don't need another person to hold the filer from the back of the rack.
5	Tighten all the screws.
6	Proceed to install the disk shelves and SCSI tape backup device. See the appropriate hardware guides.

Examples of front installed and mid-installed filers: The following illustration shows a filer front-installed in a 19-inch rack.



The following illustration shows a filer mid-installed in a 19-in. rack.



About this chapter

For information about installing the Dual StorageShelf 2 and Dual StorageShelf 1, see the *Hardware Guide for the NetApp StorageShelf 2* and *Hardware Guide for the Digital Disk Shelves*, respectively.

When installing the SCSI disk shelf pairs, make sure that the individual SCSI disk shelves are connected in pairs.

Topics in this chapter

This chapter discusses the following topics.

- ◆ [“Rules for connecting SCSI disk shelf pairs”](#) on page 20
- ◆ [“How the SCSI disk adapter connectors are labeled”](#) on page 21

Rules for connecting SCSI disk shelf pairs

About connecting SCSI disk shelf pairs

Observe the following rules when connecting the disk shelf pairs to the filer:

- ◆ Use one wide differential SCSI adapter to connect one or two SCSI disk shelf pairs.
- ◆ You can use previously purchased wide differential SCSI adapters as long as they are supported by the filer.

Check the NOW Web page at <http://www.now.netapp.com> to learn what configurations are supported by your filer.

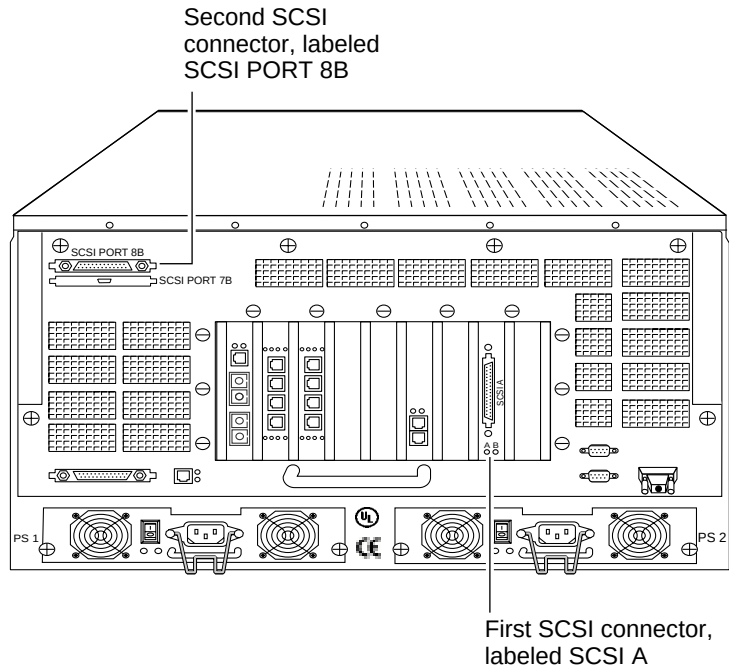
- ◆ Disk shelf ID 0 must be connected to the filer.
- ◆ On each Dual StorageShelf 2, connect the Environmental Monitor Units (EMUs) and make sure that the EMU addresses are unique with Master EMU (EMU ID 0) on ID 0.
- ◆ To connect Dual StorageShelf 2 or Dual StorageShelf 1, use the adapters and ports specified in the following table.

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

How the SCSI disk adapter connectors are labeled

The following illustration shows the location of the SCSI adapter's two connectors when the adapter is in slot 8.

- ◆ The first connector is labeled SCSI A on the adapter
- ◆ The second connector is labeled SCSI PORT 8B on the chassis drawer



When combining SCSI and FC-AL disk shelves

If you are connecting the SCSI Dual StorageShelf 1, SCSI Dual StorageShelf 2, and two Fibre Channel StorageShelves to the F760 at the same time, the SCSI adapter for the SCSI Dual StorageShelf 2 must be in the highest slot, slot 8.

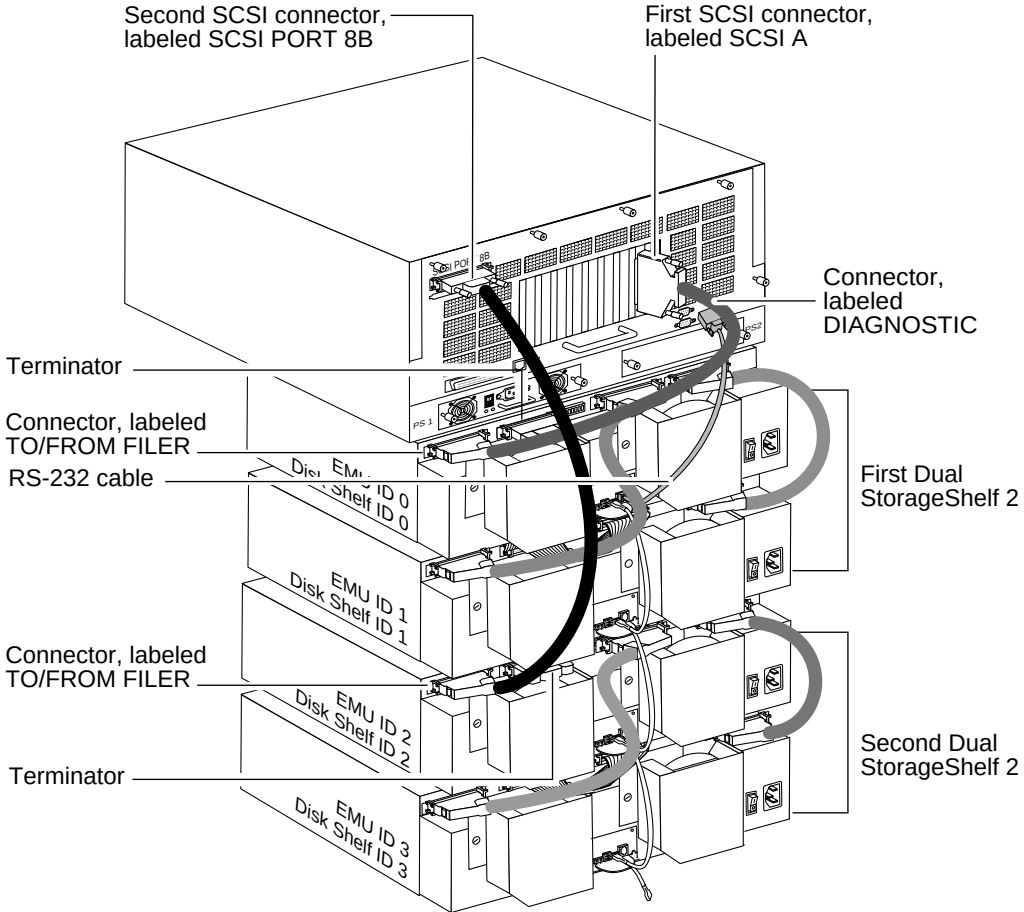
You must use the following connectors for the disk shelves:

- ◆ Dual StorageShelf 2—Slot 8
- ◆ Dual StorageShelf 1—Slot 7
- ◆ First Fibre Channel StorageShelf—Onboard interface
- ◆ Second Fibre Channel StorageShelf—Slot 4

Connecting the Dual StorageShelf 2

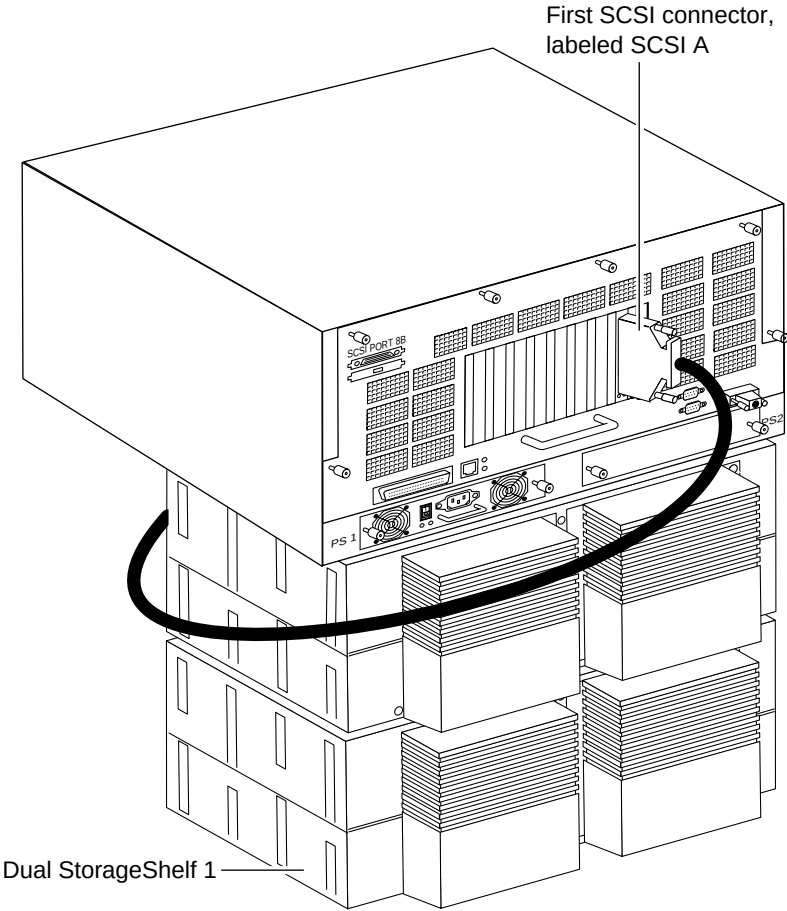
To connect the Dual StorageShelf 2 to the filer, follow these steps.

Step	Action
1	Connect one end of the SCSI cable to the connector labeled To/From Filer on disk shelf ID 0.
2	Connect the cable's other end to the adapter in filer slot 8, labeled SCSI A. Result: You have connected the first disk shelf pair to the filer.
3	Connect another SCSI cable to the connector labeled To/From Filer on disk shelf ID 2 (first disk shelf in second pair).
4	Connect the cable's other end to the adapter's second port, labeled SCSI PORT 8B, on the chassis drawer. Caution _____ You must use the adapter's second port. Do not use a port on another SCSI adapter (if one is installed in slot 7). Result: You have connected the second disk shelf pair to the filer. The following illustration shows two disk shelf pairs connected to the filer.
5	Using the provided RS-232 cable, connect the master EMU, labeled EMU ID 0 (on disk shelf ID 0) to the filer port labeled DIAGNOSTIC. A caption in the illustration points to the RS-232 cable and the DIAGNOSTIC port on the filer.
6	Tighten the cable connections on each end.

Step	Action
7	Make sure that each disk shelf pair is terminated on the first disk shelf. Two captions in the following illustration point to the terminators. 

**Connecting the
Dual StorageShelf 1**

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

Step	Action
1	Make sure that one end of the SCSI cable is connected to the SCSI connector on the first disk shelf in the disk shelf pair.
2	Connect the other end of the SCSI cable to the adapter in filer slot 8, labeled SCSI A.
3	Secure both connectors by tightening the connector thumbscrews. The following illustration shows a disk shelf pair connected to the filer.  The diagram illustrates the physical connection between a filer and a Dual StorageShelf 1. The filer is shown as a rack-mounted unit with various ports and slots. A SCSI cable is connected from the SCSI A adapter in slot 8 of the filer to the SCSI connector on the first disk shelf of the Dual StorageShelf 1. The Dual StorageShelf 1 is shown as a stack of disk shelves. Labels in the diagram include 'First SCSI connector, labeled SCSI A' pointing to the SCSI connector on the first disk shelf, and 'Dual StorageShelf 1' pointing to the stack of shelves. Other labels on the filer include 'SCSI PORT 8B', 'PS 1', and 'RS2'.

Scope of this chapter

This chapter discusses how to connect your F700 series filer to a third-party SCSI tape backup device or to a third-party fibre channel switch that you connect to a third-party FC-AL tape backup device.

Topics in this chapter

This chapter describes the following topics:

- ◆ [“Preparing the third-party devices”](#) on page 26
- ◆ [“Connecting a filer to third-party devices”](#) on page 27

Preparing the third-party devices

Preparing the third-party devices

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

Step	Action
1	Set the ID on the tape backup device. See the documentation for the tape backup device.
2	If you have a robotic loader on the tape backup device or a fibre channel switch, set its ID.
3	Turn off all third-party devices and go to “Connecting a filer to third-party devices” on page 27.

Connecting a filer to third-party devices

Rules for connecting the third-party devices

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

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

Note

See the documentation for the third-party device.

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

For detailed information

This section describes the following topics:

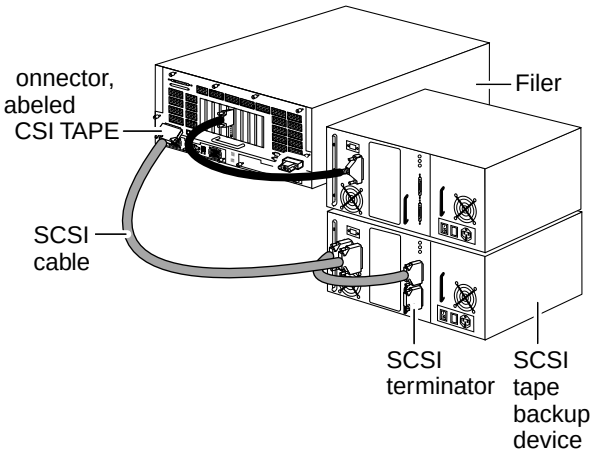
- ◆ [“Connecting a filer to a third-party SCSI tape backup device”](#) on page 28
- ◆ [“Connecting a filer to a third-party fibre channel switch”](#) on page 30

Connecting a filer to a third-party SCSI tape backup device

Connecting a SCSI tape backup device

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

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

Step	Action
5	Terminate any open port on the tape backup device with an active SCSI terminator. For information about terminating the open port, see the documentation for the tape backup device. 
6	Go to “Connecting the Filer to a Network” on page 33.

Connecting a filer to a third-party fibre channel switch

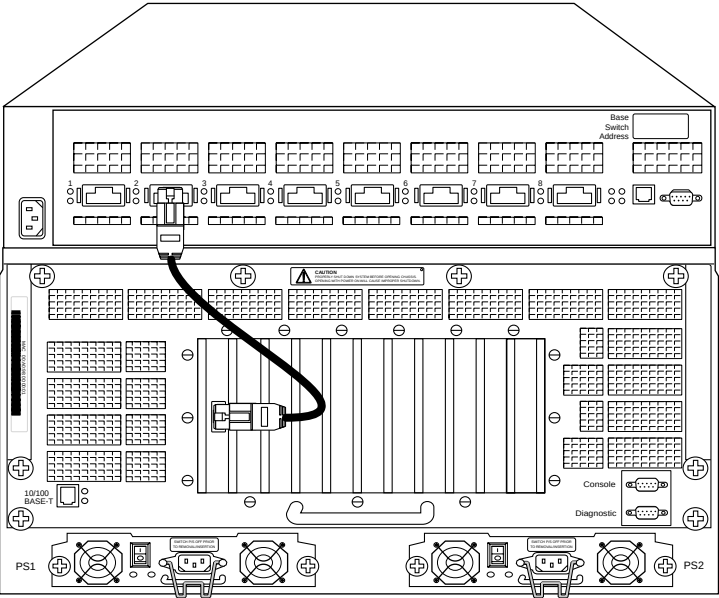
Connecting a fibre channel switch

To connect a third-party fibre channel switch to the filer, complete the following steps.

Note_____

See the third-party documentation about connecting the fibre channel tape-backup device to the fibre channel switch.

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

Step	Action
3	Connect the cable provided with the fibre channel switch to the following points of connection: a. The appropriate port on the back panel of your filer b. An available port on the fibre channel switch 
4	Clip and click in each end of the cable.
5	Go to “Connecting the Filer to a Network” on page 33.

About this chapter This chapter describes how to connect the filer to any of three types of networks—Ethernet, FDDI, and ATM.

Topics in this chapter This chapter describes the following topics:

- ◆ “[Connecting to an Ethernet network](#)” on page 34
- ◆ “[Connecting to a FDDI network](#)” on page 42
- ◆ “[Connecting to an ATM network](#)” on page 47

Connecting to an Ethernet network

About this section

This section identifies the types of Ethernet connections supported by your F700 filer and how to connect to each type of Ethernet connection.

For detailed information

This section describes the following topics:

- ◆ [“Types of Ethernet networks supported”](#) on page 35
- ◆ [“Connecting to an Ethernet port using copper cabling”](#) on page 37
- ◆ [“Connecting to a GbE fiber port”](#) on page 41

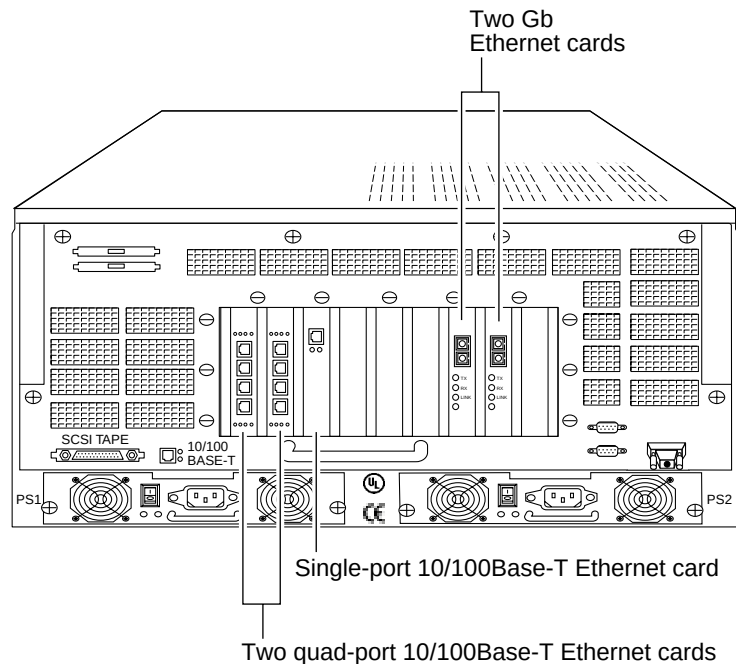
Types of Ethernet networks supported

Supported Ethernet connections

Your F700 series filer has an onboard 10Base-T/100Base-TX port and supports the following types of Ethernet network interface cards (NICs):

- ◆ Single-port 10Base-T/100Base-TX
- ◆ Quad-port 10Base-T/100Base-TX
- ◆ 100Base-TX/1000Base-T
- ◆ Gigabit Ethernet (GbE) with fiber connectivity

The following illustration shows two quad-port 10Base-T/100Base-TX cards in slots 1 and 2, one single-port 10Base-T/100Base-TX card in slot 3, and two GbE fiber NICs in slots 7 and 8.



Note

For specific information about the slot assignments available and the NICs supported by your filer, see the System Configuration Guide at <http://now.netapp.com>.

Ethernet cabling requirements

The following table lists the cabling requirements for Ethernet connections.

Note

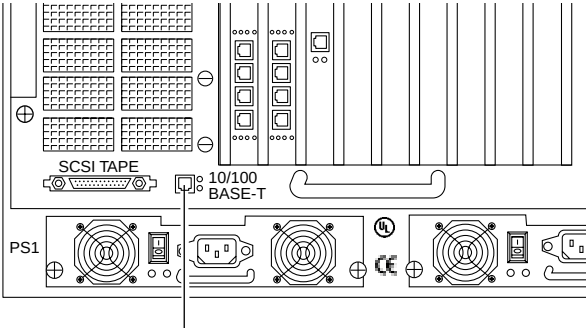
Do not exceed the maximum cable length specification.

Ethernet port	Cabling requirements	
10Base-T/ 100Base-TX	Category 3 (10Base-T only) or 5 (10Base-T/100Base-TX) unshielded twisted-pair (UTP) cable with RJ-45 connectors	
100Base-TX/ 1000Base-T	Category 5 unshielded twisted-pair (UTP) cable with RJ-45 connectors	
GbE fiber	Type of cable	Max. distance
	50 micron multimode fiber optic cable with SC connector	550m
	62.5 micron multimode fiber optic cable with SC connector	220m

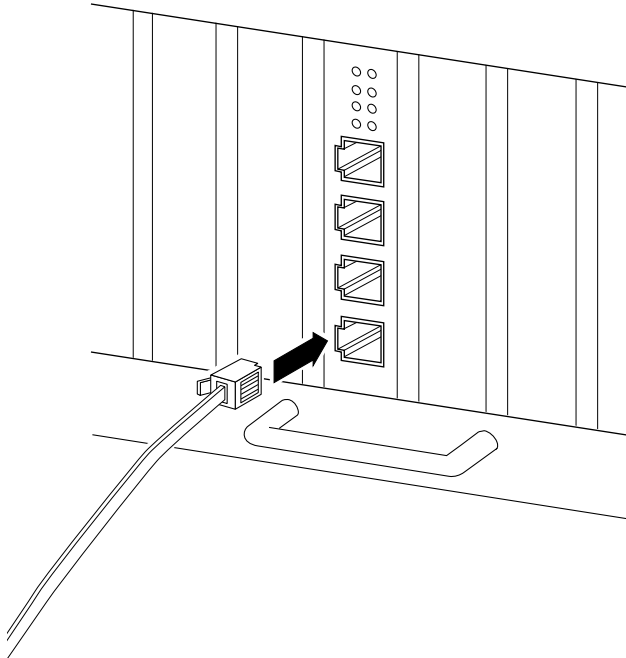
Connecting to an Ethernet port using copper cabling

Connecting to an Ethernet port using copper cabling

To connect the filer to a 10Base-T/100Base-TX or 100Base-TX/1000Base-T Ethernet network using copper cabling, complete the following step.

Step	Action	
1	If your Ethernet port is...	Then...
	The filer’s onboard Ethernet port, labeled 10/100BASE-T Push the cable with the RJ-45 connector into the onboard Ethernet port on the filer, until it clicks and locks into place. The following illustration shows the onboard Ethernet connector.  Onboard Ethernet connector	

Step	Action
	A single-port 10Base-T/ 100Base-TX NIC Push the cable with the RJ-45 connector into the RJ-45 port on the Ethernet NIC, until it clicks and locks into place. The following illustration shows a UTP cable with an RJ-45 connector connecting to a single-port 10Base-T/100Base-TX NIC. The diagram illustrates the physical connection of a UTP cable to a network interface card (NIC). A cable with a standard RJ-45 connector is shown being pushed into the designated port on the NIC. The NIC panel features several status indicators: a 'DATA' label with a crossed-out circle icon, an 'ACT/LNK' label with a small circle icon, and a '100TX' label with another small circle icon. A thick black arrow points from the cable connector towards the port, indicating the direction of insertion. The NIC is mounted on a vertical panel, and a horizontal slot is visible below the port.

Step	Action	
	A quad-port 10Base-T/100Base-TX NIC The following illustration shows a UTP cable with an RJ-45 connector connecting to one of the ports on a quad-port 10Base-T/100Base-TX NIC.	Push the cables with the RJ-45 connector into the RJ-45 ports on the NIC. 

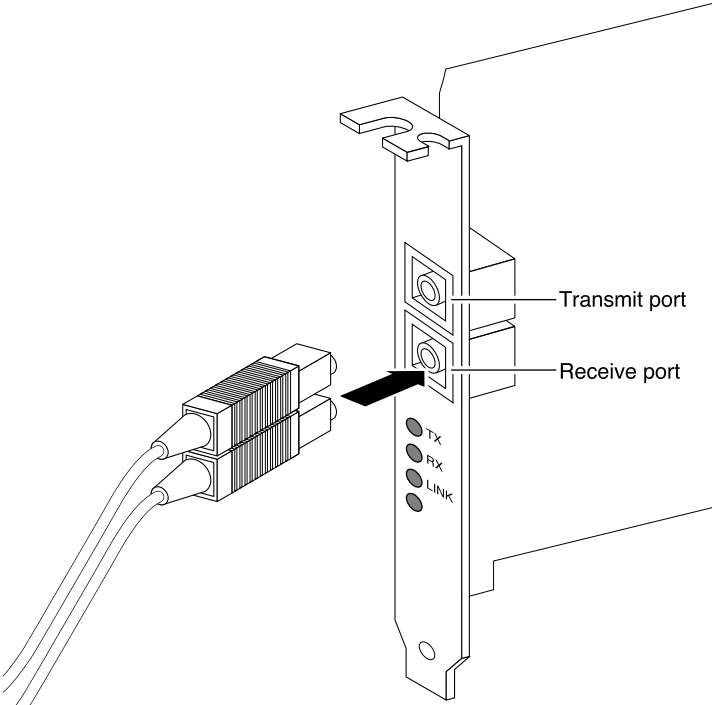
Step	Action
	A 100Base-TX/1000Base-T NIC Push the cable with the RJ-45 connector into the RJ-45 port on the NIC, until it clicks and locks into place. The following illustration shows a UTP cable with an RJ-45 connector connecting to a single-port 100Base-TX/1000Base-T NIC. Note The NIC is labeled 10/100/1000-TX; however, the filer supports only 100Base-TX/1000Base-T. The diagram illustrates the connection of a UTP cable to a network interface card (NIC). A cable with an RJ-45 connector is shown being inserted into the 'DATA' port of a '100Base-TX/1000Base-T card'. The card is part of a larger panel with multiple ports. Below the 'DATA' port, there are three status indicators: 'LNK', 'ACT', and '10/100/1000 TX'. A metal bracket is shown below the card, likely used to secure it in place.

Connecting the filer to an Ethernet network

Connecting to a GbE fiber port

Connecting to a GbE network using fiber connectivity

To connect the filer to a GbE network using fiber, complete the following step.

Step	Action
1	Push the cable with the SC connector into the ports on the GbE NIC, until it clicks and locks into place. 

Connecting to a FDDI network

About this section

This section identifies the types of FDDI connections supported by your F700 series filer and how to connect to each type of FDDI network.

For detailed information

This section describes the following topics:

- ◆ [“Types of FDDI networks supported”](#) on page 43
- ◆ [“Connecting with single-attached FDDI”](#) on page 44
- ◆ [“Connecting with dual-attached FDDI”](#) on page 46

Types of FDDI networks supported

Supported FDDI NICs and network configurations

The following table lists the types of FDDI NICs used in your F700 filer and the network configurations supported.

Type of NIC used	Type of network configuration
Single-attached FDDI-TP with an RJ45 port	Single-attached FDDI network
Single-attached FDDI-fiber with a duplex SC port	Single-attached FDDI network
Dual-attached FDDI-fiber with two duplex SC ports and one RJ12 port	a. Single-attached FDDI network (only top SC port used) b. Dual-attached FDDI network

FDDI cabling requirements

The FDDI cabling requirements are listed in the following table.

Note

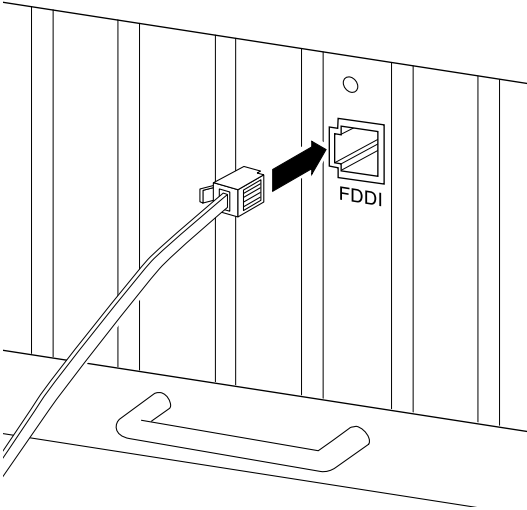
Do not exceed the maximum cable length specification.

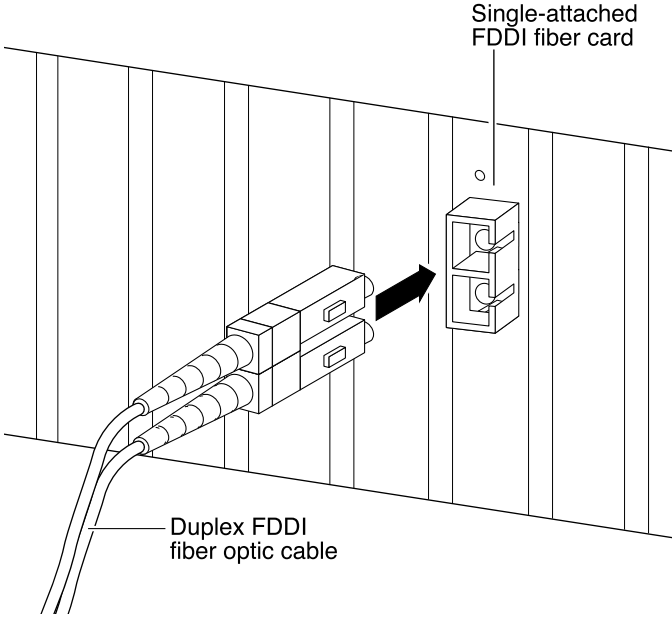
Type of connector	Cabling requirements
RJ45 connector	Category 5 unshielded twisted-pair (UTP) or a 100-ohm screened twisted-pair (ScTP) cable with a TP-MIC plug
Duplex SC connector	50 micron multimode fiber optic cable for up to 550m.
	62.5 micron multimode fiber optic cable for up to 220m.

Connecting with single-attached FDDI

Connecting to a single-attached FDDI network

To connect the F700 to a single-attached FDDI network, complete the following step.

Step	Action	
1	If your FDDI NIC is a...	Then...
	Single-attached FDDI-TP NIC with an RJ45 port	Push the cable with the RJ-45 connector into the port on the FDDI NIC, until it clicks and locks into place.
	The following illustration shows a cable with the RJ-45 connector connecting to a single-attached FDDI NIC. 	

Step	Action
	Single-attached FDDI-fiber NIC with a duplex SC port Push the SC connector into the port on the FDDI NIC, until it clicks and locks into place. The following illustration shows a duplex FDDI fiber optic cable connecting to a single-attached FDDI fiber NIC.  The diagram illustrates the connection of a duplex FDDI fiber optic cable to a single-attached FDDI fiber card. The cable, labeled 'Duplex FDDI fiber optic cable', has two SC connectors. An arrow indicates the cable being inserted into the two ports of the 'Single-attached FDDI fiber card'.
	Dual-attached FDDI-fiber NIC with two duplex SC ports and one RJ12 port Push the SC connector into the upper port (Port B) on the FDDI NIC, until it clicks and locks into place. Leave the NIC's bottom port unused.

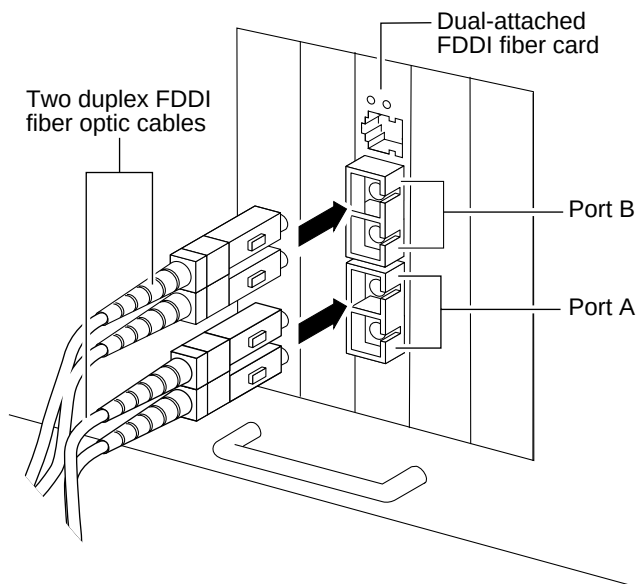
Connecting with dual-attached FDDI

Connecting to a dual-attached FDDI network

To connect the filer to a dual-attached FDDI network, complete the following steps.

Step	Action
1	Push the SC connector into the lower port (Port A) on the FDDI NIC, until it clicks and locks into place.
2	Push the SC connector into the upper port (Port B) on the FDDI NIC, until it clicks and locks into place.

The following illustration shows Port A and Port B on the dual-attached FDDI fiber NIC and two duplex FDDI fiber optic cables.



Connecting to an ATM network

- ATM NICs supported

Your filer supports two ATM fiber NICs (OC3 and OC12) and one ATM UTP NIC.
- Cabling requirements

The cabling requirements for connecting the filer to an ATM network are listed in the following table.

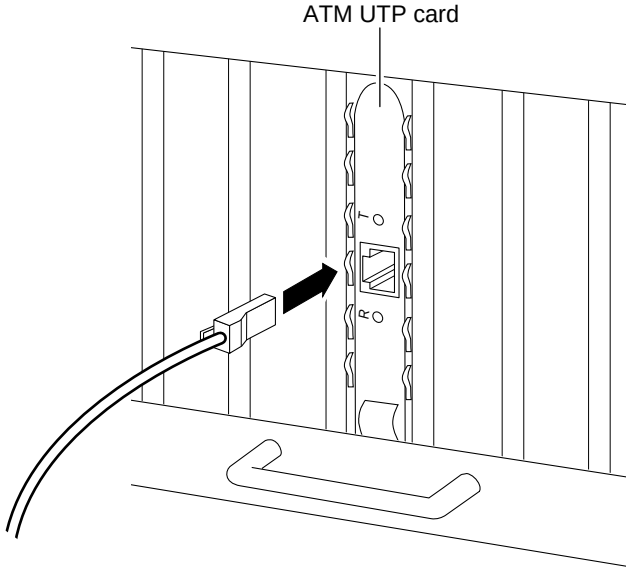
Note_____

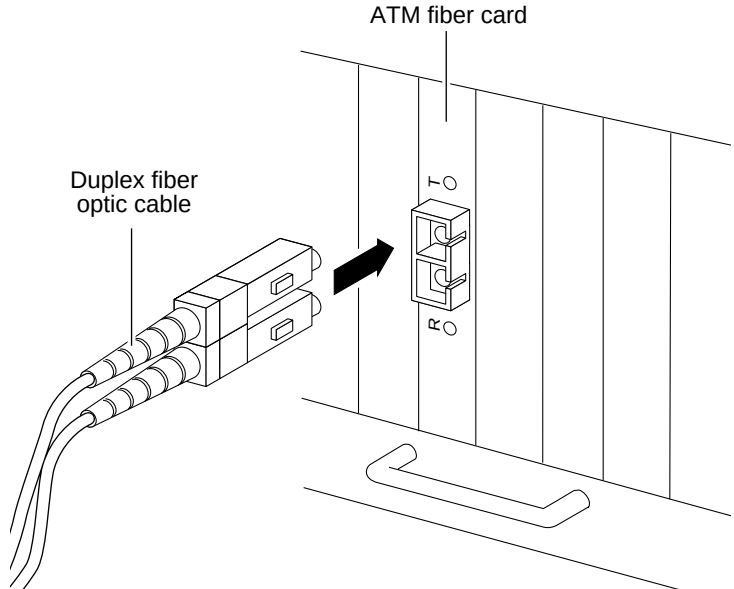
Do not exceed the maximum cable length specified in the appropriate ATM Forum UNI (User Network Interface) standard.

Type of connector	Cabling requirements
RJ45 connector	Category 5 unshielded twisted-pair (UTP) cable with RJ-45 connector
Duplex SC connector	62.5/125 micron multimode fiber optic cable with an SC connector

Connecting to an ATM network

To connect the filer to an ATM network, complete the following step.

Step	Action	
1	If your ATM NIC is an...	Then...
	ATM UTP NIC with an RJ45 port The following illustration shows a cable with the RJ-45 connector connecting to an ATM NIC. 	Push the cable with the RJ-45 connector into the port on the ATM UTP NIC, until it clicks and locks into place.

Step	Action
	ATM fiber NIC with a duplex SC port Push the SC connector into the NIC port until it clicks and locks into place. The following illustration shows a duplex fiber optic cable connecting to the ATM fiber NIC.  The diagram illustrates the connection of a duplex fiber optic cable to an ATM fiber card. On the left, a cable with two SC connectors is shown. An arrow points from one of these connectors to the 'R' port of a card labeled 'ATM fiber card'. The card has two ports, 'T' and 'R', and a latch at the bottom.

About this chapter

This chapter describes how to power on the system, including establishing a console connection to the filer. The console connection provides you with a means of viewing system messages as the filer system boots.

Topics in this chapter

This chapter describes the following topics:

- ◆ [“Preparing to power on the system”](#) on page 52
- ◆ [“Powering on an AC system”](#) on page 56
- ◆ [“Powering on a DC system”](#) on page 58

Preparing to power on the system

Types of available connections

Before you power on the system, you need to establish a console connection to the filer from one of the following:

- ◆ ASCII terminal (also referred to as an *ANSI terminal*)
- ◆ Serial concentrator
- ◆ Communications server

This chapter describes only how to establish a connection to an ASCII terminal. To connect to the filer using a serial concentrator or communications server, refer to the documentation for those devices.

Why you need a console connection

You need a console connection to the filer for the following reasons:

- ◆ To be able to observe the system responses on the console screen when the system is started
- ◆ After the system is started, to set up the filer on the console screen using the `setup` program

When connecting from a remote site: Be sure that you do not have a local console connected to the filer console port if you are connecting an ASCII terminal from a remote site.

Establishing a console connection to the filer

DB-9 console port pin assignments

The filer DB-9 console port is wired as a DTE device, the same way as a PC.

Console port uses three-wire protocol: The console port uses the “three-wire protocol” in which the only pins used are Pins 2, 3, and 5. The other input pins are ignored and the output pins’ signal levels are not defined.

Note

Your terminal, terminal concentrator, or other equipment should use no flow control. It should also be configured to ignore DTR and RTS.

The following table describes the pin assignments for the port. The arrows in the table represent the following:

← In-to-filer
→ Out-from-filer

DB-9 Pin Assignments				
DTE DB-9 pin	Corresponding DB-25 pin	Signal	Dir.	Description
1	20	DTR	→	Data Terminal Ready
2	3	RD	←	Received Data
3	2	TD	→	Transmitted Data
4	8	DCD	←	Carrier Detect
5	7	SG	—	Signal Ground
6	6	DSR	←	Data Set Ready
7	5	CTS	←	Clear to Send
8	4	RTS	→	Request to Send

DB-9 Pin Assignments				
DTE DB-9 pin	Corresponding DB-25 pin	Signal	Dir.	Description
9	22	RI	←	Ring Indicator

Cabling requirements

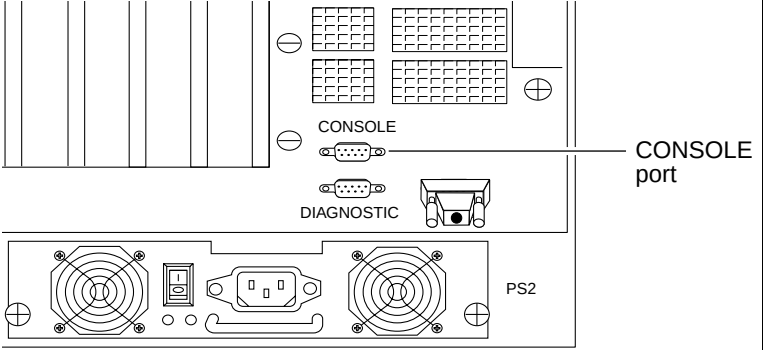
The following table describes the cabling requirements for connecting an ASCII terminal or a modem to the filer DB-9 console port.

To connect...	Use this cable...
ASCII terminal (DTE device)	Null-modem (crossover) cable supplied with the filer
Modem (DCE device)	Straight-through cable or two back-to-back null-modem cables

Connecting an ASCII terminal to the filer

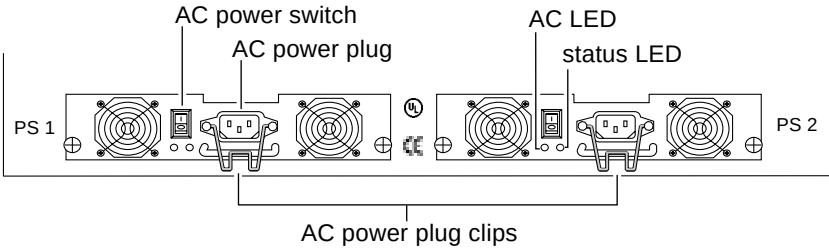
To connect an ASCII terminal to the filer, complete the following steps.

Step	Action
1	Make sure that the console and filer settings are as follows: 9600 baud, 8 data bits, no parity, 1 stop bit. See the documentation for your console.

Step	Action
2	Connect the cable socket end to the filer plug connector labeled CONSOLE. The following illustration shows the location of the CONSOLE port. 

Powering on an AC system

Powering on an AC system To power on a filer system using an AC power source, complete the following steps.

Step	Action	
1	If your system is installed in...	Then go to...
	One or more NetApp System Cabinets A freestanding 19-inch rack	<i>System Cabinet Installation Guide</i> for additional instructions. Complete the following steps.
2	Make sure that the power switch on each AC power supply is in the Off position.	
3	Power on the disk shelves and tape backup device first. Caution_____ It is important that the filer is the last unit that you power on. _____ The disk 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.	
4	On the filer, connect the power cord (socket end) to the recessed power plug on the power supply. (A power cord is supplied for each power supply.)	
5	Secure the power cord with the retaining clip. The following illustration shows two power supplies in the back of the filer.  AC power switch AC power plug AC LED status LED PS 1 PS 2 AC power plug clips	
6	Plug the other end of the power cord into a grounded electrical outlet.	

7	Repeat Steps 3 through 6 if you have a second power supply. Caution _____ Be sure to connect the second power supply to a separate AC circuit. _____
8	Turn the power switch on the AC power supplies to the On position. In a successful power-on process, the filer automatically ◆ Verifies the filer hardware ◆ Loads its operating system ◆ Checks its connections ◆ Displays the startup messages ◆ Starts the <code>setup</code> program
9	Make sure that the LEDs on the front panel and the AC LED on the power supplies illuminate, as follows:
	LEDs on front panel
	Power Status
	Turns green. Turns yellow, then turns off when filer starts.
	AC LED on power supply
	Yellow Green
10	First turns yellow to indicate that AC power is present. Then turns green to indicate that all outputs are good.
	If this does not happen, call Network Appliance Technical Support.
11	Check the startup messages as they appear on the console screen or LCD. The startup messages are described in Chapter 8 “Troubleshooting the Filer Hardware.” At the end of the initial startup, the default host name prompt <code>toaster></code> appears on the console screen. If this does not happen, call Network Appliance Technical Support.
11	Proceed to verify the FC-AL disk shelf installations. Go to Chapter 7 .

Powering on a DC system

About DC power supplies

The filer DC power supplies have the following features:

- ◆ The DC connections are labeled positive (+), negative (-), and ground (G).
- ◆ The second power supply provides redundancy.

If you ordered only one DC power supply, the filer is shipped with a cover over the empty power supply slot.

Wiring requirements

To connect the DC terminals on the power supply to the DC power source, you need to meet the following wiring requirements.

Recommended wire gauge: 12 AWG with color-coded insulation, that is, red for positive (+), black for negative (-), green for ground (G).

Ring terminals: Each wire is terminated with a ring terminal that accommodates #6 screws and has the following properties:

- ◆ Outer ring maximum diameter—30 in.
- ◆ Inner ring—Clearance hole for #6-32 stud
- ◆ Insulated grip sleeve

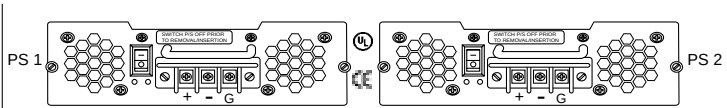
Maximum length of wire between power supply and source: Before you connect the DC filer to the DC power source you need to calculate the maximum length of the combined positive and negative wires. Then divide this value by half to obtain the length of a single wire that runs between the DC filer and DC source.

For instructions about how to make these calculations, see [Appendix B, “Communications Regulations.”](#)

Powering on a DC system

To power on a filer system using a 48V DC power source, complete the following steps.

Step	Action
1	Power on the disk shelves and backup device first.

Step	Action		
2	Make sure that the DC power supplies on the filer and the DC buses at the DC power source are off.		
3	Connect the first DC power supply to a DC bus by connecting their respective terminals as follows:		
	Power supply terminal	to	DC bus terminal
	Positive	→	Positive
	Negative	→	Negative
	Ground	→	System ground
The following illustration shows the two DC power supplies. The labels for the positive, negative, and ground terminals are below the terminals.			
			
4	If you have a second DC power supply, use the same method to connect the second power supply to the a second DC bus.		
5	Cover the terminal block on each power supply with the provided metal cover before you turn on the DC power source.		
WARNING —————			
To protect yourself from possible electric shock, it is important that the terminal blocks are covered when the filer is connected to the DC power source.			

Step	Action				
6	Turn on the DC buses. (One DC bus for one DC power supply and a second DC bus for the second DC power supply.) Result: In a successful power-on process, the filer automatically ◆ Verifies the filer hardware ◆ Loads its operating system ◆ Checks its connections ◆ Displays the startup messages ◆ Starts the <code>set up</code> program				
7	Make sure that the LEDs on the filer front panel and the LEDs on the DC power supplies illuminate, as follows:				
	LEDs on front panel				
	<table><tr><td>Power</td><td>Turns green indicating power is on.</td></tr><tr><td>Status</td><td>Turns yellow, then turns off when filer starts.</td></tr></table>	Power	Turns green indicating power is on.	Status	Turns yellow, then turns off when filer starts.
	Power	Turns green indicating power is on.			
	Status	Turns yellow, then turns off when filer starts.			
LEDs on DC power supply					
<table><tr><td>Yellow</td><td>First turns yellow to indicate that DC power is present, then turns off when filer starts.</td></tr><tr><td>Green</td><td>Illuminates to indicate that all outputs are good. If this does not happen, call Network Appliance Technical Support.</td></tr></table>	Yellow	First turns yellow to indicate that DC power is present, then turns off when filer starts.	Green	Illuminates to indicate that all outputs are good. If this does not happen, call Network Appliance Technical Support.	
Yellow	First turns yellow to indicate that DC power is present, then turns off when filer starts.				
Green	Illuminates 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. The startup messages are described in Chapter 8, “Troubleshooting the Filer Hardware.”				
9	At the end of the initial startup, the default host name prompt <code>toaster></code> appears on the console screen. If this does not happen, call Network Appliance Technical Support. The filer is ready to be configured.				
10	Proceed to verify the disk shelf and tape backup device installations. Go to Chapter 7.				

About this chapter

This chapter discusses the command to use to verify your fibre channel disk shelf installation.

Command to use to verify the installation

About the command

To verify the fibre channel disk shelf installation after you power on the system, you use the `fctest` command, which tests

- ◆ All fibre channel adapters (for Loop A only) in the filer
- ◆ The fibre channel disks in the disk shelves

The result is a report that gives the following information about the integrity of the fibre channel environment:

- ◆ Loss of synchronization—Number of occurrences
- ◆ CRC errors—Number found in the packets
- ◆ Underrun events—Number of occurrences
- ◆ Inbound and outbound frames—Total number
- ◆ Confidence factor, 0 to 1 scale—Health of the fibre channel system:
 - ❖ 1—Indicates no significant errors
 - ❖ Less than 1—Indicates problems in the loop that are likely to interfere with normal operation

Preparing to run `fctest`

To be able to run the `fctest` command, you need to enter maintenance mode using two system boot diskettes, labeled *System Boot Disk 1* and *System Boot Disk 2*. Be sure to check the diskette labels to make sure that you're using the correct boot diskettes for your filer model.

Entering maintenance mode: To enter maintenance mode on the filer, complete the following steps.

Step	Action
1	Connect a terminal to the connector labeled CONSOLE on the filer.
2	Make sure that the filer is turned off.
3	Insert the <i>System Boot Disk 1</i> diskette into the diskette drive.
4	Power on the filer.
5	When the LCD prompts, remove the first diskette and insert the <i>System Boot Disk 2</i> diskette into the diskette drive.

Step	Action
6	Press Enter. Result: The filer boots and, if it can, displays the boot menu, shown below, on the console screen: 1) Normal Boot 2) Boot without /etc/rc 3) Change Password 4) Initialize all disks 5) Maintenance mode boot Selection (1-5)?
7	To select Maintenance mode, press the following keys: 5 and Enter Result: The > prompt appears. You are in maintenance mode.

Verifying the disk shelf installation

To verify one or more fibre channel disk shelf installations, complete the following steps.

Step	Action
1	To display the commands available in maintenance mode, enter the following command: help
2	Enter the following command: disk_list Result: The filer displays all disk devices.
3	Enter the following command: fctest -v (v—verbose) Result: A report appears on the screen.

Step	Action	
4	If the confidence factor is...	Then...
	Between .95 and .99	You have loop stability problems; a component in the loop is causing signal problems. Check the plugs.
	If it is below .95	Call Network Appliance Technical Support.
	A confidence factor of less than one indicates loop stability problems; a component in the loop is causing signal problems. Check the plugs. If it is below .95, call Network Appliance Technical Support.	
5	To test a specific adapter and its connected disks, enter the following command: fctest -v 8 8 refers to the fibre channel adapter in slot 8 on the filer.	
6	Enter the following command: shelfchk Result: The red disk LEDs on all disk shelves connected to the indicated adapter should be on. This means that the connections in and to the disk shelves are good. In addition, the following message appears: shelfchk Only shelves attached to ha 8 should have all LEDs ON. Are these LEDs all ON now? (ha 8 refers to fibre channel adapter in slot 8 on the filer.)	

Step	Action	
7	If...	Then...
	All disk LEDs are lit Enter y. Result: The following message appears: <pre>>shelfchk</pre> Only shelves attached to ha 8 should have all LEDs ON. Are these LEDs all ON now? y >Wed Jan 11 13:31:51 GMT [rc]: Disk Configuration - No Errors Identified Note_____ If most, but not all, disk LEDs on a disk shelf or loop are lit, this might indicate malfunctioning individual LEDs. Call Network Technical Support for help. _____	All disk LEDs are not lit Enter n. Result: The following message appears: <pre>>shelfchk</pre> Only shelves attached to ha 8 should have all LEDs ON. Are these LEDs all ON now? n *** Your system may not be configured properly. Please check cable connections. > Wed Jan 21 00:39:44 GMT [rc]: Disk Configuration - Failure Identified by Operator. Contact Network Appliance Technical Support for help.

About this chapter

This chapter provides information about how to troubleshoot the F700 series hardware based on the filer 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. See the *F700 Series Field Service Guide* or contact Network Appliance Technical Support for more information.

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

Topics in this chapter

This chapter discusses the following topics:

- ◆ [“Using LED indicators”](#) on page 68
- ◆ [“LCD messages”](#) on page 84

Using LED indicators

About this section

This section describes the LED responses from the filer and various hardware components on your filer.

For detailed information

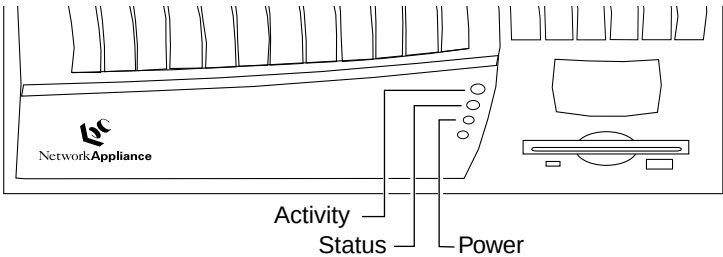
This section describes the following topics:

- ◆ [“Front and back panel LEDs”](#) on page 69
- ◆ [“Power supply LEDs”](#) on page 71
- ◆ [“Network connection LEDs”](#) on page 73
- ◆ [“SCSI adapter LEDs”](#) on page 83

Front and back panel LEDs

Front panel LEDs

The following illustration shows the LEDs on the front panel.

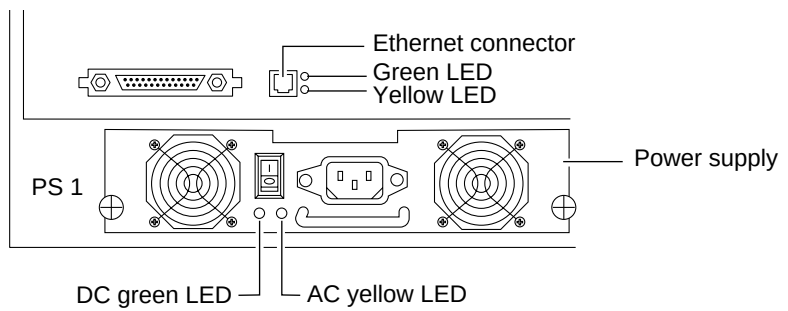


The following table describes the three LEDs on the front panel.

LEDs	State	Indicates
Activity	Green	CPU is continuously active.
	Flashing	CPU is periodically active.
	Off	CPU is idle.
Status	Green	The system status is normal.
	Yellow	A fault has occurred or the system has halted. The system requires service. See the LCD message for a description of the system problem. NOTE: The Status LED turns yellow when you turn on the filer and stays lit while the operating system is loading. It turns green when the filer is working normally.
Power	Green	On—The system is on.
	Off	Off—The system is off.

About back panel LEDs

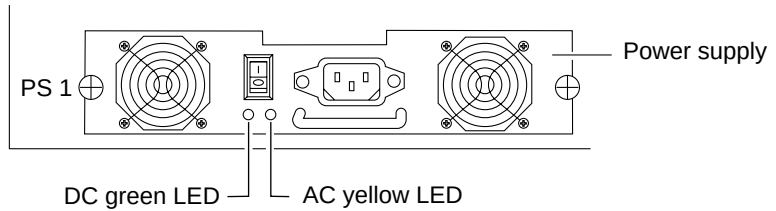
The following illustration shows the Ethernet connector and power supply LEDs on the back panel of an AC filer.



Power supply LEDs

AC power supply LEDs

The following illustration shows the AC power supply LEDs.

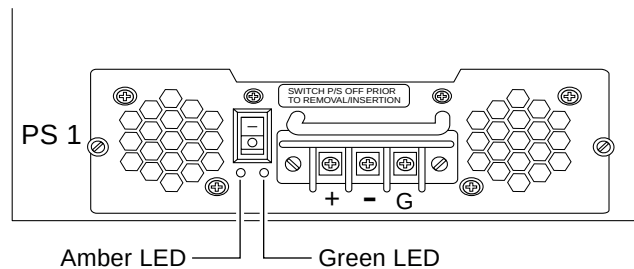


The following table describes the power supply LEDs.

LEDs	State	Indicates
Green	On	Power supply output is good.
	Off	Power supply output has failed.
Yellow	On	Power supply is receiving AC power.
	Off	AC power is not present.

DC power supply LEDs

The following illustration shows the DC power supply LEDs.



The following table describes the DC power supply LEDs.

LEDs	State	Indicates
Amber	On	Input voltage from the DC power source is good, that is, meets specifications.
	Off	Voltage from the DC power source does not meet specifications (-40V DC to -60V DC). Check the input voltage with a voltmeter. If the voltage does not meet specifications, correct it. If it does, the power supply is the source of the problem. Replace the power supply.
Green	On	Output voltage from the power supply to the filer is good, that is, meets specifications.
	Off	A problem exists with the power supply or filer. Try changing the power supply. If the green LED does not illuminate, the filer is bad (is shorted or is overloading the power supply)

Network connection LEDs

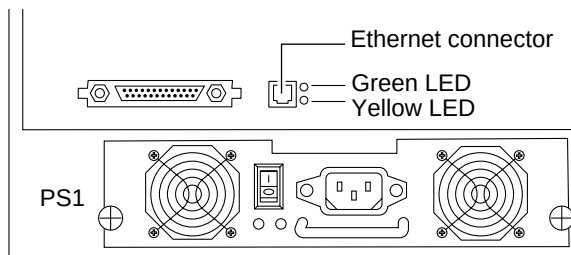
About this section

This section describes the LED responses for the network connections supported by the F700 filer. For each of the following types of network connections, the location of the LEDs is identified and the LED functionality is described:

- ◆ “Onboard 10Base-T/100Base-TX Ethernet port”
- ◆ “Single-port 10Base-T/100Base-TX NIC LEDs” on page 74
- ◆ “Quad-port 10Base-T/100Base-TX NIC LEDs” on page 75
- ◆ “100Base-TX/ 1000Base-T NIC LEDs” on page 76
- ◆ “GbE fiber NIC LEDs” on page 78
- ◆ “FDDI NIC LEDs” on page 79
- ◆ “ATM NIC LEDs” on page 82

Onboard 10Base-T/100Base-TX Ethernet port

Location of LEDs: The onboard 10Base-T/100Base-TX Ethernet port has two LEDs, as shown in the following illustration.

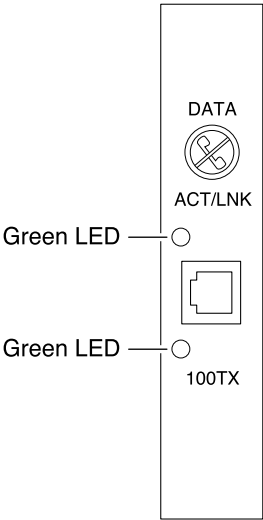


Description of LEDs: The following table describes the LEDs for the onboard 10Base-T/100Base-TX Ethernet port.

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 is on the network.

Single-port 10Base-T/100Base-TX NIC LEDs

Location of LEDs: The single-port 10Base-T/100Base-TX Ethernet NIC has one port and two LEDs, as shown in the following illustration.

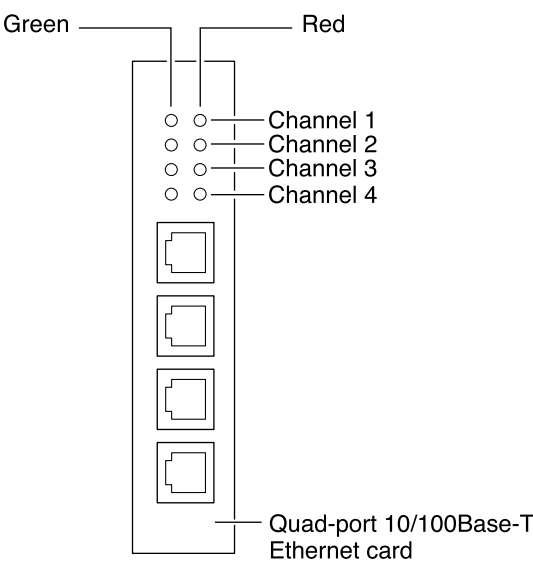


Description of LEDs: The following table describes the LEDs on the single-port 10Base-T/100Base-TX Ethernet NIC.

LEDs	State of illumination	Indicates...
ACT/LNK	On	Valid network connection. For some devices, the LED can take several seconds to light up.
	Off	One of three scenarios: ◆ Idle. ◆ There is no power. ◆ Faulty cable connection.
	Flashing	Transmitting and receiving data.
100	On	Operating at 100 Mbps.
	Off	Operating at 10 Mbps.

Quad-port 10Base-T/100Base-TX NIC LEDs

Location of LEDs: The quad-port 10Base-T/100Base-TX Ethernet NIC has four ports for four channels, with the top port assigned to the first channel. Each port has a corresponding pair of green and red LEDs, as shown in the following illustration.

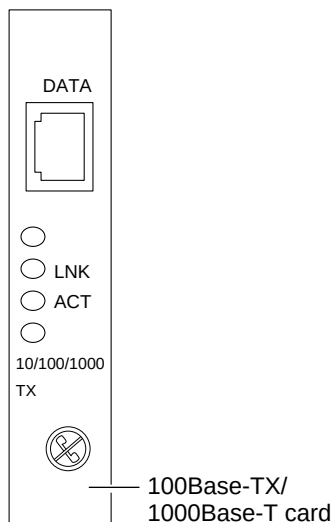


Description of LEDs: The following table describes the function of the LEDs.

LEDs	State of illumination	Indicates...
Green	On Solid	Link is up.
	On Flashing	Network activity.
	Off	Cabling problems.
Red	On	Operating at 100 Mbps.
	Off	Operating at 10 Mbps.

100Base-TX/ 1000Base-T NIC LEDs

Location of LEDs: The 100Base-TX/1000Base-T NIC has one port and four LEDs, as shown in the following illustration.



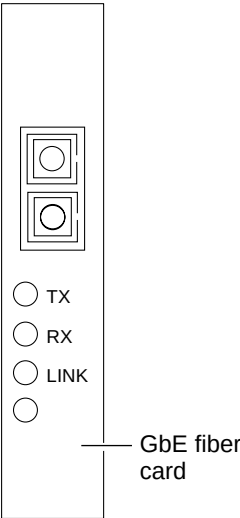
Description of LEDs: The following table describes the LEDs on the 100Base-TX/1000Base-T NIC.

LEDs	State	Indicates...
Top (not labeled)		Not used.
LNK	On	Valid network connection. For some devices, the LED can take several seconds to light up.
	Off	Link to network is not present.
ACT	On	Sending or receiving data.
	Off	Idle.
Bottom (not labeled)	Amber	Operating at 1000 Mbps.
	Green	Operating at 100 Mbps.

GbE fiber NIC LEDs **Location of LEDs:** The GbE fiber NIC has one port and four LEDs, as shown in the following illustration.

Note_____

The F700 filer uses only the TX, RX, and LINK LEDs.



Description of LEDs: The following table describes the LEDs on the GbE fiber NIC.

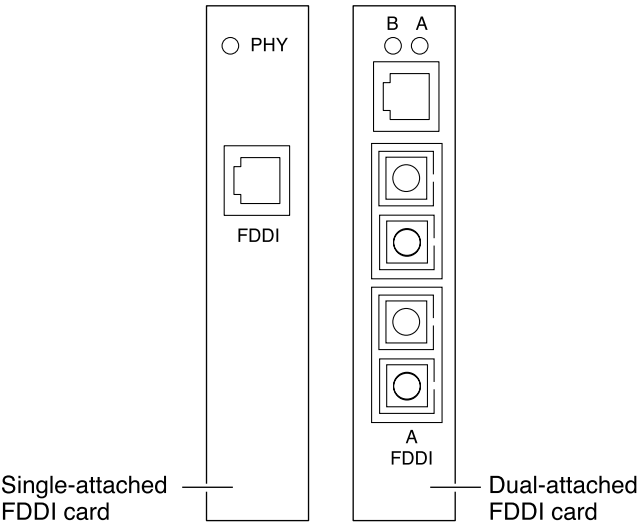
LEDs	State	Indicates...
TX	On	Transmitting data.
	Off	Idle.
RX	On	Receiving data.
	Off	Idle.
LINK	On	Valid network connection.
	Off	Connections need to be checked.

FDDI NIC LEDs

Number of LEDs: The FDDI NICs have either one or two bi-color LEDs. The number of LEDs on the NIC depends on the type of FDDI NIC used.

Type of FDDI NIC used	Number of LEDs	LED identification
Single-attached FDDI-TP with an RJ45 port	1	PHY
Single-attached FDDI-fiber with a duplex SC port	1	PHY
Dual-attached FDDI-fiber with two duplex SC ports and one RJ12 port	2	A and B

Location of LEDs: The ports on a single-attached FDDI-TP NIC and a dual-attached FDDI-fiber NIC are shown in the following illustration.



Description of LEDs: The following table describes the LEDs on a FDDI NIC.

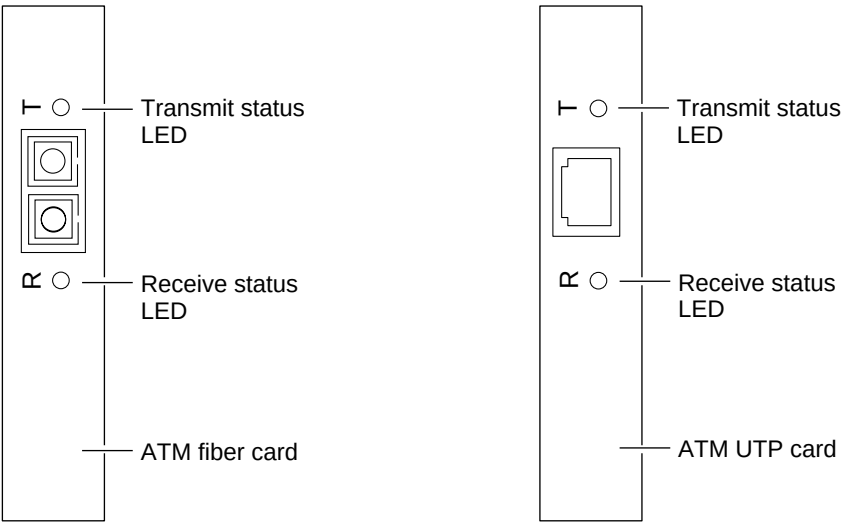
LEDs	State	Indicates...
PHY or A	Flashes green	One of two scenarios: ◆ Three flashes at startup indicate that the network connection is in progress. ◆ Continued flashing indicates that there is no cable attached.
	Green	Transmitting data.
	Flashes amber	Illegal network topology.
	Amber	One of two scenarios: ◆ If on before the filer boots the operating system, there is a self-test failure. ◆ If on after the filer boots the operating system, there is a port or connection failure.
	Alternates green and amber	One of three scenarios: ◆ In standby mode, if the NIC has two duplex SC ports and one RJ12 port and is connected to a concentrator. ◆ A disabled port. ◆ Adapter failure.

LEDs	State	Indicates...
B	Flashes green	One of two scenarios: ◆ Three flashes at startup indicate that the network connection is in progress. ◆ Continued flashing indicates that there is no cable attached.
	Green	Transmitting data.
	Flashes amber	Illegal network topology.
	Amber	One of two scenarios: ◆ If on before the filer boots the operating system, there is a self-test failure. ◆ If on after the filer boots the operating system, there is a port or connection failure.

ATM NIC LEDs

Location of LEDs: All ATM NICs have one port and two LEDs. The Transmit LED is above the port and the Receive LED is below the port.

The following illustration shows an ATM fiber NIC and an ATM UTP NIC.



Description of LEDs: The following table describes the LEDs on the ATM NICs.

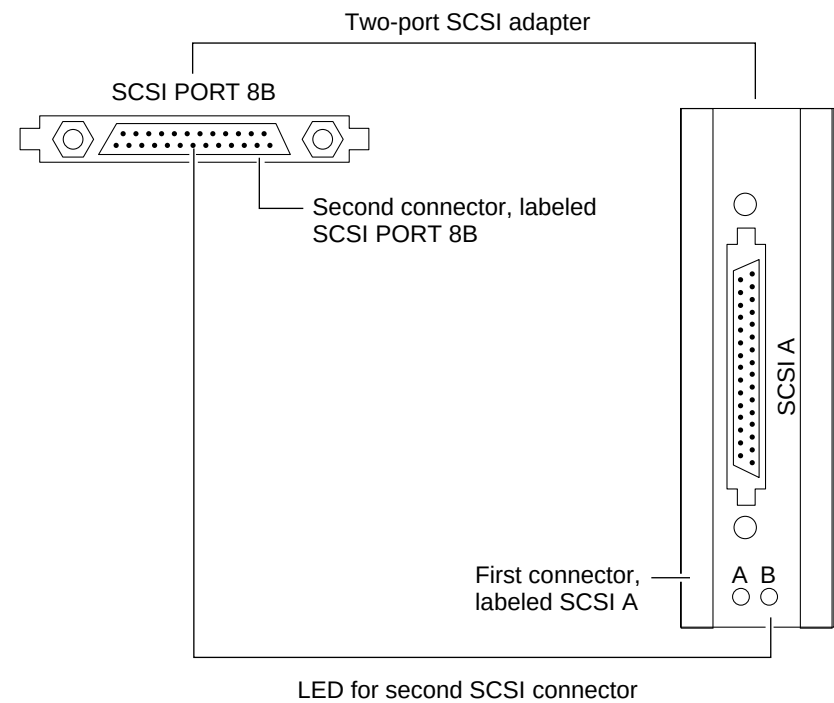
LEDs	State	Indicates...
T	Green	Transmitting data.
	Off	Idle.
	Amber	SONET alarm condition declared because of trouble with the receiving device.
R	Green	Receiving data.
	On	Idle.
	Red	No carrier available.
	Amber	No carrier available (OC12 only).

Using LED indicators

SCSI adapter LEDs

SCSI disk adapter LEDs

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 work 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.

LCD messages

About LCD messages

This section identifies and describes the LCD messages and suggests corrective actions for problems associated with the message. 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 the four types described in the following table.

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

Some of the corrective actions require you to open the system chassis, reseal expansion cards, install or remove SIMMs, or replace hardware components. See 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.

Topics in this section

This section describes the following topics:

- ◆ [“Startup messages”](#) on page 85
- ◆ [“Error messages at startup”](#) on page 92
- ◆ [“Informational or error messages”](#) on page 99
- ◆ [“Error messages when halting”](#) on page 104

Startup messages

Introduction

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 startup error messages are described in “[Error messages at startup](#)” on page 92.

When starting the system from a system boot diskette

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

For more information about starting the system boot diskette, see 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 PROM (Programmable Read-Only Memory).

Sample POST messages on console: The following list provides 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 LCD: The following list provides 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 messages on the LCD

The following table describes the error messages that might appear on the LCD if the filer encounters errors during the POSTs.

POST error message	Description and corrective action
Startup failed	This message appears if the startup fails. The system tries to start up again. This message is usually followed by one of the POST error messages in this section.
*SIO error	Fatal error. The filer SIO or ISA bridge chip failed its timer interrupt test. The system cannot operate properly without this function. Replace the motherboard.

POST error message	Description and corrective action
*Watchdog failed	The filer watchdog reset hardware, used to reset the filer when a system hang occurs, is not functioning properly. Replace the motherboard when convenient.
*Watchdog error	The filer watchdog reset hardware is not functioning properly. Replace the motherboard when convenient.
*CPU speed err	The CPU measured clock speed does not match the expected value for the filer model. This can indicate problems with system clocks and buses. Replace the motherboard.
*L2 parity error	A parity error was detected in the CPU second-level cache. Replace the motherboard.
*Fan(s) stopped	One of more chassis fans stopped spinning or is spinning too slowly. If more than one chassis fan fails, the system does not boot. Replace the chassis fan assembly containing the failed fan.

POST error message	Description and corrective action
*Overtemp alert	An internal temperature sensor detected a dangerously high temperature that can be a harmful to the system components inside the chassis. Power down the filer. Correct the cause of the high temperature. Reduce the ambient temperature to 40° C or lower. Make sure that you have proper air circulation through the filer. If the temperature inside the filer is not excessively hot, check the sensor. Replace the motherboard.
*PS #1 failed *PS #2 failed	One of the power supplies failed and the filer is running on the second power supply. 1. Replace the failed power supply. 2. If the filer is running on only one power supply, the power supply is reporting an error condition and can still power the filer. Replace it as soon as possible.
*No power info!	The system is clearly running but no information about the power supply is being reported. Something is wrong with the power supply or the status reporting circuitry. Replace the power supply. Replace the motherboard.
*Clock bogus. Date reset	Fatal error. The system real-time clock (RTC) contains an invalid date value. The system does not boot, but the date is reset to Jan. 1, 1970 to enable a subsequent boot up. Reboot the filer and reset the date immediately to avoid file system problems.

POST error message	Description and corrective action
*Clock error	Fatal error. The system real-time clock (RTC) is not operating (counting) correctly. Replace the motherboard.
*Clock dead	Fatal error. The system real-time clock (RTC) is not working. Its battery might have expired. Replace the RTC battery or replace the motherboard.
*Env-A stat err *Env-B stat err *Env-C stat err	One of the system's three environmental status monitors shows an improper value, indicating that it cannot properly monitor its environmental health. Replace the motherboard.
*Env-A rupt err *Env-B rupt err *Env-C rupt err	One of the system's three environmental status monitors cannot interrupt the processor, rendering the filer unable to properly monitor its environmental health. Replace the motherboard.
*FP button stuck	The front panel Reset button appears to be stuck. 1. Make sure that the button is not stuck 2. Replace the LED/Button assembly. 3. Replace the motherboard.
*FLPY format err *FLPY head err *FLPY init fail *FLPY read err *FLPY reg error *FLPY seek err *FLPY track err *FLPY setup err	These messages indicate a failure of the diskette drive hardware. 1. Replace the diskette drive and cable. 2. Replace the motherboard.

POST error message	Description and corrective action
*LCD won't open *LCD cmd stall *LCD cursor err *LCD data error	The system LCD device is not operating correctly. All subsequent POST messages are displayed on the console. 1. Replace the LCD assembly and cable. 2. Replace the motherboard.

About the ok> prompt: Contact Network Appliance Technical Support if the ok> prompt appears. The ok> prompt accepts debugging commands, which are reserved for authorized service personnel only. It also enables you to do firmware upgrades.

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. See the *Data ONTAP System Administrator's Guide* for information about how the filer is started from a system boot diskette.

Boot messages

```
NetApp Release x.x.x: 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

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, see NOW at http://now.netapp.com .
Can't open /etc/rc	The <code>/etc/rc</code> file is corrupted. Run <code>setup</code> by entering <code>setup</code> at the <code>hostname></code> prompt. The <code>setup</code> 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 <code>setup</code> program, see the <i>Data ONTAP System Administrator's Guide</i>.
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.

Error message	Description
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.
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.
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.
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, see 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.
Drive placement ha <i>x</i> shelf <i>y</i>	ha—host adapter, <i>x</i>— host adapter number, <i>y</i>—disk shelf number. The specified drives are incorrectly placed in the disk shelf. For more information, see the manual for the specific disk shelf. This SES error message might also appear while the system is running.
EMU rev <i>x</i> not qualified	The EMU revision level is not recognized. Contact Network Appliance Technical Support for help.
EMU <i>y</i> 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 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 /etc/rc, running setup	The system cannot find the /etc/rc 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. See the <i>Data ONTAP System Administrator's Guide</i> for more information about filer setup.
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 FC-AL or SCSI disk controllers!	The system cannot detect any FC-AL or SCSI controllers. Turn off the filer and verify that all network cards are properly seated in the appropriate expansion slots.

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 SES on shelf <i>x</i> ha <i>y</i>	<i>ha</i> —host adapter, <i>x</i> —disk shelf number, <i>y</i> —host adapter number. Occurs if the Enclosure Services in the FC-AL drive racks have not initialized or have problems. This SES error message might also appear while the system is running.
NVRAM <i>#n</i> downrev!	<i>n</i> —The serial number of the NVRAM card. The card is an early revision that cannot be used with the system. For information about which revision of the card is required, see the corresponding message on the console. 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.
Unsupported NVRAM size <i>x</i> MB	<i>x</i> —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.

Error message	Description
Unsupported SES shelf <i>x</i> , ha <i>y</i>	<i>ha</i>—host adapter, <i>x</i>—disk shelf number, <i>y</i>—host adapter number. The system detects unsupported Enclosure Services hardware. This SES error message might also appear while the system is running.

Informational or error messages

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 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 licensed CIFS. One of the following errors causes CIFS service to fail: ◆ The filer <code>/etc/passwd</code> and <code>/etc/group</code> files are missing. To learn how to create new files, see 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. See 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 n $x\%$ rebuilt	n—The RAID group disk number; x—amount of data reconstruction 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. See 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 n is broken	n—The RAID group disk number. The solution depends on whether you have a hot spare installed in the system. See 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 when the fan assembly of the filer stops functioning. Replace the fan assembly as soon as possible.
Fault on shelf n	n—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. See the <i>Data ONTAP System Administrator's Guide</i> for more information about maintenance mode.

Error message	Description
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.
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). See the console messages or to the <code>/etc/messages</code> file for detailed information. Report the problem to Network Appliance Technical Support.
Parity disk is broken	The parity disk not operating and the system is in degraded mode. The solution depends on whether a hot spare is installed in the system. See 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 shuts 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. See 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. See 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> .
<code>x default route</code> <code>x route to y</code>	These messages appear briefly when the routing software is configuring the routing table. For more information, See the <i>Data ONTAP System Administrator's Guide</i> .

Error messages when halting

Error messages when halting

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

Error message	Description
CPU fan has failed	The filer CPU fan stopped functioning. The system automatically shut down. Replace the CPU fan before you restart the system.
Disk hung during swap!	A disk error 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 use the <code>boot</code> command to 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, see the <i>Data ONTAP System Administrator's Guide</i> .
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.

Error message	Description
Halted	This message appears after you enter a <code>halt</code> 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.
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, <code>Dumping core</code> 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.

Error message	Description
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 <i>x</i>	Contact Network Appliance Technical Support for help and report the machine check code.
Uncor sys mchk: code <i>x</i>	Contact Network Appliance Technical Support for help and report the machine check code.

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

After reading this chapter, you will know the following:

- ◆ Recommended AC power line sizes
- ◆ How to calculate the length of DC wires

Recommended AC power line sizes

About AC power feeds

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

Note

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

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

110V, single-phase	20 Amp Circuit	30 Amp Circuit	40 Amp Circuit	50 Amp Circuit
25 ft	12 AWG	10 AWG	8 AWG	8 AWG
50 ft	8 AWG	6 AWG	6 AWG	4 AWG
75 ft	6 AWG	4 AWG	4 AWG	2 AWG

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

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

AWG	8	10	12
Harmonized Cordage	4.0	2.5	1.5

Calculating the length of the DC wires

Variable definitions to use	To calculate the maximum combined length of the positive and negative wires between the DC source and DC power supplies, use the following variable definitions:	
◆	V_{OC}	Voltage across an open circuit of the input source
◆	V_{LOAD}	Voltage across a load, R_{TEST} , connected to the input source
◆	R_{TEST}	Test resistor of known value, i.e. 10 Ω @ 300 W
◆	R_{CABLE}	D.C. resistance of the cable at a given length
◆	R_{SOURCE}	D.C. resistance of the source
◆	R_{TOTAL}	Combined D.C. resistance of cable and D.C. source
		$R_{TOTAL} = R_{SOURCE} + R_{CABLE}$
◆	$V = IR$	Ohm's Law

Calculating the length

The following two examples show how to calculate the maximum combined length of the positive and negative wires that connect the DC power supply to the DC source.

Example 1: This example uses the following givens:

Given

$V_{\text{DROP}} = 2 \text{ V}$	Maximum voltage drop through input source and cable
$V_{\text{MIN}} = 40 \text{ V}$	Minimum input voltage
$I_{\text{MAX}} = 8.6 \text{ A}$	Maximum input current @ 40 V
$V_{\text{OC}} = 48 \text{ V}$	Measured
$V_{\text{LOAD}} = 47.5 \text{ V}$	Measured
$R_{\text{TEST}} = 10 \Omega$	(300 W)

Solution

$$V_{\text{DROP}} = I_{\text{MAX}} R_{\text{TOTAL}}$$

$$2 = 8.6 R_{\text{TOTAL}}$$

$$R_{\text{TOTAL}} = 2/8.6$$

$$R_{\text{TOTAL}} = .233 \, \Omega$$

$$R_{\text{SOURCE}} = \left(\frac{V_{\text{OC}}}{V_{\text{LOAD}}} - 1 \right) R_{\text{TEST}}$$

$$R_{\text{SOURCE}} = \left(\frac{48 \, \text{V}}{47.5 \, \text{V}} - 1 \right) 10 \, \Omega$$

$$R_{\text{SOURCE}} = .105 \, \Omega$$

$$R_{\text{CABLE}} = R_{\text{TOTAL}} - R_{\text{SOURCE}}$$

$$= .233 - .105$$

$$R_{\text{CABLE}} = .128 \, \Omega$$

For example, if you have a solid strand 12-gauge wire at room temperature, use the following calculation.

$$\text{Total cable length} = \frac{R_{\text{CABLE}}}{\text{DC resis.}^1}$$

$$\text{Total cable length} = \frac{.128 \, \Omega}{.0017 \, \Omega/\text{ft}} = 75 \, \text{ft.}$$

AWG	Strand	DC Resistance ^a (Ohm/ft)		Total cable length ^b (ft)	
		25° C	75° C	25° C	75° C
12	Solid	.0017	.0020	75	64
12	7/20	.0015	.0018	85	71
12	19/25	.0017	.0020	75	64
12	65/30	.0018	.0022	71	58
12	165/34	.0016	.0019	80	67

a. Data from Alpha Wire, wire manufacturer

b. Combined positive and negative run

Example 2: This example uses the following givens:

Given

$$V_{\text{DROP}} = 2 \text{ V} \quad \text{Maximum voltage drop through input source and cable}$$

$$V_{\text{MIN}} = 40 \text{ V} \quad \text{Minimum input voltage}$$

$$I_{\text{MAX}} = 8.6 \text{ V} \quad \text{Maximum input current @ 40 V}$$

Solution

$$V_{\text{DROP}} = I_{\text{MAX}} R_{\text{TOTAL}}$$

$$2 = 8.6 R_{\text{TOTAL}}$$

$$R_{\text{TOTAL}} = 2/8.6$$

$$R_{\text{TOTAL}} = .233 \, \Omega$$

$$R_{\text{TOTAL}} = R_{\text{SOURCE}} + R_{\text{CABLE}}$$

$$R_{\text{CABLE}} = R_{\text{TOTAL}} = .233 \, \Omega$$

For example, if you have a solid strand 12-gauge wire at room temperature, use the following calculation:

$$\text{Total cable length} = \frac{R_{\text{CABLE}}}{\text{DC resis.}^1}$$

$$\text{Total cable length} = \frac{.233 \, \Omega}{.0017 \, \Omega/\text{ft}} = 136 \, \text{ft.}$$

AWG	Strand	DC Resistance ^a (Ohm/ft)		Total cable length ^b (ft)	
		25° C	75° C	25° C	75° C
12	Solid	.0017	.0020	136	116
12	7/20	.0015	.0018	155	129
12	19/25	.0017	.0020	136	116
12	65/30	.0018	.0022	129	105
12	165/34	.0016	.0019	145	122

a. Data from Alpha Wire, wire manufacturer

b. Combined positive and negative run

About using other wire sizes

If you need a longer run for your combined positive and negative DC wires, choose a wire with a lower resistance and calculate the total cable length. For example, a solid #10 AWG has a lower DC resistance than a solid #12 AWG.

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

Regulatory notices

FCC notices (U.S. only)

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

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

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

Compliance with Part 15 of CFR 47

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

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

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

Compliance with ICES-003

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

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

Compliance with EN regulations

Marking by the symbol  indicates compliance of this Network Appliance device to the EMC Directive and the Low Voltage Directive of the European Union. Such marking is indicative that this Network Appliance device meets the following technical standards:

- ◆ EN 55022—“Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment.”
- ◆ EN 50082-1: 1992—“Electromagnetic compatibility—Generic immunity standard Part 1: Residential, Commercial, and Light Industry.”
- ◆ EN 60950—“Safety of Information Technology Equipment.”

Caution

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

Bureau of Commodity Inspection and Quarantine notice (BCIQ, Taiwan only)

警告使用者：

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

Translation of the BCIQ notice:

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

This documentation package applies to the following products:

- ◆ NetApp filers: F720, F740, and F760
- ◆ NetCache Appliances: C720, C720s, and C760
- ◆ NetApp System Cabinets: P/Ns 110-01981 and 110-01980
- ◆ Disk shelves: P/Ns XL401R-FJC-02D, XL401R-S-02Z, XL401R-R-02N, XL108-01471, and XL108-01472

DECLARATION OF CONFORMITY

We, Network Appliance, Inc.,
495 East Java Drive
Sunnyvale, California, 94089, 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

5/12/97
Date


Helen Bradley
Officer of the Company

Part number:
210-02379

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