

NetApp® Filers

F600 Series

Hardware Installation Guide

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

declare under our sole responsibility that the product(s)

Type of Equipment	Description	Part No.	Year of Manufacture
Network File Server	NetApp F630 Filer	F630x	1997
Cache Server	NetApp C630	C630x	1997

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

January, 1997

Helen Bradley
Officer of the Company

Table of contents

Preface	xi
Chapter 1:	
System overview	1-1
Overview of the filer	1-1
Hardware features.....	1-3
Network connectivity.....	1-3
FC-AL disk drives.....	1-3
SCSI disk drives.....	1-4
Combined FC-AL and SCSI disk storage support.....	1-4
Cluster support	1-4
18-GB FC-AL disk shelves in cluster systems	1-5
1.5 Terabyte (TB) disk storage limit	1-5
Floppy drive	1-5
Tape drives	1-5
System monitoring and indicators.....	1-5
System memory.....	1-5
Nonvolatile memory	1-6
Serial ports	1-6
Redundant power supply.....	1-6
Front and back panels of the filer	1-7
Expansion slots and cards	1-10
Installation requirements	1-11
Environmental requirements	1-11
Space requirements	1-12
Electrical requirements	1-13

Chapter 2:	
Installing the filer	2-1
Installation tools	2-1
Installing the filer	2-2
Mounting the filer in a rack.....	2-2
Connecting the filer to a power source	2-4
Installing the disk shelves.....	2-5
Installing the serial console	2-5
Connecting the filer to the network	2-7
Ethernet network	2-8
FDDI network	2-9
ATM network	2-15
Chapter 3:	
Storage devices	3-1
Storage device support	3-1
How disk drives are numbered	3-3
Determining the disk SCSI card number	3-3
Determining the disk SCSI ID number	3-3
Mapping disk ID numbers to SCSI addresses	3-4
Connecting an external tape device to the filer	3-5
Chapter 4:	
Troubleshooting system hardware	4-1
LED indicators.....	4-2
LED indicators on the filer front panel	4-2
LED indicators on expansion cards	4-3
LED indicators on the power supply.....	4-8
LCD messages	4-9

Startup messages	4-10
Error messages when the system is starting.....	4-10
Messages when the system is operating.....	4-15
Errors causing the system to halt or restart	4-18
Appendix A:	
Startup messages	A-1
POST (power-on self test) messages	A-1
System console.....	A-1
System LCD.....	A-2
Boot messages	A-3
System console.....	A-3
System LCD.....	A-4
Appendix B:	
Opening the system backplane carrier	B-1
Opening the system backplane carrier.....	B-1
Removing the system backplane carrier.....	B-6
Closing the system backplane carrier	B-7

List of figures

Figure 1-1. NetApp F630 filer..... 1-2

Figure 1-2. Front panel of the F630 with the door closed..... 1-7

Figure 1-3. Front panel of the filer with the door open..... 1-8

Figure 1-4. Back panel of the filer..... 1-9

Figure 2-1. 19-in. equipment rack for the filer..... 2-2

Figure 2-2 Sample FDDI network configuration 2-10

Figure 2-3 Connecting a duplex fiber optic cable to a
single-attachment FDDI-fiber card..... 2-12

Figure 2-4 Connecting two duplex fiber optic cables to a
dual-attachment FDDI-fiber card 2-13

Figure 2-5 Pins on the bypass switch connector 2-14

Figure 2-6 Connecting a duplex fiber optic cable to an ATM card... 2-16

Figure 4-1. LEDs on the quad-port Ethernet cards..... 4-4

Figure 4-1. LEDs on the ATM network card 4-7

Figure 4-2. Power supply faceplate 4-8

List of tables

Table 1-1. Special slot requirements on the F630 1-4

Table 1-1. Environmental requirements for the filer 1-11

Table 1-2. Dimensions and weight of the filer 1-12

Table 1-3. Electrical requirements for the filer 1-13

Table 2-1. Pin configuration for the filer serial port 2-6

Table 2-2. Filer to terminal connections..... 2-6

Table 2-3. Optical bypass connector pin assignments..... 2-14

Table 4-1. Filer front panel LEDs 4-2

Table 4-2. Single-channel, two port Ethernet card LEDs 4-3

Table 4-3. Single-channel, single-port Ethernet card LEDs..... 4-4

Table 4-4. Quad-port 10Base-T Ethernet card LEDs..... 4-5

Table 4-5. Quad-port 10Base-T/100Base-T Ethernet card LEDs 4-5

Table 4-6. LED for each port on the FDDI card 4-6

Preface

About this guide

This guide provides you with instructions for installing your Network Appliance filer for the first time. It provides information for filers of the NetApp™ F600 series. The guide is organized as follows:

Chapter	Information included in the chapter
1	System overview and installation requirements
2	Procedures for installing the filer
3	List of supported storage devices and procedure for installing an external tape device
4	Information to assist in troubleshooting system hardware
A	Startup messages
B	Procedure for opening the system backplane carrier

Use this guide in conjunction with the *System Administrator's Guide*, which describes how to operate and manage the filer. This hardware guide describes only hardware components that require installation when you first set up the system. Refer to the *Field Service Guide for the NetApp F600 Series* for information about how to upgrade or service the system hardware.

Audience

This guide is for system administrators who are familiar with computer networks, distributed file systems, and NFS, CIFS, or HTTP service. It does not cover basic system administration topics such as IP addressing, routing, and network topology. It emphasizes the characteristics of the filer hardware.

Terminology

When the term “filer” is used, the information applies to all models of the NetApp F600 series.

The term “FDDI adapter” refers to a network adapter that can be connected to a Fiber Distributed Data Interface (FDDI) network, whether the cable supported is a twisted-pair or fiber-optic cable. To distinguish between the FDDI adapters with different media types, this guide uses the terms “FDDI-TP” and “FDDI-fiber.”

Command conventions

You can enter filer commands on the system console or on an administration host, which is a client computer that accesses the filer using Telnet. When describing commands entered on an administration host, this guide assumes that the host runs the SunOS operating system. The administration host, however, is not required to run SunOS. Refer to the *System Administrator's Guide* for more information about the administration host.

Keyboard conventions

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

When describing key combinations, this guide uses the hyphen (-) to separate individual keys. For example, “Ctrl-D” means pressing the Control and D keys at the same time. Also, this guide uses the term “Enter” to refer to the key that generates a carriage return, although the key is named Return on some keyboards.

This guide uses the term “type” to mean pressing one or more keys on the keyboard. It uses the term “enter” to mean pressing one or more keys and then Enter.

Formatting conventions

In this guide, the following kinds of formatting in the text identify special information:

Formatting convention	Type of information
<i>Italic type</i>	Words or characters that require special attention. File names. Placeholders for information you must supply. For example, if the guide says to enter the <code>arp -d <i>hostname</i></code> 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 monospaced font	Words or characters you type. What you type is always shown in lowercase letters, unless it must be typed in uppercase letters to work properly.

Special messages

This guide contains special paragraphs denoted by icons in the margin. They 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.

Chapter 1: System overview

This chapter provides information about the hardware features and installation requirements of your filer. If you are already familiar with the hardware features of the filer, go directly to “Installation requirements” on page 1-11 to make sure the location at which you install the filer meets important requirements.

Overview of the filer

The Network Appliance filer is a multiprotocol file server that is designed to provide fast and reliable file service to network clients. Network clients are computers, such as UNIX systems, PCs, and Macintosh computers, that support NFS (Network File Service), CIFS (Common Internet File System), or HTTP (Hypertext Transfer Protocol).

Figure 1-1 illustrates the NetApp F630.

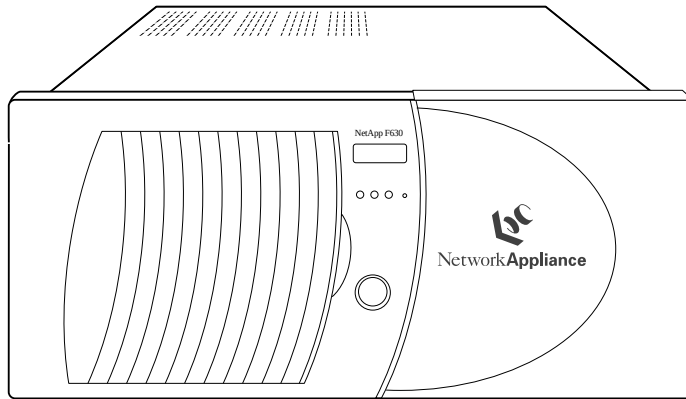


Figure 1-1. NetApp F630 filer

The filer provides file service to clients that are attached to Ethernet, FDDI, and ATM networks. It stores data on disk drives in external disk shelves. It also supports external tape drives for backing up data.

Initially, a serial console must be attached to the filer to set up the system. Once the filer is set up for network operation, you can access the filer through a Telnet session; however, Network Appliance recommends that the console be attached at all times so you can enter commands to manage the filer when you cannot access the filer through the network.

The filer has an LCD that displays system messages. It also has LED indicators that provide information about the status of the system.

Hardware features

This section describes the hardware features and options available on the filer.

Network connectivity

The following network cards are available for the filer:

- Ethernet network cards:
 - Single-port Ethernet cards for 10Base-T or 100Base-TX connections
 - Quad-port Ethernet cards for 10Base-T connections
 - Quad-port Ethernet cards for 10Base-T and 100Base-TX connections
- FDDI network cards:
 - Single-attachment FDDI-TP cards
 - Single-attachment FDDI-fiber cards
 - Dual-attachment FDDI-fiber cards
- ATM network cards:
 - Single-port ATM network cards

FC-AL disk drives

The filer supports the following FC-AL (Fibre Channel Arbitrated Loop) disk drive features:

- 9-GB FC-AL disks in an external disk shelf for 9-GB disks only.
- 18-GB FC-AL disks in an external disk shelf for 18-GB disks only.
- FC-AL adapters for fibre channel disk shelves. Each adapter supports one FC-AL loop.
- Up to three FC-AL loops with up to 56 disks per loop.
- Support for 9-GB and 18-GB disk shelves combined in the same loop.

SCSI disk drives

The filer supports the following SCSI disk drive features:

- Two-port, wide differential SCSI adapters for SCSI disks. Each port supports up to 13 fast SCSI disk drives.
- 9-GB and 4-GB SCSI disks in external disk shelves.
- “Hot swappable” disks (hot swapping a disk means adding, removing, or replacing a disk while the system is running)

Combined FC-AL and SCSI disk storage support

The filer supports combined FC-AL and SCSI disk shelf storage at the same time.

Table 1-1 lists the slots that you must use when you have a SCSI Dual StorageShelf 1, SCSI Dual StorageShelf 2, and two Fibre Channel StorageShelves connected to the F630 at the same time.

Table 1-1. Special slot requirements on the F630

Connections for
• Dual StorageShelf 1—Slot 7 • Dual StorageShelf 2—Slot 8 • Two Fibre Channel StorageShelves—Slots 4 and 5

Cluster support

The F630 supports clusters. It supports only FC-AL disk shelves in clusters. For information, refer to the *Cluster Conversion Guide*.

A cluster consists of a pair of filers that are connected and configured in a special way to provide fault tolerance. When one filer in a cluster undergoes a system failure and can’t reboot, the partner filer in the cluster can take over the failed filer’s functions and serve the data on the failed filer’s disks. For more information, refer to Chapter 2 in the *First-Time Configuration Guide*.

18-GB FC-AL disk shelves in cluster systems

1.5 Terabyte (TB) disk storage limit

The disk storage limit for the filer is 1.5 TB and applies to FC-AL, SCSI, and combined FC-AL and SCSI disk storage.

Floppy drive

One floppy drive is installed in the filer to start the system from a diskette if the system fails to start from the hard disk.

Tape drives

The following expansion cards are available for connecting external tape drives or tape stackers to the filer:

- Single-ended, fast narrow SCSI card
- Differential, fast wide SCSI card

For information about the types of external tape stackers and tape drives supported by the filer, refer to Chapter 3, “Storage devices.”

System monitoring and indicators

The environmental card is installed in an ISA (Industry Standard Architecture) slot on the system backplane. The card monitors the operating environment of the system, such as the temperature and fans.

The environmental card also serves as an interface between the processor and the LCD, LEDs, and interrupt switch on the filer front panel. The LCD displays messages up to 32 characters. Three LEDs report system activity and power status.

System memory

The filer has 128 MB of memory installed at the factory. System memory can be upgraded to a maximum of 512 MB. The minimum amount of memory required to support a filer with a maximum disk configuration is 256 MB.

Nonvolatile memory

The filer has 8 MB of NVRAM installed at the factory on the battery-backed NVRAM card. NVRAM can be upgraded to 16 MB or 32 MB.

Serial ports

Two RS-232C asynchronous serial ports provide the following connections:

- Serial console for system administration
- Environmental monitor unit (EMU) on the StorageShelf 2 disk shelf for reporting disk shelf operational status

Redundant power supply

The filer supports the optional NetApp RPS 2 for redundant N+1 power. In a redundant N+1 power configuration, two power supply units are installed in the RPS and the filer operates using both units. If one power supply unit is turned off or fails, the filer operates using the power from the second power supply unit. You can mount the NetApp RPS 2 in a 19-in. equipment rack.

Front and back panels of the filer

The front of the filer is covered by an aluminum bezel. Figure 1-2 illustrates the front panel of the NetApp F630.

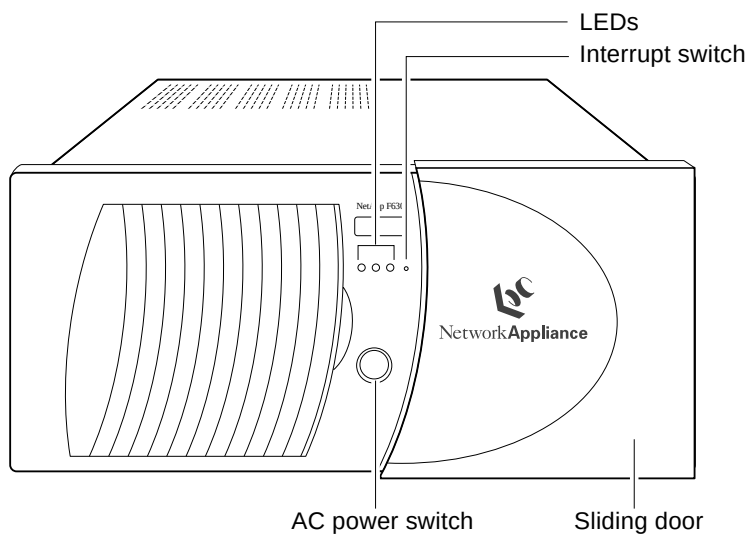


Figure 1-2. Front panel of the F630 with the door closed



CAUTION: Do not press the interrupt switch on the front panel. This switch is for debugging and is reserved for authorized service personnel only.

The aluminum bezel has a sliding door to cover the floppy drive. To open the door, grip the right edge of the door and slide it to the left. Figure 1-3 illustrates the front panel of the filer with the door open.

The bezel covers the fan assembly and LCD control panel. To remove the bezel, hold the upper and lower edges of the bezel and pull it straight off the panel. To replace the bezel, align the pins on the bezel with the holes on the panel, then push the bezel straight on to the panel. Do not remove or replace the bezel while the filer is operating because you might press the AC power switch or interrupt switch, causing the filer to power off or enter a mode used for debugging.

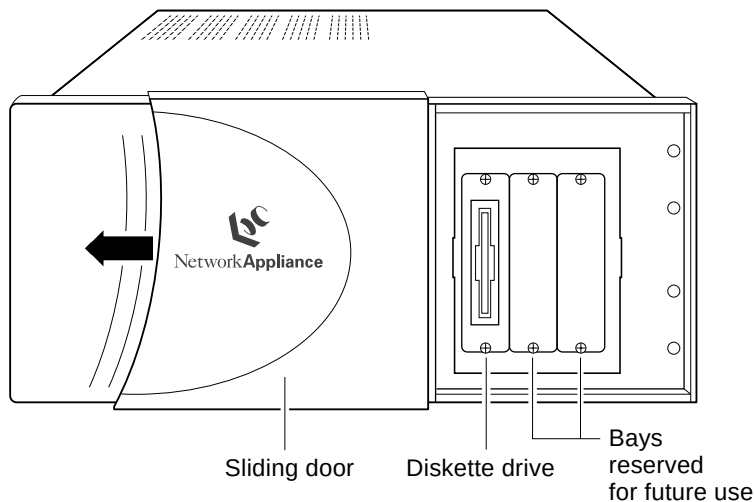


Figure 1-3. Front panel of the filer with the door open

Connectors on expansion cards are accessible on the back panel of the filer. Figure 1-4 illustrates the filer back panel. The number of expansion cards and the types of cards in your filer may differ from the filer illustrated in Figure 1-4. Empty expansion slots in you filer are covered by metal protector plates.

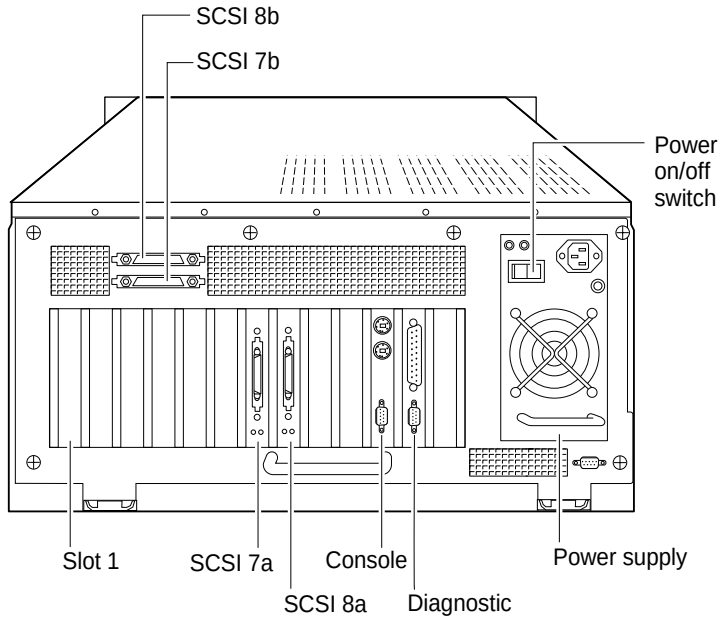


Figure 1-4. Back panel of the filer

Expansion slots and cards

Your filer is shipped with the expansion cards that you ordered already installed. This section provides information about the locations of the expansion cards and how expansion cards are numbered in the system.



NOTE: The “NetApp on the Web” (NOW) web page at <http://now.netapp.com> provides information about the number and types of expansion cards that can be installed in the filer expansion slots.

The filer system backplane contains 10 PCI (Peripheral Component Interconnect) expansion slots. Two slots, slots 9 and 10, are unbridged 64-bit slots. Eight slots, slots 1 through 8, are bridged 32-bit slots. The system backplane also has three ISA slots; the environmental card is installed in slot 13, an ISA slot. Two ISA slots are reserved for future use. The system card assembly occupies slots 11 and 12.

The expansion card connectors are located on the faceplate of the card, except for the two-port SCSI cards. The two-port SCSI cards have two connectors: the first connector (connector A) is on the faceplate of the card and the second connector (connector B) is on the back panel of the filer. Connector B is internally attached to the SCSI card by a cable. The back panel of the filer is described in “Front and back panels of the filer” on page 1-7.

As you face the back panel, expansion slots are numbered 1 to 10 from left to right. In product documentation and system messages, expansion cards are numbered by the slots they occupy. For example, a SCSI card in slot 7 is SCSI 7. If multiple connectors exist on a card, the connectors are numbered by location on the card (a, b, and so on). For example, the SCSI connectors on the two-port SCSI card in slot 8 are SCSI 8a and SCSI 8b.

The filer SCSI connectors are illustrated in Figure 1-4 on page 1-9. For more information about network interfaces, refer to “Connecting the filer to the network” on page 2-7.

Installation requirements

Before installing the filer, make sure the location you select for installation meets the environmental, space, and electrical requirements described in this section.



CAUTION: If you install the filer in a location that does not meet the installation requirements, the system might not operate properly.

Environmental requirements

Table 1-1 describes the environmental requirements for the filer.

Table 1-1. Environmental requirements for the filer

	Operating	Nonoperating
Temperature	50°F to 104°F (10°C to 40°C)	-40°F to 151°F (-40°C to 66°C)
Relative humidity	10% to 90% (noncondensing)	8% to 95% in original shipping container (noncondensing) Otherwise, 50% (noncondensing)



CAUTION: If you have more than eight disk shelves in your configuration, you must install the system in a NetApp System Cabinet.

Space requirements

When installing the filer, leave at least 3 feet (about 1 meter) of space between the back of the system and the wall. This amount of space allows you to reach the back panel for cabling the system. It also allows you to slide the backplane carrier out from the back of the filer when removing or installing hardware.



CAUTION: Do not block the ventilation holes on the top cover of the filer. Leave at least 1.5 inches (about 4 centimeters) of space directly above the ventilation holes for air circulation. You can mount equipment directly on the unvented area on the top cover of the filer as long as the equipment does not extend over and block the filer ventilation holes.

Table 1-2 describes the dimensions and weight of the filer.

Table 1-2. Dimensions and weight of the filer

Height	8.75 in. (22.23 cm)
Width	17.25 in. (43.82 cm)
Depth	22 in. (55.88 cm)
Net weight	60 lb (27.22 kg)

Electrical requirements

Use the power cords supplied in your shipment to attach the filer to a properly grounded power source. Table 1-3 describes the electrical requirements for the filer.

Table 1-3. Electrical requirements for the filer

Power supply	90 to 250 VAC single phase
Maximum current	8 A at 90 VAC 4 A at 180 VAC
Frequency	47 to 63 Hz
Thermal rating	667 BTU/hr (measured when the filer was equipped with seven expansion cards.)

Chapter 2: Installing the filer

This chapter provides instructions for installing the filer for the first time. It describes the minimum number of steps required to get you started with your filer. These steps are:

1. Install the filer.
2. Install the disk shelves.
3. Install the serial console.
4. Connect the filer to the network.

If you plan to connect an external tape stacker or tape drive to the filer, refer to “Chapter 3, Storage devices,” for an example.

Before you proceed, make sure your site meets the requirements described in “Installation requirements” on page 1-11. Also, install the filer in a location as free as possible of dust and static electricity.

Installation tools

To install the filer, you need the following tools:

- #2 Phillips screwdriver
- Antistatic wrist strap and grounding leash

Installing the filer

Installing the filer involves mounting the filer in an equipment rack and connecting the filer to a power source.

Mounting the filer in a rack

The filer can be mounted in a 19-in. equipment rack with the eight #10-32 screws that are shipped with your system. The rack you use must have a front panel width of 19 inches (48.26 centimeters) and have front mounting rails. Figure 2-1 illustrates part of a 19-in. equipment rack.

The only tool you need to mount the filer is a #2 Phillips screwdriver. If the screws provided in your shipment do not fit the holes on your rack, you need to provide screws of an appropriate size. If the rack does not have threaded holes, you need to provide clip nuts or nut bars for fastening the screws.

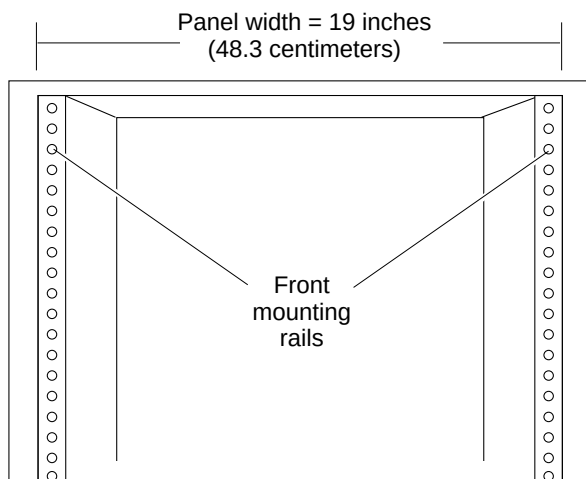


Figure 2-1. 19-in. equipment rack for the filer



WARNING: The filer is heavy. Work with at least one other person when mounting the filer to avoid injuring yourself or damaging the filer.

To mount the filer in a rack, follow these steps:

1. If you have not yet done so, remove the back panel of the rack and open the front door.
2. Remove the bezel to gain access to the mounting holes on the filer.
 - a. Grip the upper and lower edges of the bezel.
 - b. Pull it straight out, away from the panel.
3. On each front mounting rail of your rack, select four holes that are spaced appropriately for the mounting holes on the filer.
4. Align the holes on the filer flanges with the holes you selected in step 3.

The person assisting should stand behind the rack to help support the weight of the filer.

5. Insert the screws into the mounting holes on the filer flanges and the mounting rails of the rack.

Install the lower screws first to help support the weight of the filer.

6. Tighten all the screws.
7. Replace the bezel.
 - a. Align the pins on the bezel with the holes on the panel.
 - b. Push the bezel straight on the panel.

The procedure for rack-mounting the filer is complete.

Connecting the filer to a power source

This section provides the procedure for connecting a power source to the filer power supply. If you purchased the NetApp RPS 2 with your filer, install the NetApp RPS 2 after mounting the filer in the rack. Refer to the *Installation Guide for the NetApp RPS 2* for information about how to install and operate the redundant power supply.

To connect a power source to the filer power supply, follow these steps:

1. Make sure the AC power switches on the filer are in the Off and standby positions.

The filer has two power switches. One switch is on the power supply on the back of the filer and the other switch is on the filer front panel, which is turned off when the AC power switch is not pressed in.

2. Connect the socket end of the power cord to the recessed power plug on the power supply module located on the back of the filer.
3. Plug the other end of the power cord into a grounded electrical outlet.
4. To determine whether the filer is receiving power, turn it on by first turning on the AC power switch on the power supply, then pressing the AC power switch on the front panel in, to the On position.

The power LED on the front panel will light.

The AC LED on the power supply will light.

5. Turn off the filer.

The procedure for installing the filer is complete.

Installing the disk shelves

Refer to the disk shelf documentation that shipped with your filer for instructions on how to install disk shelves.



NOTE: In a noncluster system, in a fibre channel disk shelf (9-GB or 18-GB), be sure you have at least one disk installed in drive bays 03 and one in drive bays 4–6. In a cluster system, be sure to have at least one additional disk installed in drive bays 0–2.



NOTE: If you plan to install a disk drive used by another filer in your new disk shelf while the filer and disk shelves are not powered, erase the disk label on the used disk drive before you install the drive in the shelf. If you do not erase the disk label and install the drive while the system is down, the filer may not boot. Refer to the *System Administrator's Guide* for information about how to erase disk labels.

Installing the serial console

To set up the filer, connect a serial console to the filer's console port. Network Appliance recommends that the console be connected at all times so you can enter commands to manage the filer if you cannot access it through the network. This section describes how to connect an ASCII terminal as the serial console to the filer. An ANSI terminal is also an ASCII terminal, which can be used as the console for the filer



NOTE: You can connect a serial concentrator or communications server to the filer instead of connecting a serial console directly to the filer. You can establish a full-duplex terminal connection with the filer using either device. If you need further information about this configuration, refer to the documentation that shipped with your serial concentrator or communications server.

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

1. Use the provided 9-pin to 25-pin serial cable to connect the terminal to the serial port marked "Console" on the filer back panel.

Refer to Figure 1-4 on page 1-9 for the location of the console port.

If the provided serial cable is not compatible with the connector on your terminal, use a null modem cable to connect the terminal to the filer according to the information provided in Table 2-1 and Table 2-2. The connector on the cable that you are connecting to the serial port must be a female connector.



NOTE: The filer serial port supports only DTE devices. It does not support DCE devices such as modems. Most terminals are wired as DTE devices.

Table 2-1. Pin configuration for the filer serial port

Pin	Function	Abbreviation
1	Data Carrier Detect	DCD
2	Receive Data	RXD
3	Transmit Data	TXD
4	Data Transmit Ready	DTR
5	Ground	GND
6	Data Set Ready	DSR
7	Request to Send	RTS
8	Clear to Send	CTS

Table 2-2. Filer to terminal connections

Filer: Signal (DB-9 pin number)	Terminal: Signal (DB-25 pin number)
RXD (2)	TXD (2)
TXD (3)	RXD (3)
GND (5)	GND (7)

2. Set the terminal characteristics as follows:

- 9600 baud
- 8 data bits
- no parity
- 1 stop bit



NOTE: To make sure your terminal works properly with the filer, you must set the terminal characteristics correctly. Refer to the documentation that shipped with your terminal for setup information.

The installation of the serial console is complete.

Connecting the filer to the network

You can connect the filer to multiple networks using the network cards installed in the filer. Network interfaces are named as follows:

- The Ethernet interface on a single-port Ethernet network card is named according to the numbered expansion slot in which the card is installed. For example, if a single-port Ethernet card is in slot 4, its interface is named e4.
- Each Ethernet interface on a quad-port Ethernet network card is named according to the numbered expansion slot in which the card is installed and the ports (a – d) on the card. For example, if a quad-port Ethernet card is in slot 4, the first port (interface), at the top of the card faceplate, is named e4a. The last port (interface), at the bottom of the card faceplate, is named e4d.
- The FDDI interface on an FDDI network card is named according to the numbered expansion slot in which the card is installed. For example, if an FDDI card is in slot 2, its interface is named f2.
- The ATM interface on an ATM network card is named according to the numbered expansion slot in which the card is installed. For example, if an ATM network card is in slot 10, its interface is named a10.

This section describes how to connect your filer to an Ethernet, FDDI, or ATM network, provided a network has been installed at your site. When you have finished connecting the filer to the network, you can set up your filer software as described in the *System Administrator's Guide*.

Ethernet network

This section describes the connectors and cabling requirements for connecting the filer to an Ethernet network and the procedure to connect them.

Connectors

The interfaces on the Ethernet network cards accept RJ-45, 8-pin modular connectors. Use the following connection guidelines when you connect the filer to an Ethernet network:

- On a single-channel, two-port Ethernet card with a 10Base-T (upper) and a 100Base-TX (lower) port, use only one connector at a time. You cannot have 10Base-T and 100Base-TX connectivity at the same time on this card.
- On a single-channel, single-port Ethernet card with a 10Base-T/100Base-TX connector, the card automatically configures the port for 10-Mb/s or 100-Mb/s operation according to the IEEE (Institute of Electrical and Electronic Engineers) 802.3u standard.
- On a quad-port Ethernet card with 10Base-T connectors, you can use all four connectors at the same time.
- On a quad-port Ethernet card with 10Base-T/100Base-TX connectors, you can use all four connectors at the same time. This Ethernet card automatically configures each port for 10-Mb/s or 100-Mb/s operation according to the IEEE 802.3u standard.

Cabling requirements

Use the following types of cables to connect the filer to an Ethernet network:

- For 10Base-T devices, use Category 3 or 5 unshielded twisted-pair (UTP) cable.
- For 100Base-TX devices, use Category 5 UTP cable.

When connecting Ethernet devices to the filer using Category 3 or Category 5 UTP cable, do not exceed the maximum cable length specifications in the appropriate IEEE Ethernet standard.

Connecting the filer to an Ethernet network

To connect the filer to an Ethernet network, push the twisted-pair cable connector into the RJ-45 connector on the network card until it clicks and locks in place.

FDDI network

This section describes the cabling requirements and network configurations for connecting the filer to an FDDI network. It also describes how to connect the filer to an FDDI network using various types of FDDI network cards.

Cabling requirements

Use the following types of cables to connect the filer to an FDDI network:

- On the FDDI-TP card, use Category 5 unshielded twisted-pair (UTP) or Category 5 sheath-shielded, 100-ohm twisted-pair (TP) cable with a TP-MIC plug.
- On the FDDI-fiber card, use duplex 62.5/125 micron or 50/125 micron multimode fiber optic cable with SC connectors.

When connecting FDDI devices to the filer using UTP or fiber optic cable, do not exceed the maximum cable length specifications in the appropriate FDDI ANSI (American National Standards Institute) standard.

Network configurations

The network configuration depends on whether the filer is a single-attachment station or dual-attachment station.

Single-attachment station. You can connect a single-attachment FDDI-TP or FDDI-fiber card to a dual-ring backbone through an FDDI concentrator. See Figure 2-2 for an example.

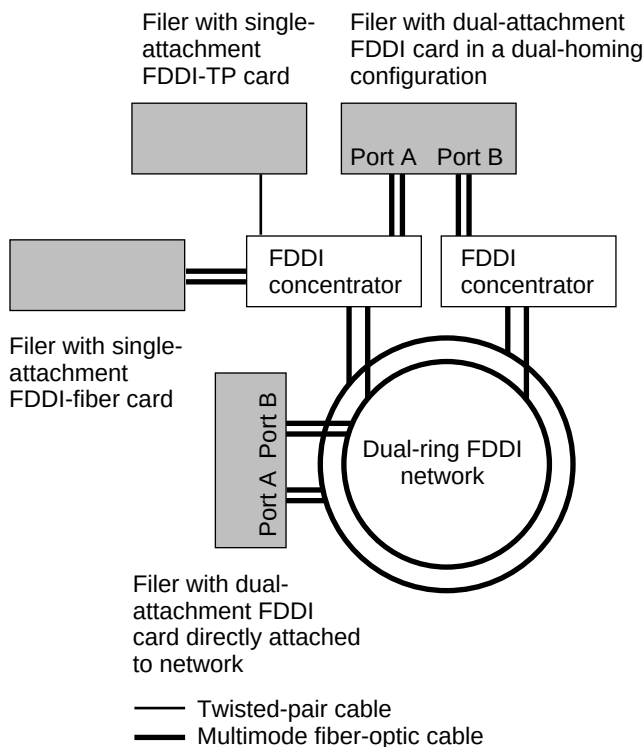


Figure 2-2 Sample FDDI network configuration



NOTE: If you have a dual-attachment FDDI-fiber card, you can also use it in a single-attachment configuration. Connect port B on the card to the FDDI concentrator and leave port A unused. For information about how to connect port B to an FDDI network, refer to “Connecting the filer to an FDDI network” on page 2-11.

Dual-attachment station. You can connect a dual-attachment FDDI-fiber card to an FDDI network using one of following methods:

- By connecting the card directly to the primary and secondary FDDI rings using two duplex multimode fiber optic cables. See Figure 2-2 for an example.
- By using a redundant configuration called dual homing. In this configuration, the card is attached to two concentrators that are connected to the dual ring. Port A on the card is the backup connection that becomes active only if the primary connection (port B) fails. See Figure 2-2 for an example.

Connecting the filer to an FDDI network

You can connect the filer to an FDDI network using one of the following FDDI cards:

- Single-attachment FDDI-TP with an RJ-45 connector.

To attach the filer to an FDDI network using this card, push the twisted-pair cable connector into the RJ-45 connector on the card until it clicks and locks in place.

- Single-attachment FDDI-fiber card with a duplex SC connector.

The top connector is the transmit port and the bottom connector is the receive port. To connect the filer to an FDDI network using this card, push the duplex fiber optic cable connector into the duplex SC connector on the card until it clicks and locks in place (see Figure 2-3). The exact shape of the connectors on the duplex fiber optic cable might be different from those illustrated, depending on the cable manufacturer.



NOTE: Make sure the transmit port on the card is connected to the receive port on the connected FDDI device and the receive port on the card is connected to the transmit port on the connected FDDI device.

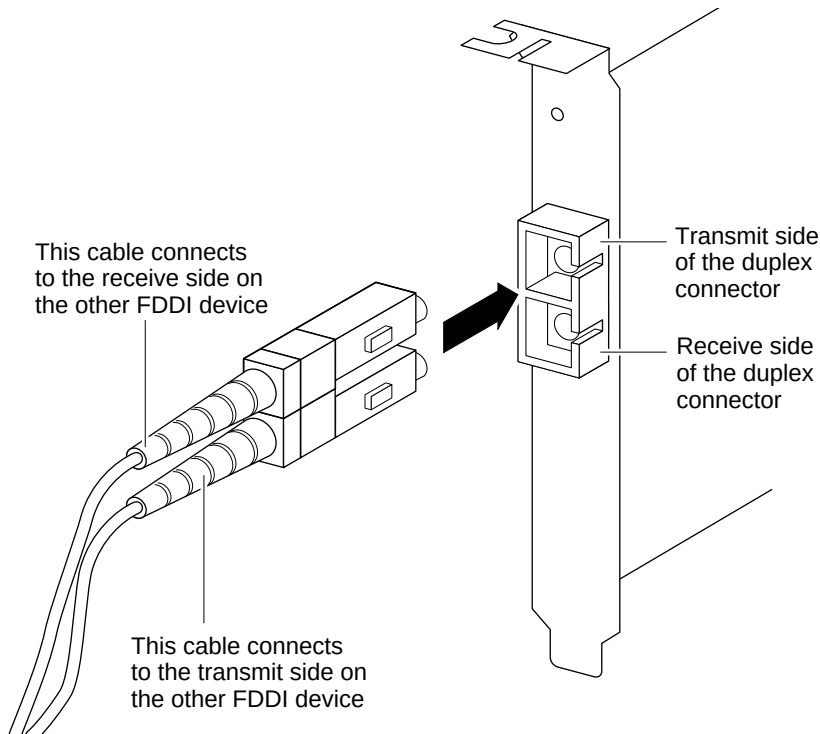


Figure 2-3 Connecting a duplex fiber optic cable to a single-attachment FDDI-fiber card

- Dual-attachment FDDI-fiber card with two duplex SC connectors.

The upper connector is for port B and the lower connector is for port A. On each duplex SC connector, the top connector is the transmit port and the bottom connector is the receive port. To connect the filer to an FDDI network using this card, push a duplex fiber optic cable into the duplex SC connector for port A and a duplex fiber optic cable into the duplex SC connector for port B until they click and lock in place (see Figure 2-3). The exact shape of the connectors on the duplex fiber optic cables might be different from those illustrated, depending on the cable manufacturer.



NOTE: Make sure the transmit port on the card is connected to the receive port on the connected FDDI device and the receive port on the card is connected to the transmit port on the connected FDDI device.

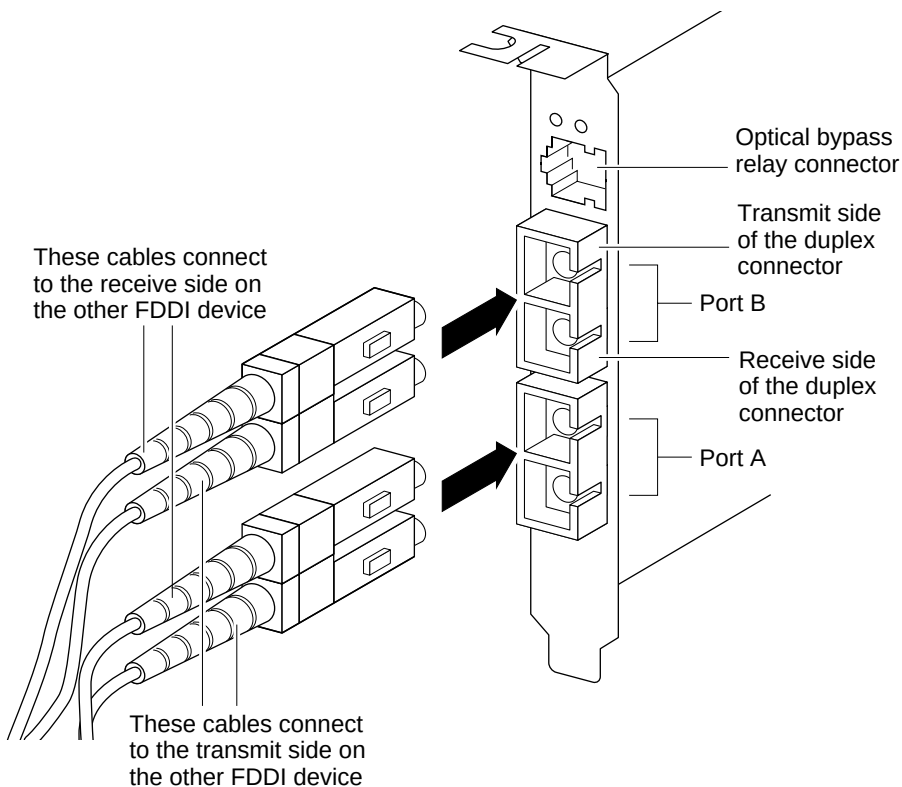


Figure 2-4 Connecting two duplex fiber optic cables to a dual-attachment FDDI-fiber card

Connecting the filer to a bypass switch

The dual-attachment FDDI-fiber card provides an RJ-12 connector for connecting an optional third-party optical bypass relay to the filer. If your filer is equipped with a dual-attachment FDDI-fiber card, you can connect the RJ-12 connector on the card to a bypass switch. When the bypass switch is activated, it removes a nonfunctional dual-attachment card from the ring.

Figure 2-5 illustrates the connector for the optical bypass switch and Table 2-3 describes the function of each pin on the connector.

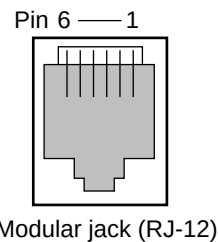


Figure 2-5 Pins on the bypass switch connector

Table 2-3. Optical bypass connector pin assignments

Pin	Function
1 and 2	Relay drive: +5.0 V DC
3 and 4	Bypass_enable
5	Bypass_present
6	Return: grounded internally

Obtain the cable for connecting the RJ-12 connector to the bypass switch from a bypass switch supplier. Refer to the documentation that shipped with your bypass switch for more information about connecting FDDI stations to the network through an optical bypass relay.

ATM network

This section describes the cabling requirements for connecting the filer to an ATM network. It also describes how to connect the filer to an ATM network.

ATM card slot assignments

The ATM card works in any of slots 1 through 8 and slot 10. The first ATM card should go into slot 10 unless you have a Gigabit (GB) Ethernet card in that slot.

Cabling requirements

To connect the filer to an ATM network, use a duplex 62.5/125 micron multimode fiber optic cable with SC connectors. When connecting ATM devices to the filer using fiber optic cables, do not exceed the maximum cable length specifications in the appropriate ATM Forum UNI (user network interface) standard.

Connecting the filer to an ATM network

The ATM card has a duplex SC connector. The connector labeled “T” is the transmit port and the connector labeled “R” is the receive port (see Figure 2-6). To connect the filer to an ATM network, push the duplex fiber optic cable connector into the duplex SC connector on the card until it clicks and locks in place. Figure 2-6 shows the transmit port on the top and the receive port on the bottom. The position of the ports might be different on your card.



NOTE: The other end of the duplex fiber optic cable is connected to an ATM switch, which provides connectivity to the ATM network. Make sure the transmit port on the card is connected to the receive port on the ATM switch and the receive port on the card is connected to the transmit port on the ATM switch.

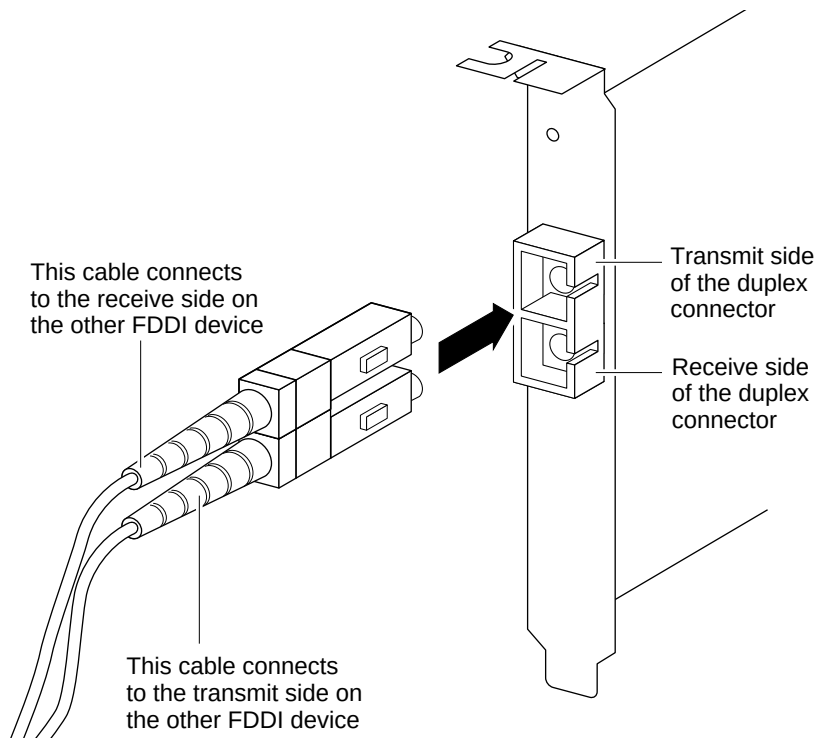


Figure 2-6 Connecting a duplex fiber optic cable to an ATM card

Chapter 3: Storage devices

This chapter describes the types of storage devices supported by the filer. It includes information about how disks are numbered. It also provides instructions about how to connect an external tape library (stacker) or tape drive to the filer.

This chapter assumes that your filer has been installed properly according to the instructions in “Chapter 2, Installing the filer.”

Storage device support

The filer supports the following types of storage devices:

- One floppy drive, which is used for starting the system from diskette if the system fails to start from the hard disk.
- SCSI hard disks installed in external disk shelves.



CAUTION: The disks used with the NetApp F500 series filers are not interchangeable with narrow SCSI disks used with some other Network Appliance filers. Network Appliance labels each disk shipped with the filer as “WIDE SCSI” so that you can differentiate it from a narrow SCSI disk, which does not have this label.

- An internal tape drive, which is factory installed as an option in the NetApp F540.

- External tape stackers or tape drives. Table 3-0 lists the external tape stackers supported by the filer, and Table 3-0 lists the external tape drives supported by the filer. You can purchase an external tape stacker or tape drive from Network Appliance.

Table 3-0. Supported external tape stackers

Manufacturer	Model
Exabyte	Exabyte 210
Exabyte	EXB-10e
Quantum	DLT 4700

Table 3-0. Supported external tape drives

Manufacturer	Model
Quantum	DLT 2000
Quantum	DLT 4000
Quantum	DLT 7000 (for the NetApp F520)
Breece Hill Technologies	Q2.15 (for the NetApp F520)
Exabyte	Exabyte 8500C
Exabyte	Exabyte 8505
Exabyte	Exabyte 8505XL
Hewlett-Packard	C1533A
Hewlett-Packard	C1553A



CAUTION: If you connect an unsupported external tape stacker or tape drive to the filer, the unsupported device might cause the filer to halt.

How disk drives are numbered

Each disk connected to the filer has a unique SCSI address, which is a combination of the disk SCSI adapter number and SCSI ID number. You can write the address in this format:

SCSI adapter number.SCSI ID



NOTE: In some filer screen messages, the SCSI adapter number is referred to as “HA#,” which stands for “host adapter number.”

The following sections describe how to determine the disk SCSI adapter and SCSI ID numbers.



NOTE: Like disk drives, tape drives have a SCSI address that consists of the drive SCSI card number and SCSI ID number. To determine the SCSI address of a tape drive, execute the `sysconfig -t` command, which lists the SCSI address of each tape drive. If the `sysconfig -t` output lists a tape drive with SCSI address “2.5,” the drive SCSI card number is 2 and the drive SCSI ID number is 5.

Determining the disk SCSI card number

SCSI cards are numbered by the slots they occupy. If multiple connectors exist on a SCSI card, the connectors are numbered by location on the card (a and b). For example, the SCSI connectors on the dual-channel SCSI card in slot 8 are SCSI 8a and SCSI 8b.

The disk SCSI card number is the number of the connector to which the disk and its disk shelf is connected. For example, if a disk is installed in a shelf connected to SCSI 8a, the disk SCSI card number is 8a.

Determining the disk SCSI ID number

The disk SCSI ID number depends on where the disk is located in the disk shelf. Some disk shelves contain labels that indicate the SCSI ID numbers for the disks in the shelf. Refer to the documentation that shipped with your disk shelf for information about disk shelf SCSI ID numbers.

Mapping disk ID numbers to SCSI addresses

Some filer commands and system messages refer to disks by disk ID numbers — numbers that the system assigns to disks when probing them during system booting. For example, your filer might indicate that disk 6 is logging excessive errors.

To locate a disk referenced by its disk ID number, execute the `sysconfig -r` command, which displays the disk ID number and SCSI address of each disk. The following is an example of output from running the `sysconfig -r` command.

```
toaster> sysconfig -r
```

RAID Disk	DISK_ID#	HA#.SCSI#	Used (MB/blks)	Phys (MB/blks)
-----	-----	-----	-----	-----
parity	1	8a.1	4000/8192000	4095/8388312
data 1	2	8a.2	4000/8192000	4095/8388312
data 2	3	8a.3	4000/8192000	4095/8388312
data 3	4	8a.4	4000/8192000	4095/8388312
data 4	5	8a.5	4000/8192000	4095/8388312
data 5	6	8a.6	4000/8192000	4095/8388312
data 6	7	8a.8	4000/8192000	4095/8388312
data 7	8	8a.9	4000/8192000	4095/8388312
data 8	9	8a.10	4000/8192000	4095/8388312
data 9	10	8a.11	4000/8192000	4095/8388312
data 10	11	8a.12	4000/8192000	4095/8388312
data 11	12	8a.13	4000/8192000	4095/8388312
spare	0	8a.14	0	4095/8388312

You can determine from the `sysconfig -r` output that disk 6 corresponds to the disk with SCSI address 8a.6. That is, the disk that is assigned SCSI ID 6 in the disk shelf that is connected to the SCSI 8a connector on the filer. In the NetApp F540, the disk with SCSI address 8a.6 is the disk that is assigned SCSI ID 6 in the first disk shelf of a daisy chain that is connected to the SCSI 8a connector.



NOTE: Some disk shelves contain labels that indicate the SCSI ID numbers of the disks in the shelf. Refer to the documentation that shipped with your disk shelf for information about disk SCSI ID numbers.

Connecting an external tape device to the filer

This section describes how to connect an external tape library (stacker) or tape drive to the filer. Refer to “Storage device support” on page 3-1 for a list of external tape stackers and tape drives supported by the filer. Refer to the documentation that shipped with your tape device for information about how to install and configure the tape device.

How you connect an external tape device to the filer depends on the filer model and the type of SCSI connections it supports. On the NetApp F540, connect an optional external tape device to the single-ended, narrow SCSI card in expansion slot 2. On the NetApp F520, connect an optional external tape device to an optional single-ended, narrow SCSI card or to an optional differential, wide SCSI card in expansion slot 2.



NOTE: The single-ended, narrow SCSI card contains a high-density, 50-pin connector. The differential, wide SCSI card contains a high-density 68-pin connector. If your tape device is shipped with a SCSI cable that uses a different type of connector, you need to provide a cable adapter for the tape device SCSI cable.

To connect an external tape device to the filer, follow these steps:

1. Execute the `halt` command to shut down the filer, and then turn off its power.
2. Set the SCSI IDs for the tape device and the robotic loader (if present) in the tape device according to the information in the documentation that shipped with your tape device.

If your system contains an internal tape drive, make sure the SCSI ID of the internal tape drive does not conflict with the SCSI IDs that you set for the external tape device. For information about determining the SCSI ID of a tape device, refer to “How disk drives are numbered” on page 3-3.

3. If necessary, remove the external SCSI terminator from the connector on the SCSI card.

The terminator is present only if your system contains an internal tape drive.

4. Make sure the tape device is not powered.



CAUTION: Turn off the tape device before you connect or disconnect the tape device from the filer; otherwise, you may damage the SCSI connector on the filer.

5. Use the SCSI cable that comes with your tape device to connect the device to the connector on the SCSI card.

If making a connection to a single-ended, narrow tape device, make sure you use a SCSI-2, double-shielded SCSI cable with 50-pin connectors. The length of this cable must be three meters (10 feet) or less. If making a connection to a differential, wide tape device, make sure you use a SCSI-2, double-shielded cable with 68-pin connectors. The length of this cable must be five meters (17 feet) or less.

Do not connect the tape device to any other SCSI connector on the filer.

6. Terminate the SCSI bus at the tape device.

The terminator that you install must be of the “active SCSI terminator” type. Refer to the documentation that shipped with your tape device for information about terminating the SCSI bus.

The procedure for connecting an external tape device to the filer is complete.

Chapter 4: Troubleshooting system hardware

This chapter includes information about how to troubleshoot the system hardware based on LED indicators on hardware components and system error messages displayed on the filer LCD.



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

This chapter also includes recommended corrective actions for the problems that are indicated by LEDs or LCD messages. Some of the corrective actions require you to open the system chassis, reseal expansion cards, or replace hardware components. Refer to Appendix B, “Opening the system backplane carrier,” for information about opening the system chassis. Refer to the *Field Service Guide for the NetApp F600 Series* or contact Network Appliance Technical Support for information about reseating expansion cards and replacing hardware components.

LED indicators

LED indicators appear on the following hardware components:

- Filer front panel
- Some expansion cards
- Power supply

LED indicators on the filer front panel

Table 4-1 describes the LED indicators on the filer front panel.

Table 4-1. Filer front panel LEDs

Label	Color	Function
ACTIVE	Green	During normal operation, the LED flashes to indicate CPU activity. While there is no CPU activity, the LED is off.
STDBY/SERV (standby/ service)	Yellow	During normal operation, the LED is off. It lights yellow when the system requires service. Refer to the LCD message for a description of the system problem. On the system front panel, the LED is labeled STDBY (G)/SERV (Y), which means that the LED lights green when the filer is in standby mode — a product feature to be implemented in a future software release. This guide refers to the LED as the service LED.
POWER	Green	The LED lights and remains lit when the system is powered.



NOTE: After you turn on the filer, it is normal for the service LED to turn yellow and to stay lit until the operating system is loaded. The service LED turns off after the filer is successfully started.

LED indicators on expansion cards

This section identifies and describes the LEDs on the Ethernet, FDDI, and ATM network cards, and the dual-channel SCSI cards.

Ethernet network cards

The single-port and quad-port Ethernet cards have LED indicators. The LEDs on each card are described in this section.

Single-port Ethernet cards. This section provides descriptions for the LEDs on the two types of single-channel Ethernet cards.

The single-channel Ethernet card that has two connectors (10Base-T and 100Base-TX) has four LEDs on the faceplate. Table 4-2 lists the LEDs as they appear on the faceplate (from left to right) and the LED function.

Table 4-2. Single-channel, two port Ethernet card LEDs

LED	Function
Twisted-pair link LED (amber)	The LED is on when the link is functioning properly. If the link fails, the LED turns off.
Media type LED (amber)	When the LED is on, the 100Base-TX (lower) connector is active. When the LED is off, the 10Base-T (upper) connector is active.
Transmit LED (green)	The LED flashes while the card is transmitting traffic.
Receive LED (green)	The LED flashes while the card is receiving traffic.

If the twisted-pair link LED turns off, make sure the card and network cable are installed correctly. If the fault persists, the card or network cable might have a problem.

The single-channel Ethernet card that has one connector provides four LEDs on its faceplate. Table 4-3 lists the LED functions.

Table 4-3. Single-channel, single-port Ethernet card LEDs

LED	Function
COL (amber)	Lights when a collision is detected.
ACT (amber)	Lights during network activity.
100 Mb (green)	Lights when the port is operating at 100 Mb/s. The LED is off when the port is operating at 10 Mb/s.
LINK (green)	Lights when the link is functioning properly. The LED is off if the link fails or a link is not detected.

If the twisted-pair link LED turns off, make sure the card and network cable are installed correctly. If the fault persists, the card or network cable might have a problem.

Quad-port Ethernet cards. This section provides descriptions for the LEDs on the two types of quad-port Ethernet cards, the 10Base-T card and the 10Base-T/100Base-TX card.

The quad-port Ethernet card provides eight LEDs on the faceplate. The LEDs are arranged in four pairs from top to bottom (see Figure 4-1). The first pair is for channel 1 (the topmost channel on the card), the second pair for channel 2, and so on.

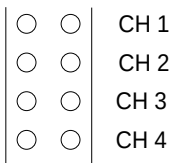


Figure 4-1. LEDs on the quad-port Ethernet cards

Table 4-4 describes functions of each pair of LEDs on the quad-port 10Base-T Ethernet card.

Table 4-4. Quad-port 10Base-T Ethernet card LEDs

LED	Function
Amber (left) network activity	Lights when there is activity on the network. If there is no network activity, the LED turns off.
Green (right) twisted-pair link	Lights when the link is functioning properly. Goes out if the link fails.

Table 4-5 describes the functions of each pair of LEDs on the quad-port 10Base-T/100Base-TX Ethernet card.

Table 4-5. Quad-port 10Base-T/100Base-T Ethernet card LEDs

LED	Function
Amber (left) collision detection	Lights when a collision is detected.
Green (right) twisted-pair link	Lights when the link is functioning properly. Goes out if the link fails.

If the twisted-pair link LED turns off, make sure the card and network cable are installed correctly. If the fault persists, the card or network cable may have a problem.

FDDI network cards

The single-attachment FDDI card has one LED. The dual-attachment FDDI card has two LEDs: the LED on the left side of the faceplate provides status for port B and the LED on the right side of the faceplate provides status for port A.

When you use any of the FDDI cards, the LED for each port stays green during normal operation. If the LED does not stay green, refer to Table 4-6 for information about troubleshooting the FDDI card. If the action suggested in Table 4-6 does not correct the problem, contact Network Appliance Technical Support.

Table 4-6. LED for each port on the FDDI card

LED status	Problem and corrective action
Flashes green	The possible problems are: • One of the cables connected to the card is faulty. Try another FDDI cable. • If you are using an FDDI-fiber card, one or more duplex fiber optic cables might have been attached to the card incorrectly. Make sure that the transmit port on the card is connected to the receive port on the other FDDI device in the network, and that the receive port on the card is connected to the transmit port on the other FDDI device. • The concentrator is faulty. Connect the FDDI card to another concentrator.
Stays amber	There is a network problem. Disconnect the card from the network. If the LED flashes green when you disconnect the card, the card is functional. Reconnect the card to the network with the same cable, use a new cable, or connect the card to another concentrator. If the LED stays amber after you disconnect the card, the card is not functional. Restart the filer to try to clear the problem. If the LED is still amber after the system restart, replace the card.

Table 4-6. LED for each port on the FDDI card (Continued)

LED status	Problem and corrective action
Flashes amber	The card is connected to an invalid network topology. Use the card in a proper network configuration.
Sequentially cycles to amber, then to green, and then back to amber again	The cable between the port on the card and the concentrator is faulty. Replace the cable. If the problem persists, the card or the concentrator might have a problem.
Stays off	Contact Network Appliance Technical Support to determine the cause of the problem.

ATM network card

The ATM network card has two LEDs on the faceplate as shown in Figure 4-1. In the figure, the transmit LED is on the top and the receive LED is on the bottom. The position of the LEDs might be different on your card.

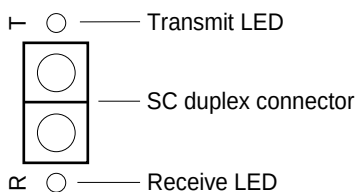


Figure 4-1. LEDs on the ATM network card

The ATM card LEDs function as follows:

- The LED labeled “T” is the transmit LED. It is green when the card is transmitting traffic. The LED is off when the card is not transmitting traffic. If the LED turns amber, it indicates a SONET (Synchronous Optical Network) alarm condition has been declared and the receiving device has a problem.

- The LED labeled “R” is the receive LED. The LED lights green while the card is receiving traffic. It is off while the card is not receiving traffic. If the LED turns red, it indicates that there is no carrier.

SCSI cards

The single-ended, fast narrow and the differential, fast wide SCSI cards for tape devices do not have LEDs.

The differential, fast wide SCSI card for disks has two green LEDs on the faceplate. The LED on the left side of the faceplate is for connector A and the LED on the right side of the faceplate is for connector B. Each LED lights when the card detects activity on the corresponding SCSI bus.

LED indicators on the power supply

The following two LEDs are on the upper left-hand corner of the power supply (see Figure 4-2):

- AC (amber LED) lights to indicate the AC signal is good.
- DC (green LED) lights to indicate the DC output power is good.

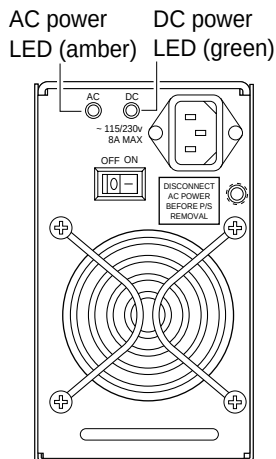


Figure 4-2. Power supply faceplate

LCD messages

LCD messages can be divided into the following types:

- Startup messages, which indicate the results of the POSTs (power-on self tests) and the status of the boot process.
- Error messages when the system is starting.
- Error or informational messages when the system is operating.
- Error messages showing the system has halted or is restarting because of system problems.

Most LCD messages are accompanied by messages displayed on the system console and logged to `/etc/messages`. When you see an error message on the LCD, also read the message on the console because it provides more information about the error condition than the LCD message. If you contact Network Appliance Technical Support for service, report both the LCD and console messages.

This section identifies and describes the different types of messages on the LCD and suggests the corrective actions to correct the problem associated with the message.

Some of the corrective actions require you to open the system chassis, reseal expansion cards, install or remove SIMMs, or replace hardware components. Refer to Appendix B, “Opening the system backplane carrier,” for information about how to open the system chassis. Refer to the *Field Service Guide for the NetApp F600 Series* or contact Network Appliance Technical Support for information about how to reseal expansion cards, install or remove SIMMs, and replace hardware components.

Startup messages

When the system verifies the hardware and loads the operating system at power-on, it displays startup messages on the LCD. These messages correspond to messages displayed on the console. For sample messages displayed after the filer is powered on, refer to Appendix A, “Startup messages.”

If you are starting the system from a floppy disk, instead of displaying the system prompt after starting, the system asks you for input. In this case, the LCD displays the following message:

Waiting for user input

For more information about starting the system from a floppy disk, refer to the *System Administrator's Guide*.

Error messages when the system is starting

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

- Add at least xMB more memory

The system has too little memory for the amount of disk space installed. In the actual message, x is the amount of memory that you need to add to the system. For information about system memory requirements for the NetApp F600 series filers, refer to NOW at <http://now.netapp.com>.

- Cannot initialize labels

The system cannot initialize disk labels when trying to create a new file system. Normally you do not need to create and initialize a file system; do so only after consulting Network Appliance Technical Support.

Contact Network Appliance Technical Support if this problem occurs.

- Cannot read labels

This error can happen only when the filer tries to initialize a new file system. The message indicates that the filer has a problem reading disk labels that it wrote to the disks. Normally you don't need to create and initialize a file system; do so only after consulting Network Appliance Technical Support.

This error can occur for these reasons:

- The system fails to read the size of one of the disks.
- The disk labels written were not valid.

Contact Network Appliance Technical Support if this problem occurs.

- Can't open `/etc/rc`

The system cannot open the `/etc/rc` file; the `/etc/rc` file may have been erased. Reboot the system to activate the setup program. The setup program prompts you to enter the necessary system configuration information; answer the prompts on the system console to complete the setup process. To answer the setup program prompts, use the information you recorded in the filer configuration information form in the *Quick Start Guide*. Refer to the *System Administrator's Guide* for more information about the filer setup program.

- Dirty shutdown in degraded mode

Because you did not shut down the system cleanly while the system was in degraded mode, the file system may be inconsistent. 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.

- Drive *m.n* not SCSI-2

The system detects a disk or tape drive that does not support SCSI-2. In the actual message, *m* is the drive SCSI adapter number and *n* is the drive SCSI ID number. Replace the drive with one that supports SCSI-2.

- Drive *m.n* not supported

The system detects a disk or tape drive that is not supported by Network Appliance. In the actual message, *m* is the drive adapter number and *n* is the drive ID number. Check the Network Appliance price list to verify that the drive is supported by the filer.

- File system may be scrambled

One of the following errors causes the file system to be inconsistent:

- An unclean shutdown occurred when the filer was in degraded mode and when NVRAM was not working. Contact Network Appliance Technical Support for instructions about how to start the system from a 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 with more than one disk missing. Make sure that all the 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 for instructions about repairing the file system.

- Invalid PCI card slot *n*

The system detects an expansion card that is not supported by Network Appliance. In the actual message, *n* is the number of the expansion slot in which the unsupported card is installed. Replace the unsupported card with a card that is included in the Network Appliance price list.

- No disks!

The system can detect controllers but cannot detect the disks. Verify the following:

- All disks are installed properly in the disk shelf.
- If the disk shelf is the first shelf in a daisy chain, verify that both ends of the cable that attach the shelf to the system chassis are securely attached. If the disk shelf is the second shelf in a daisy chain, verify that the ends of the cables that attach the second shelf to the first shelf are securely attached.

If the problem persists, use another cable, then power-cycle the disk shelf and reseal the controller. If you still have the problem, contact Network Appliance Technical Support because the card might be faulty.

- No `/etc/rc`, running setup

The system cannot find the `/etc/rc` file. The system automatically starts the `setup` program and prompts you to enter the necessary system configuration information; answer the prompts on the system console to complete the setup process. Use the information you recorded in the filer configuration information form in the *Quick Start Guide* to answer the `setup` program prompts. Refer to the *System Administrator's Guide* for more information about the filer setup program.

- 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 the expansion slot.

- No SCSI disk controllers!

The system cannot detect any SCSI controllers. Turn off the system and verify that all network cards are seated properly in the appropriate expansion slots.

- NVRAM #*n* downrev!

The NVRAM card is an early revision that cannot be used with the system. In the actual message, *n* is the serial number of the NVRAM card. See the corresponding message on the console for information about which revision of the NVRAM card is required. Replace the NVRAM card.

- NVRAM test failed

The system NVRAM produces an error when the system is starting. Contact Network Appliance Technical Support if this message appears.

- Replace NVRAM batteries!

The system is in degraded mode and both batteries on the NVRAM card are low or discharged. Replace both batteries immediately.

- Unsupported NVRAM size *x*MB

The size of NVRAM in the system is not supported. In the actual message, *x* is the amount of memory currently on the NVRAM card. Verify that the system has 8 MB, 16 MB, or 32 MB of NVRAM.

Messages when the system is operating

Normally, once the system has started, the LCD shows a number followed by a bar graph to indicate the number of operations the system processed per second.

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

- CIFS service disabled!

This message appears only if you have licensed CIFS. One of the following errors causes CIFS service to fail:

- The filer's */etc/passwd* and */etc/group* files are missing. Refer to the *System Administrator's Guide* for information about creating new files.
- The filer failed to register its WINS host name and workgroup name with the WINS server. Using the `cifs setup` command, enter the host name and workgroup name.
- The WINS server has a problem. Refer to the documentation that shipped with your WINS server for information about troubleshooting the server.

If the problem persists, contact Network Appliance Technical Support.

- Data disk *n* *x*% rebuilt

The system shows how much data reconstruction has been completed on the spare disk after the system entered degraded mode. In the actual message, *n* is the RAID group disk number and *x* is the percentage of data reconstruction completed. If an error occurs when the reconstruction is in progress, the error message overrides this message.

Refer to the *System Administrator's Guide* for information about how to locate a disk based on the RAID group disk number.

- Disk *n* is broken

A data disk is not operating and the system is in degraded mode. In the actual message, *n* is the RAID group disk number. How to fix this problem depends on whether you have a hot spare installed in the system. Refer to the *System Administrator's Guide* for information about how to locate a disk based on the RAID group disk number and how to replace a faulty disk.

- Fans stopped; replace them!

This message appears if the fan assembly of the filer stops functioning. Replace the fan assembly as soon as possible.

- Fault on shelf *n*

This message appears when the system detects an error on one or more disk shelves. In the actual message, *n* is the disk shelf number. For each shelf the message lists, check the LEDs on the power supply to see whether the fan or power supply on the shelf needs replacement. Replace the faulty fan or power supply on the shelf.

Each disk shelf is numbered according to the channel to which it is attached. For example, if a pair of disk shelves is attached to SCSI 8a, each disk shelf in the pair is referred to as shelf 8a.

- Maintenance mode

The system is running in maintenance mode. Refer to the *System Administrator's Guide* for more information about maintenance mode.

- 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 starting, or because you disabled it by using the `nfs off` command.

- Parity disk is broken

The parity disk is not operating and the system is in degraded mode. How to fix this problem depends on whether you have a hot spare installed in the system. Refer to the *System Administrator's Guide* for information about replacing a faulty disk.

- Parity disk $x\%$ rebuilt

The system shows how much data reconstruction has been completed on the spare disk after the system entered degraded mode. In the actual message, x is the percentage of data reconstruction completed. If an error occurs when the reconstruction is in progress, the error message overrides this message.

- Power supply degraded!

One of the power supply units in the NetApp RPS 2 has been turned off (or removed from the RPS) or has failed (due to a fan, DC output power, or AC input power failure).

Check the messages on the console for more information about this error message. The console messages identify the power supply unit (1 or 2) that is generating the alarm.

- Replace NVRAM batteries!

This message appears in these situations:

- One battery on the NVRAM card is low or discharged. Replace both batteries as soon as possible.
- Both batteries on the NVRAM card are low or discharged. The system will shut down every 24 hours to encourage you to replace the batteries as soon as possible. (The interval at which the system shuts down can be changed using the `raidtimeout` option.)
- The system is in degraded mode and both batteries on the NVRAM card are low or discharged. The system shuts down immediately for you to replace the batteries.

- Drive placement ha x

This message appears when you do not have at least one disk installed in drive bays 0–3 and one in drive bays 4–6 in your fibre channel disk shelf (9-GB or 18-GB).

This message also appears in a cluster system when you do not have at least one disk additional installed in drive bays 0–2.

Errors causing the system to halt or restart

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

- CPU fan has failed

This message appears if the CPU fan of the filer stops functioning. The system automatically shuts down. Replace the CPU fan before you restart the system.

- Dumping core

This message appears while the system is dumping core following a system crash. Write down the system crash message displayed on the system console and report the problem to Network Appliance Technical Support.

Refer to the *System Administrator's Guide* for information about core files.

- Disk hung during swap!

This message appears if a disk error occurs when you hot swap 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 type `boot` to restart the system.

- Error dumping core

This message appears when the system cannot dump core during a system crash; the system restarts without dumping core. Report the problem to Network Appliance Technical Support.

- Halted

This message appears after you enter a `halt` command or after the system is halted automatically because of a problem. If an error message appears during the restart, follow the instructions suggested in this chapter to fix the problem, or contact Network Appliance Technical Support for help.

- Panicking

This message appears when the system crashes. If the system does not hang while crashing, this message is replaced by the “Dumping core” message.

- Rebooting

The system is restarting. This message will be replaced by the boot messages.

- Replace NVRAM batteries!

Both batteries on the NVRAM card are discharged. The system automatically shuts down. Replace both batteries before you restart the system.

- System error: `errsts%x`

The system detects a hardware error such as a parity error that cannot be corrected. The system restarts to clear the error condition. The `%x` in the actual message is an error code that represents a specific error condition. Record the error code and report the problem to Network Appliance Technical Support.

- System too hot

The temperature sensor indicates that the system temperature is too high. Make sure that the ventilation holes on the top cover of the system are not blocked. If the ventilation holes are not blocked and the problem persists, contact Network Appliance Technical Support for help.

Appendix A: **Startup messages**

This appendix describes the messages displayed on the system console and LCD after you power on the filer.

There are two categories of startup messages:

- POST (power-on self test) messages, which appear immediately after you power on the filer
- Boot messages, which appear when the filer is loading the operating system

Both types of startup messages are described in the following sections.

POST (power-on self test) messages

When you turn the power on, the filer runs a series of tests called POSTs to check the hardware on the system board. This section describes the post messages displayed on the system console and LCD.

System console

The following sample messages appear on the console when the POSTs are running.

Alpha Open Firmware by FirmWorks

Copyright (c) 1995-1997 FirmWorks, Network Appliance. All Rights Reserved.

```
Memory size is 256MB
Testing SIO
Testing LCD
Testing 256MB
Complete
Probing devices
```

The POSTs are executed from a PROM (programmable read-only memory) on the system board. If one of the tests fails, the following message appears on the console:

```
Startup failed
ok>
```

The ok> prompt accepts debugging commands reserved for authorized service personnel only. Contact Network Appliance Technical Support to report the problem.

System LCD

If a console is not connected to the filer, you can observe the LCD on the system front panel. The following are sample messages that appear on the LCD when the POSTs are running.

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

If the filer hardware passes all POSTs, the filer begins to load the filer software and display the boot messages that are described in the next section.

Boot messages

After the filer hardware passes all POSTs, the filer begins to load the filer software. This section describes the boot messages displayed on the system console and LCD.

System console

The following are sample messages that appear on the console when the filer is successfully started. (The exact boot messages on your console depend on your system configuration.)



NOTE: If you are starting the system from a floppy disk (System Boot disk), some messages may be different than the messages shown below. Refer to the *System Administrator's Guide* for information about how to boot the filer from a floppy disk.

```
Finding image...
Loading 7 5 disk@1
Complete
Starting NetApp Release 4.1: Wed Mar 12 05:52:32 PDT 1997
Copyright (c) 1992-1997, Network Appliance, Inc.
Scanning for disk drives: .....
Configuring disk drives: 8a.1 8a.2 8a.3 8a.4 8a.5 8a.6 8a.8 8a.9
8a.10 8a.11 8a.12 8a.13 8a.14
Disk 0 is reserved for "hot spare"

1 disk is reserved for "hot spare".
Loading file system.
add net default: gateway gateway1
NFS server is running.
CIFS server is registering...
CIFS server is running.
Wed Mar 12 18:23:09 [rc]: NetApp Release 4.1 boot complete.
Wed Mar 12 18:23:10 GMT [tty_login_mgr]: Login from console
toaster>
```

Your filer might display additional boot messages on the console about RAID disk reconstruction or core dumps, such as the following:

```
Wed Mar 12 18:23:11 GMT [raid_disk_admin]:One disk is missing
from the array
A "hot spare" disk is available and the missing disk
will be reconstructed on the spare disk.
.
.
.
saving core: 35115008 (small), 134774784 (large).
Wed Mar 12 18:24:11 GMT [rc]: saving 33M to /etc/crash/core.0-
small
("../common/wafl/wafl.c:345: Assertion failure.")
Wed Mar 12 18:24:38 GMT [rc]: saving 129M to /etc/crash/core.0
("../common/wafl/wafl.c:345: Assertion failure.")
```

System LCD

The LCD on the filer front panel displays status and activity messages. If a console is not connected to the filer, you can observe the LCD to determine the filer activity. The following are sample messages displayed on the LCD when the filer is successfully started. (Some of the boot messages on the LCD appear very briefly and might not be noticeable.)

```
Finding image
Loading 7 5 disk@1
Scanning for PCI devices
Initializing PCI devices
Checking disk labels
Scanning for disk drives
Spinning up drive 8a.1 8a.2 8a.3 8a.4 8a.5 8a.6 8a.8
8a.9 8a.10 8a.11 8a.12 8a.13 8a.14
Configuring drive 8a.1 8a.2 8a.3 8a.4 8a.5 8a.6 8a.8
8a.9 8a.10 8a.11 8a.12 8a.13 8a.14
Updating disk labels
Checking NVRAM
Marking spare disks
Loading file system
Starting RAID and WAFL
```

Initializing e3 f5 f6
CIFS registering

Your filer might display additional boot messages on the LCD about RAID disk reconstruction or core dumps, such as the following:

Starting rebuild to spare disk
Dumping core

Once the filer is started, the LCD displays a bar graph showing the number of operations the system processed per second.

If your filer fails to start, write down both the console and LCD messages, and report the problem to Network Appliance Technical Support.

Appendix B: Opening the system backplane carrier

You may need to open the system backplane carrier to access the system backplane, system board assembly, expansion cards, and other field-replaceable units in the filer. This appendix provides the procedures for opening and closing the filer system backplane carrier.

Opening the system backplane carrier

The system backplane carrier contains the system power supply. Because of the weight of the power supply, 11.6 lb. (5.2 kg), you should remove it before opening the carrier.



NOTE: Filers in the NetApp Series F600 will not power up unless the system backplane carrier is completely closed. This is because all power connections as well as connections to the LCD control panel and the diskette drive are through blind-mating connectors between the system chassis and the system backplane carrier. When the system backplane carrier is pulled out, the connections are broken, and the system will not power up.

To remove the power supply and open the system backplane carrier, follow these steps:

1. Notify users that the filer will be shut down.
2. Execute the `halt` command at the console prompt to save the contents of the NVRAM to disk.

The screen displays a message similar to the following message:

```
toaster> halt
Sat Mar 22 23:37:42 GMT [rc]: System shut down with
"halt" command.
Program terminated
ok
```

3. Turn off the power switch on the front of the filer.
4. Turn off the switch on the power supply.
5. Turn off disk shelf power.

Refer to the documentation that shipped with your disk shelf for information about how to turn off the disk shelf.

6. Unplug the filer AC power cord from the power outlet.
7. Unplug the filer AC power cord from the AC power cord receptacle on the filer power supply (see Figure B-1).

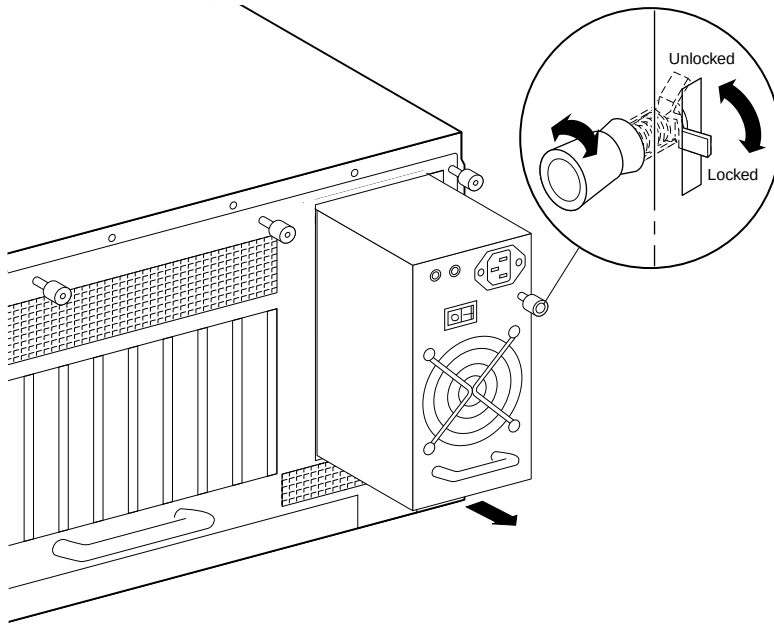


Figure B-1. Power supply in the NetApp F600 series

8. Loosen the thumbscrew on the front of the filer power supply (see Figure B-1).

Turn the thumbscrew counterclockwise to loosen the latch that secures the power supply to the filer chassis. Loosening the thumbscrew retracts the latch into the power supply case.



CAUTION: The power supply is heavy. Support the bottom of the unit with one hand while removing it from the filer.

9. Use the handle on the power supply to pull it out of the filer.
10. Set the power supply aside

11. Loosen the six thumbscrews on the back panel of the system backplane carrier by turning each thumbscrew counterclockwise (see Figure B-2).



NOTE: The thumbscrews are torqued at the factory to prevent them from coming loose during shipment. You may need to use a Phillips screwdriver to loosen the thumbscrews the first time you open the system backplane carrier.

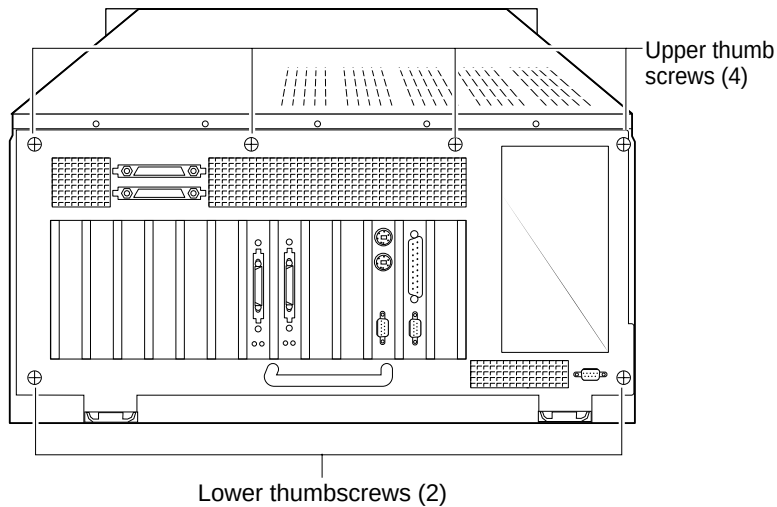


Figure B-2. System backplane carrier thumbscrews

12. Carefully pull the system backplane carrier out of the cabinet (see Figure B-3).

You can pull out the system backplane carrier until the carrier tabs click to lock the slide rails in place. The carrier has a travel distance of approximately 18 inches (46 centimeters).

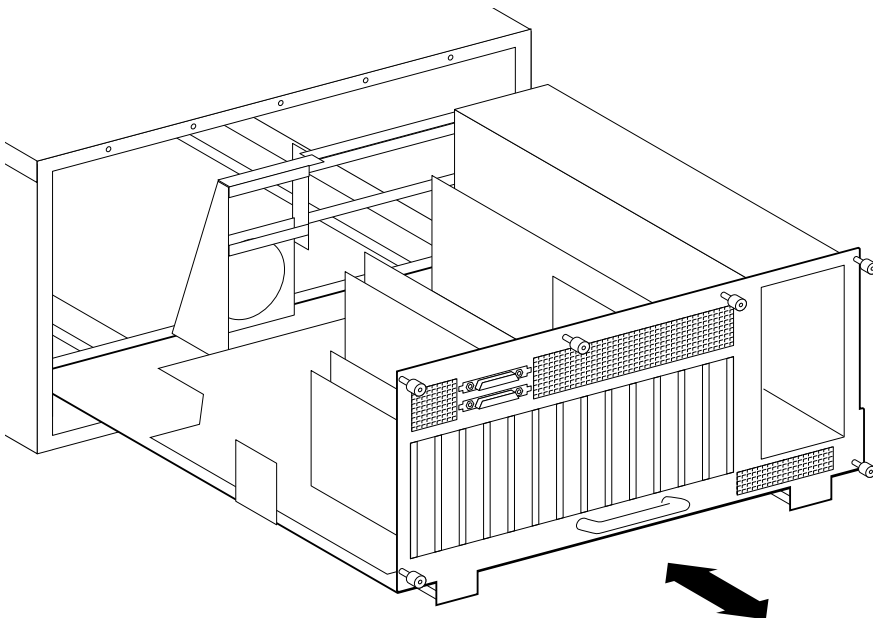


Figure B-3. Pulling the system backplane carrier out of the cabinet

Removing the system backplane carrier

You can remove the system backplane carrier from the filer to make maneuvering easier when replacing units.

To remove the system backplane carrier from the filer, follow these steps:

1. Follow the procedure for “Opening the system backplane carrier” on page B-1.
2. Press inward on the carrier tabs under each cabinet slide rail while pulling the system backplane carrier out of the cabinet (see Figure B-4).

Support the system backplane carrier with both hands, and set it aside.

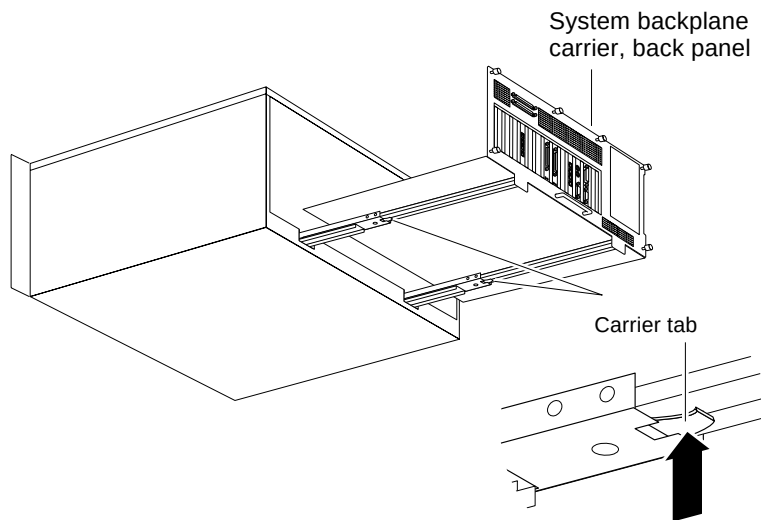


Figure B-4. Removing the system backplane carrier

Closing the system backplane carrier

Close the system backplane carrier after you have replaced the unit.

To close the system backplane carrier, follow these steps:

1. If you removed the carrier, insert the carrier slide rails evenly and slowly into the cabinet slide rails using both hands to support the carrier (see Figure B-5). There should be no resistance.



CAUTION: The carrier slide rails must align with the ball bearings along the cabinet slide rails; otherwise the system backplane carrier will not go in and the slide rails could be bent permanently.

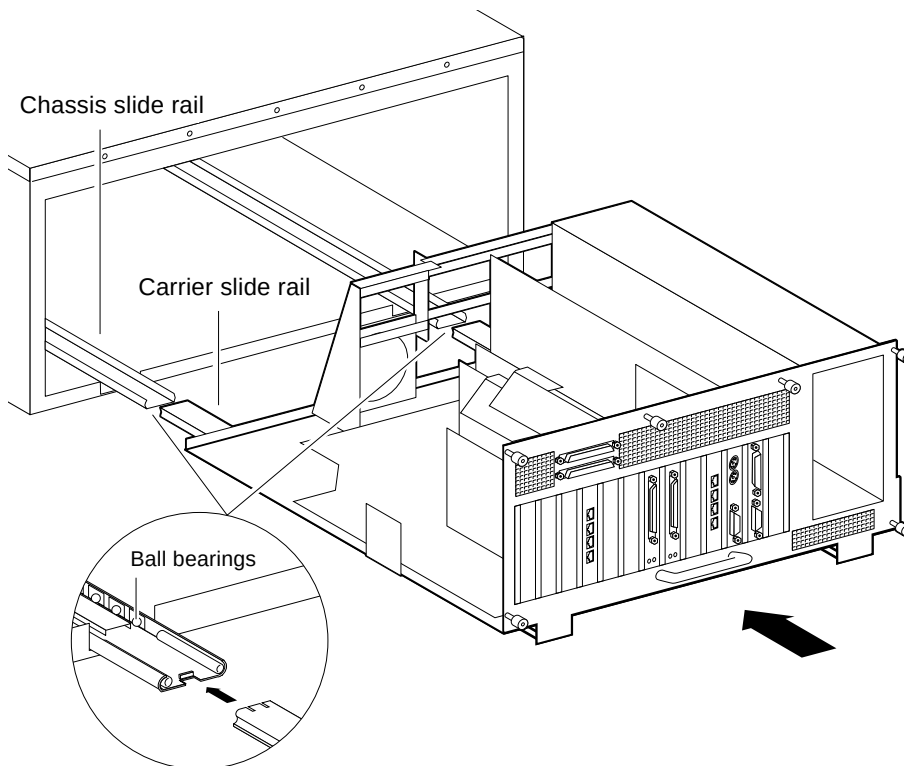


Figure B-5. Inserting the system backplane carrier slide rails

2. Carefully push the system backplane carrier into the cabinet.

If the system backplane carrier is locked in position, press inward on the carrier tabs under each carrier slide rail (see Figure B-4 on page B-6) while pushing the system backplane carrier into the cabinet.

Blind-mating connectors built into the cabinet and on the system backplane carrier attach I/O and the environmental components as the carrier slides into place.

3. Tighten the six thumbscrews on the back panel of the system backplane carrier by pressing in and turning each thumbscrew clockwise (see Figure B-2 on page B-4).

4. To install the power supply:

- a. Turn the power supply so that the passive interlock power connector faces into the power supply bay on the filer.

The power supply is keyed so that it can be inserted in the filer power supply bay in only one way.

- b. Make sure the latch is retracted in the power supply case by turning the thumbscrew counterclockwise.
 - c. Push the power supply slowly and firmly into the bay until the power supply is firmly seated in the bay.
 - d. Tighten the thumbscrew on the power supply clockwise to secure the power supply to the chassis.
5. Plug the AC power cord into the AC power cord receptacle on the power supply.

6. Plug the other end of the AC power cord into the power outlet.
7. Turn on the power supply switch.
8. Turn on disk shelf power.

Refer to the documentation that shipped with your disk shelf for information about how to turn on the disk shelf.

9. Turn on the filer power switch.

Index

Numerics

- 100Base-TX
 - connector 2-8
 - support 1-3
- 10Base-T
 - connector 2-8
 - support 1-3

A

- Active LED on system front panel 4-2
- Add at least xMB more memory,
 - message 4-10
- ATM network card
 - cable for 2-15
 - cabling requirements 2-15
 - connecting the filer 2-15
 - description 1-3
 - interface, naming 2-7
 - LED indicators 4-7

B

- back panel description 1-9
- batteries (NVRAM card)
 - system in degraded mode 4-14
 - when to replace 4-17
- bezel
 - description 1-7
 - removing 1-8, 2-3
 - replacing 2-3
- boot command 4-18

- boot messages
 - on system console A-3
 - on system LCD A-4
- bypass switch, FDDI network card 2-14

C

- cable connections
 - multimode fiber optic cable 2-9, 2-15
 - UTP cable 2-9
- cables 2-9
- cabling requirements
 - ATM 2-15
 - Ethernet 2-9
 - FDDI 2-9
- Can't open /etc/rc, message 4-11
- Cannot initialize labels, message 4-10
- Cannot read labels, message 4-11
- CIFS clients 1-1
- cifs setup command 4-15
- clusters 1-4
 - fibre channel disk requirements 2-5
- combining SCSI and FC-AL disk shelves 1-4
- commands
 - boot 4-18
 - cifs setup 4-15
 - halt 3-5, 4-19, B-2
 - nfs off 4-16
 - sysconfig -r 3-4
 - sysconfig -t 3-3

- communications server, connecting to
 - the filer 2-5
- concentrator, connecting to the filer 2-5
- connectors
 - Ethernet cable 2-9
 - FDDI 2-9
 - network cards 2-8
 - RJ-12, optical bypass 2-14
 - RJ-45 2-9
 - SC for ATM 2-15
 - SC for FDDI 2-11
 - system back panel 1-9
 - TP-MIC 2-9
- console
 - installing 2-5
 - messages 4-9
 - purpose of 1-2
 - terminal characteristics 2-7
 - types of 2-5
- core dumps 4-18, A-4, A-5
- CPU fan has failed, message 4-18
- current, maximum for filer 1-13

D

- Data disk n x% rebuilt, message 4-15
- data disk, malfunctioning 4-16
- data reconstruction 4-15, 4-17
- degraded mode
 - dirty shutdown 4-11
 - power supply 4-17
 - rebuilding data 4-15, 4-17
- dimensions, filer 1-12
- Dirty shutdown in degraded mode,
 - message 4-11
- disk drives
 - degraded mode 4-16
 - failure to detect 4-13
 - hot spare 4-16, 4-17

- numbering 3-3
- parity problem 4-17
- SCSI addresses 3-3
- Disk hung during swap!, message 4-18
- disk ID numbers, mapping to SCSI
 - addresses 3-4
- disk labels
 - erasing 2-5
 - error messages 4-10, 4-11
 - inconsistent 2-5
- Disk labels scrambled, message 4-11
- Disk n is broken, message 4-16
- disk storage
 - SCSI and FC-AL 1-4
- disk storage support
 - 1.5 Terabyte limit 1-5
- door, opening front panel 1-8
- Drive m.n not SCSI-2, message 4-12
- Drive m.n not supported, message 4-12
- Drive placement has x, message 4-18
- dual homing, FDDI network
 - configuration 2-11
- dual-attachment FDDI-fiber card
 - connecting to network 2-12
 - using in dual homing configuration 2-11
 - using in single-attachment configuration 2-10
- dual-port Ethernet card 2-8
- Dumping core, message 4-18

E

- electrical requirements, filer 1-13
- environmental card 1-5
- environmental monitor unit (EMU) 1-6
- environmental requirements, filer 1-11
- equipment rack for mounting the filer
 - 2-2

- erasing disk labels 2-5
- Error dumping core, message 4-18
- error messages
 - halting or restarting the system 4-18
 - when system is operating 4-15
 - when system starts 4-10
- /etc/group file 4-15
- /etc/messages file 4-9
- /etc/passwd file 4-15
- /etc/rc file 4-11, 4-13
- Ethernet network cards
 - cabling requirements 2-9
 - connecting to network 2-8
 - connection guidelines 2-8
 - LED indicators 4-3
 - RJ-45 connector 2-9
 - types of 1-3, 2-8, 4-3
- expansion cards
 - LED indicators 4-3
 - network 1-3
 - numbering 1-10
 - placement 1-10
 - SCSI 1-3, 1-4
 - types of 1-3
- expansion slots
 - configuration information 1-10
 - number supported 1-10
 - numbering 1-10
- external tape drive
 - installing 3-5
 - types supported 1-5, 3-2
- external tape stacker
 - installing 3-5
 - SCSI cable 3-6
 - types supported 3-2

F

- faceplates

- ATM network card 4-7
- Ethernet cards 4-3
- FDDI network cards 4-5
- SCSI cards 1-10
- Fans stopped; replace them!, message 4-16
- fans, error messages 4-16, 4-18
- Fault on shelf n, message 4-16
- fault tolerance and clusters 1-4
- FC-AL disks
 - error message 4-18
 - requirements 4-18
 - support 1-3
- FDDI cabling requirements 2-9
- FDDI concentrator 2-10
- FDDI interfaces, naming 2-7
- FDDI network cards
 - cables for 2-9
 - connecting the filer 2-11
 - LED indicators 4-5
 - network configurations 2-10
 - optical bypass relay 2-14
 - types 1-3
 - types of 2-9
- FDDI rings 2-11
- fiber optic cables
 - ATM network cards 2-15
 - FDDI network cards 2-9
 - incorrect connection 4-6
- fibre channel disk requirements 2-5
- file system
 - inconsistent 4-11, 4-12
 - repairing 4-11, 4-12
- File system may be scrambled, message 4-12
- filer
 - definition 1-1
 - operations, number of A-5
 - rack mounting 2-2

files

- /etc/group 4-15
- /etc/messages 4-9
- /etc/passwd 4-15

floppy drive

- location on filer 1-8
- purpose of 3-1
- starting filer from 4-10
- support 1-5

frequency, filer 1-13

front panel

- description 1-7
- LEDs, using to troubleshoot 4-2
- removing 1-8
- switch 1-7

H

halt command 3-5, 4-19, B-2

Halted, message 4-19

HTTP clients 1-1

humidity requirements, filer 1-11

I

inconsistent disk labels 2-5

inconsistent file system 4-11, 4-12

initializing

- disk labels 4-10
- new file system 4-11

installing

- external tape drive 3-5
- external tape stacker 3-5
- filer 2-1
- requirements for 1-11
- serial console 2-5
- system backplane carrier B-8
- tools required 2-1

interrupt switch 1-7

Invalid PCI card slot n, message 4-12

ISA (Industry Standard Architecture)

slot 1-5

L

LCD bar graph, filer operations A-5

LCD messages

Add at least xMB more memory
4-10

Can't open /etc/rc 4-11

Cannot initialize labels 4-10

Cannot read labels 4-11

CIFS service disabled!, CIFS
service disabled!, message
4-15

CPU fan has failed 4-18

Data disk n x% rebuilt 4-15

Dirty shutdown in degraded mode
4-11

Disk hung during swap! 4-18

Disk labels scrambled! 4-11

Disk n is broken 4-16

Drive m.n not SCSI-2 4-12

Drive m.n not supported 4-12

Dumping core 4-18

Error dumping core 4-18

Fans stopped; replace them! 4-16

Fault on shelf n 4-16

File system may be scrambled 4-12

Halted 4-19

Invalid PCI card slot n 4-12

Maintenance mode 4-16

NFS service not enabled 4-16

No disks! 4-13

No /etc/rc, running setup 4-13

No network interfaces! 4-13

No NVRAM present 4-13

No SCSI disk controllers! 4-14

NVRAM #n downrev! 4-14

- NVRAM test failed 4-14
- Panicking 4-19
- Parity disk is broken 4-17
- Parity disk x% rebuilt 4-17
- Power supply degraded! 4-17
- Rebooting 4-19
- Replace NVRAM batteries! 4-14, 4-17, 4-19
- System error, errsts%x 4-19
- System too hot 4-19
- types of 4-9
- Unsupported NVRAM size xMB 4-14
- Waiting for user input 4-10
- LED indicators
 - ATM network card 4-7
 - Ethernet network cards 4-3
 - FDDI network cards 4-5
 - filer front panel 4-2
 - SCSI cards 4-8

M

- Maintenance mode, message 4-16
- maximum current, filer 1-13
- memory (system)
 - configuration information, NOW 4-10
 - error message 4-10
 - POST message A-2
- modem cable 2-6
- mounting
 - filer 2-2
 - rails, equipment rack 2-2
- multimode fiber optic cables
 - ATM network cards 2-15
 - FDDI network cards 2-9
 - incorrect connection 4-6

N

- N+1 power 1-6
- network cards 1-3, 2-7, 2-8
- network configuration, FDDI 2-10
- network interfaces
 - connecting the filer 2-7
 - expansion cards 1-3
 - failure to detect 4-13
 - guidelines for connecting 2-8
 - naming 2-7
- NFS clients 1-1
- nfs off command 4-16
- NFS service not enabled, message 4-16
- No disks!, message 4-13
- No /etc/rc, running setup, message 4-13
- No network interfaces!, message 4-13
- No NVRAM present, message 4-13
- No SCSI disk controllers!, message 4-14
- NOW (NetApp on the Web) 1-10, 4-10
- null modem cable for serial console 2-6
- numbering
 - disk drives 3-3
 - expansion cards 1-10
 - expansion slots 1-10
- NVRAM
 - batteries need replacement 4-14
 - discharged batteries causing shutdown 4-19
 - early revision 4-14
 - failure to detect 4-13
 - test failed 4-14
 - unsupported size 4-14
- NVRAM #n downrev!, message 4-14
- NVRAM test failed, message 4-14

O

- opening filer door 1-8
- operations (filer), number of A-5

optical bypass relay, FDDI network card
2-14

P

Panicking, message 4-19
Parity disk is broken, message 4-17
Parity disk x% rebuilt, message 4-17
parity disk, malfunctional 4-17
PCI (Peripheral Component
Interconnect) slots 1-10, 4-12
pin configuration, serial port 2-6
ports, Ethernet card guidelines 2-8
Power LED on system front panel 4-2
power source, connecting the filer 2-4
power supply
 redundant 1-6
 requirements for filer 1-13
 switch 1-9
Power supply degraded!, message 4-17
power-on self test (POST) messages
 on system console A-1
 on system LCD A-2
primary FDDI ring 2-11

Q

quad-port Ethernet card 2-8

R

rack for mounting the filer 2-2
RAID disk reconstruction A-4, A-5
raidtimeout option 4-17
rails, equipment rack mounting 2-2
Rebooting, message 4-19
rebuilding data on parity or data disks
 4-15, 4-17
redundant power supply 1-6, 2-4
requirements

 fibre channel disks 2-5
 relative humidity requirements, filer
 1-11

removing

 bezel 1-8, 2-3
 front panel 1-8
 system backplane carrier B-6

repairing the file system 4-11

Replace NVRAM batteries!, message
 4-14, 4-17, 4-19

replacing

 bezel 1-8, 2-3
 system backplane carrier B-8

requirements

 ATM cabling 2-15
 electrical 1-13
 environmental 1-11
 Ethernet cabling 2-9
 FDDI cabling 2-9
 installation 1-11
 relative humidity 1-11
 space 1-12
 temperature 1-11
 ventilation 1-12
 voltage 1-13

restarting the filer 4-19

RJ-12 connector, FDDI network card
 2-14

RJ-45 connector

 Ethernet network cards 2-9
 FDDI network cards 2-11

S

SC connectors

 ATM 2-15
 FDDI 2-11

SCSI addresses

 mapping to disk ID numbers 3-4

- of disk drives 3-3
- SCSI bus, terminating at the tape device 3-6
- SCSI cable, tape device 3-6
- SCSI cards
 - LED indicators 4-8
 - numbering 3-3
 - types of 1-3, 1-4
- SCSI connector
 - for disk drives 1-10
 - for tape devices 3-5
- SCSI devices, types of 3-1
- SCSI disk controllers, failure to detect 4-14
- SCSI disks
 - and FC-AL disks 1-4
 - support 1-4
- SCSI IDs
 - of disk drives 3-3
 - tape devices 3-5
- SCSI terminator for internal tape drive 3-6
- SCSI-2 disks 4-12
- secondary FDDI ring 2-11
- sensor, temperature 4-19
- serial cable, pins on 2-5
- serial concentrator, connecting to the filer 2-5
- serial console
 - installing 2-5
 - messages 4-9
 - purpose of 1-2
 - terminal characteristics 2-7
 - types of 2-5
- serial port
 - for connecting the console 2-5
 - pin configuration 2-6
 - type of 1-6
- service LED on system front panel 4-2

- single-attachment FDDI-TP network card, connecting to network 2-11
- single-channel Ethernet card 2-8
- slots on system backplane 1-10
- space requirements, filer 1-12
- startup messages 4-10, A-1
- STDBY/SERV LED on system front panel 4-2
- storage devices, types of 3-1
- switch
 - interrupt 1-7
 - power on front panel 1-7
 - power supply 1-9
- sysconfig -r command 3-4
- sysconfig -t command 3-3
- system backplane 1-10, B-1
- system backplane bus architecture 1-10
- system backplane carrier
 - back panel B-4
 - carrier slide rails B-7
 - carrier tabs B-6, B-8
 - closing B-7
 - installing B-8
 - opening B-1
 - removing B-6
 - travel distance B-5
- System error, errsts%x, message 4-19
- system memory
 - configuration information, NOW 4-10
 - error message 4-10
 - POST message A-2
- system panic (crash) 4-18, 4-19
- system temperature 4-19
- System too hot, message 4-19

T

- tape drives

- external 1-5, 3-5
- installing 3-5
- internal 3-1
- SCSI addresses 3-3
- tape stacker
 - installing 3-5
 - robotic loader 3-5
 - SCSI cable 3-6
 - types supported 1-5, 3-2
- temperature
 - inside system 4-19
 - requirements, filer 1-11
- terminal characteristics, serial console 2-7
- terminating the SCSI bus at the tape device 3-6
- thermal rating, filer 1-13
- thumbscrews, system backplane B-4, B-8
- TP-MIC plug for FDDI 2-9
- troubleshooting
 - by ATM card LEDs 4-7
 - by Ethernet card LEDs 4-3
 - by FDDI card LEDs 4-5
 - by filer LCD messages 4-9
 - by filer LEDs 4-2
 - by SCSI card LEDs 4-8
- two-port Ethernet card 2-8

U

- Unsupported NVRAM size xMB, message 4-14
- URL, NOW web page 1-10, 4-10
- UTP cable
 - Ethernet cards 2-9
 - FDDI cards 2-9

V

- ventilation
 - error message 4-19
 - holes 1-12
 - system requirements 1-12
- voltage requirements, filer 1-13

W

- web page, NOW 1-10, 4-10
- weight, filer 1-12
- WINS server 4-15