

# **Hardware Guide for the NetApp F200 and F300 Series**

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Part number: 210-01422  
May 1997

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- To reduce the risk of personal injury or damage to the equipment, ensure that the equipment is properly supported or braced when installing options.
- This equipment is designed for connection to a grounded outlet. The grounding type plug is an important safety feature. To avoid the risk of electrical shock or damage to the equipment, do not disable this feature.
- This equipment is furnished with one or more lithium batteries. There is a danger of explosion and risk of personal injury if the battery is incorrectly replaced or mistreated. Do not attempt to recharge the battery, disassemble it, or dispose of it in a fire.



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# Preface

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## About this guide

This guide provides you with instructions for installing your Network Appliance filer for the first time. It covers all of the filer models in the NetApp™ F200 and F300 series. It is organized as follows:

| Chapter | Provides information about                    |
|---------|-----------------------------------------------|
| 1       | System overview and installation requirements |
| 2       | Installing the filer                          |
| 3       | Storage devices                               |
| 4       | Troubleshooting the system hardware           |
| A       | Startup messages                              |
| B       | Opening the System Board Carrier              |

Use this guide in conjunction with the *System Administrator's Guide*, which describes how to operate and manage your filer.

This guide describes only hardware components that require installation when you first set up the system. For information about how to upgrade the system hardware, refer to the documentation that came with the hardware option.

## Audience

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

## Terminology

When the term “filer” is used, the information applies to all models of the NetApp F200 and F300 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.

## 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.<br><br>File names.<br><br>Placeholders for information you must supply. For example, if the guide says to enter the <code>arp -d hostname</code> command, you enter the characters “arp -d” followed by the actual name of the host.<br><br>Man page names.<br><br>Book titles in cross-references. |
| <b>Monospaced font</b>      | Command and daemon names.<br><br>Information displayed on the system console or other computer monitors.<br><br>The contents of files.                                                                                                                                                                                                                  |
| <b>Bold monospaced font</b> | Words or characters you type.                                                                                                                                                                                                                                                                                                                           |

## 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. In addition, 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.

## Special messages

This guide contains special messages that are 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 you with information about the hardware features and installation requirements of your filer. If you are already familiar with the filer's hardware features, go directly to "Installation requirements" on page 1-11 to make sure that the location at which you install the filer meets important requirements.

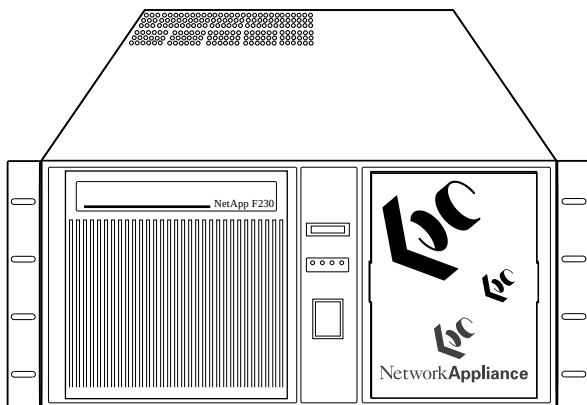
## Overview of the filer

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).

With the exception of color, the exteriors of filers in the NetApp F200 and F300 series are identical. Models in the NetApp F300 series, however, support more expansion slots than models in the NetApp F200 series. For information about the number of expansion slots supported by your filer model, refer to "Expansion card support" on page 1-6.



**NOTE:** This guide uses illustrations of a NetApp F230 to clarify functional and physical descriptions of the filer models in the NetApp F200 and F300 series. The information provided in descriptions and illustrations applies to all of the models in the NetApp F200 and F300 series unless otherwise noted.



230.01

**Figure 1-1. NetApp F230**

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

A serial console must be attached to the filer to initially set up the system. Network Appliance recommends that the console be attached at all times so that you can enter commands to manage the filer even if you have problems obtaining access to the filer through the network. The filer features an LCD for displaying system messages. It also features LED indicators that provide information about the status of the system.

# Hardware features

Table 1-1 summarizes the hardware features of the filer.



**NOTE:** Refer to the *Read Me First* for the number of Ethernet and FDDI adapter cards that are supported by your filer model.

**Table 1-1. Hardware features of the filer**

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ethernet interfaces | <p>Supports these Ethernet cards:</p> <ul style="list-style-type: none"><li>• single-port Ethernet cards for 10Base-T or 100Base-TX connections</li><li>• quad-port Ethernet cards for 10Base-T connections</li><li>• quad-port Ethernet cards for 10Base-T or 100Base-TX connections</li></ul> <p>In addition, an Ethernet adapter is supported on the system board. This on-board adapter is attached to both a 10Base-T connector and a 100Base-TX connector on the system back panel. However, you can use only one connector at a time.</p> |
| FDDI interfaces     | <p>Supports FDDI cards that support either twisted-pair or fiber-optic cable.</p> <p>The FDDI-TP card is for single-attachment stations. There are two types of FDDI-fiber card: one is for single-attachment stations and the other is for dual-attachment stations.</p>                                                                                                                                                                                                                                                                        |
| ATM interface       | <p>Supports an ATM card that supports fiber-optic cable and uses the FORE IP/SPANS (Simple Protocol for ATM Network Signaling) protocols.</p>                                                                                                                                                                                                                                                                                                                                                                                                    |

**Table 1-1. Hardware features of the filer (Continued)**

|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Disk and tape drives        | <ul style="list-style-type: none"><li>Depending on your filer model, one or more dual-channel, single-ended fast wide SCSI card or one or more dual-channel, single-ended fast narrow SCSI card.</li></ul> <p>For information on SCSI card support, refer to “Expansion card support” on page 1-6.</p> <ul style="list-style-type: none"><li>One single-ended, fast narrow SCSI adapter is embedded on the system board of all models.</li><li>Supports SCSI disks in external disk shelves.</li><li>Disks in disk shelves are “hot-swappable,” which means you can add, remove, or replace a disk while the system is running.</li></ul> <p>For information on hot swap support, refer to “Expansion card support” on page 1-6.</p> <ul style="list-style-type: none"><li>Shipped with one diskette drive, which is supported by the diskette drive controller on the system board.</li><li>Supports one optional internal tape drive.</li><li>Supports optional external tape stackers and tape drives.</li></ul> <p>For information about the types of external tape stackers and tape drives supported by the filer, refer to Chapter 3, “Storage Devices.”</p> |
| System memory               | 64 MB is factory-installed and can be upgraded to a maximum of 256 MB.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Non-volatile memory (NVRAM) | 2 MB is factory-installed on the battery-backed NVRAM card and can be upgraded to a maximum of 8 MB.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

**Table 1-1. Hardware features of the filer (Continued)**

|                        |                                                                                                                                  |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Serial ports           | Two RS-232C asynchronous serial ports are on the system board: one is for the serial console and one is reserved for future use. |
| LCD                    | Displays system messages up to 32 characters.                                                                                    |
| System LED indicators  | Three LED indicators on the system front panel provide information about the system's activity, status, and power.               |
| Redundant power supply | Supports the optional Network Appliance redundant power supply, which can be mounted in a 19-in. equipment rack.                 |

## Expansion card support

Your filer is shipped with all expansion cards installed at the factory according to your order. This section describes the types of expansion cards supported by the filer.

The system board used in the NetApp F200 series contains five PCI (Peripheral Component Interconnect) expansion slots. The system board used in the NetApp F300 series contains nine PCI expansion slots.

Slots are numbered from left to right as you face the back panel, starting with slot 1. The nine expansion slots of the NetApp F300 series are numbered 1 through 9. The five expansion slots in the NetApp F200 series are numbered 5 through 9. The system board is considered to be in slot 0.

## Expansion card types

System boards in the NetApp F200 and F300 series accept the following expansion cards:

- Ethernet cards, which can be the following types:
  - single-port Ethernet card for 10Base-T or 100Base-TX connections
  - quad-port Ethernet card for 10Base-T connections
  - quad-port Ethernet card for 10Base-T or 100Base-TX connections
- FDDI cards, which can be the following types:
  - single-attachment FDDI-TP card
  - single-attachment FDDI-fiber card
  - dual-attachment FDDI-fiber card
- ATM card
- NVRAM card

- SCSI cards, which can be the following types (depending on your filer model):
  - dual-channel single-ended fast wide SCSI card
  - dual-channel single-ended fast narrow SCSI card

Connectors on expansion cards are accessible on the back panel of the filer. Your filer might have unused expansion slots that are covered by metal protector plates. The back panel of the filer is described in “Front and back panels of the filer” on page 1-8.

### **Hot swap support for disk shelves**

Hot swapping a disk drive means removing a disk drive from a disk shelf or installing a disk drive in a disk shelf while the filer is running, with minimal interruption to the file system.

You can hot swap a disk only when a dual-channel SCSI card is installed in an expansion slot and a cable is installed between the hot swap connector on the adapter card and the hot swap connector on the system board.

If your filer uses only the system board SCSI adapter (SCSI 0), the filer does not have hot-swap capability, and you must shut down the system before removing, adding, or replacing a disk.



**CAUTION:** To prevent loss of data when hot-swapping a disk, you must prepare the filer for the disk operation by issuing the appropriate software command. For more information on preparing the filer for a hot-swap operation, refer to the *System Administrator's Guide*.

## Front and back panels of the filer

The front of the filer is covered by a plastic bezel. A plastic door is attached to the bezel to cover the diskette drive and optional tape drive. The door is held in the bezel by a tab inserted under the bezel on the edge closest to the power switch. To open the door, press in on the tab and swing the door out and away from the front panel.

For an illustration of the NetApp F230 showing the door, refer to Figure 1-1 on page 1-2. Figure 1-2 illustrates the front panel of the NetApp F230 without the door.

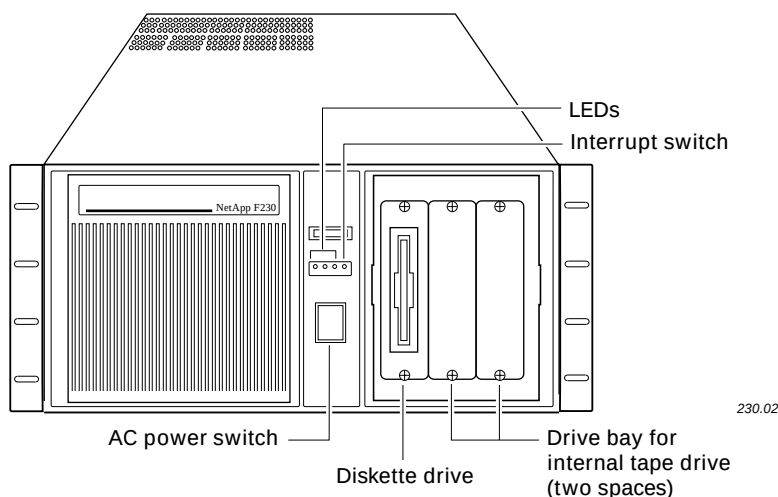


**Figure 1-2. Front panel of the NetApp F230 without the door**



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

Connectors on expansion cards are accessible on the back panel of the filer. The back panel of the NetApp F230 is illustrated in Figure 1-3, and the back panel of the NetApp F330 is illustrated in Figure 1-4. (Your system configuration may be different from those in the figures.)

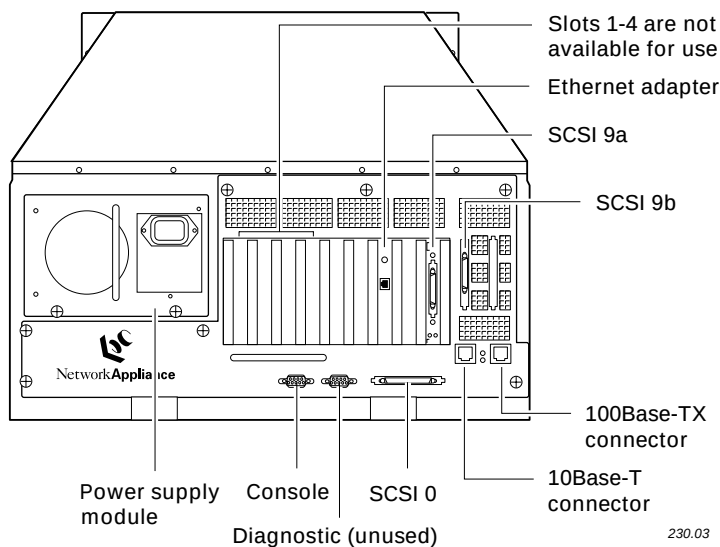


**Figure 1-3. Back panel of the NetApp F230**

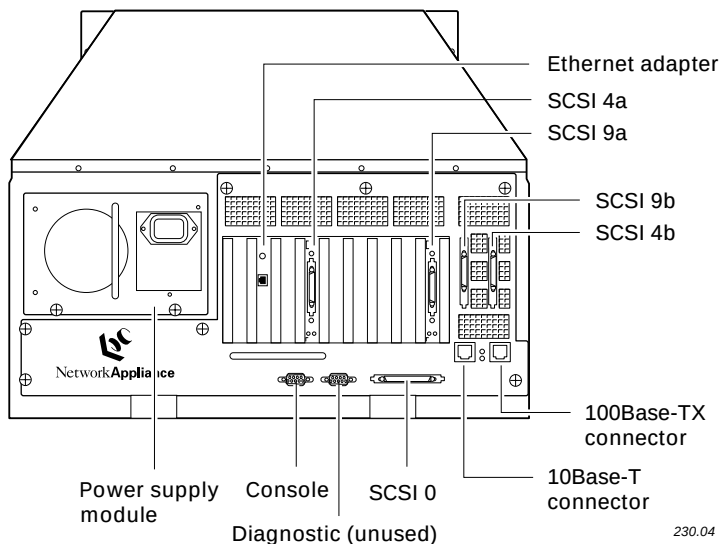


**Figure 1-4. Back panel of the NetApp F330**

Each expansion card has its connectors attached to the faceplate, except for the dual-channel SCSI adapter card. The dual-channel SCSI card has two connectors: the first connector (connector A) is on the faceplate and the second connector (connector B) is on the filer back panel. Connector B on the back panel is internally attached to the SCSI card by a cable.

As you face the back panel, expansion slots are numbered 1 to 9 from left to right. In product documentation and system messages, expansion cards are numbered by the slots they occupy. For example, the SCSI adapter on the system board is SCSI 0. If multiple connectors exist on an expansion card, the connectors are numbered by the expansion slot the card occupies and their location on the expansion card (a, b, and so on). For example, the SCSI connectors on the dual-channel SCSI card in slot 9 are SCSI 9a and SCSI 9b.



**NOTE:** The five expansion slots in the NetApp F200 series are numbered 5 through 9 from left to right. The first four unused expansion slots are covered by metal protector plates.

For more information about how to identify SCSI interfaces, refer to the disk shelf documentation that shipped with your filer. For more information about network interfaces, refer to “Attaching the filer to the network” on page 2-9.

## Installation requirements

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



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

## Environmental requirements

Table 1-2 describes the environmental requirements for the filer and disk shelf.

**Table 1-2. Environmental requirements for the filer**

|                   | Operating                    | Non-operating                   |
|-------------------|------------------------------|---------------------------------|
| Temperature       | 50°F – 95°F<br>(10°C – 35°C) | -40°F – 151°F<br>(-40°C – 66°C) |
| Relative humidity | 10% – 80%<br>noncondensing   | 10% – 90%<br>noncondensing      |

## Space requirements

When installing the filer, leave at least three feet (91.44 centimeters) 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 system board tray 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 (3.81 centimeters) of space directly above the ventilation holes for air circulation. Equipment can be mounted directly on the unvented area on the top cover of the filer as long as that equipment does not extend over and block the filer's ventilation holes.

When installing the filer and disk shelves in an enclosed equipment rack, Network Appliance recommends that you leave at least 1.5 inches (3.81 centimeters) between the disk shelf and the filer. This space allows you to route cables from the disk shelves to the filer back panel and to the AC outlet.

Table 1-3 describes the dimensions and weight of the filer.

**Table 1-3.      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 cord supplied in your shipment to attach the filer to a properly grounded power source. Table 1-4 describes the electrical requirements for the filer.

**Table 1-4.      Electrical requirements for the filer**

|                 |                                      |
|-----------------|--------------------------------------|
| Power supply    | 90 – 130 VAC or 180 – 264 VAC        |
| Maximum current | 5.5 A at 115 VAC or 2.4 A at 230 VAC |
| Frequency       | 47 – 63 Hz                           |

## Chapter 2: Installing the Filer

---

This chapter provides you with 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. Attach the filer to the network.

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

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

The following is a list of the minimum equipment that you need for installing the system:

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

## Installing the filer

Installing the filer involves these main steps:

1. Mount the filer in an equipment rack.
2. Attach the filer to a power source.

The following sections describe these steps in greater detail.

### 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.

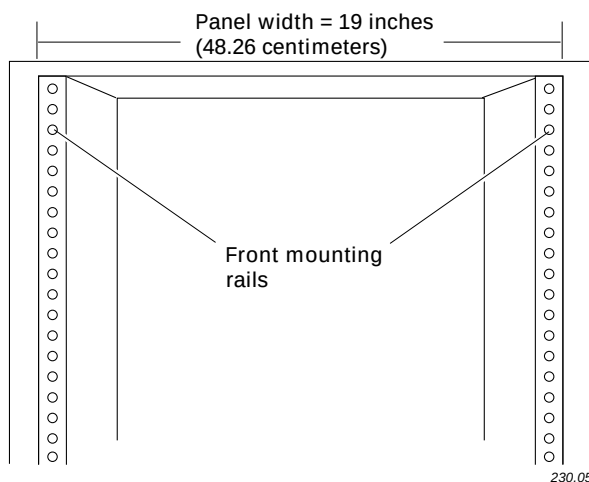


**Figure 2-1.** 19-in. equipment rack for the filer

The only equipment that you need for mounting the filer is a #2 Phillips screwdriver. However, if the screws provided in your shipment do not fit the holes on your rack, you need to provide screws of an appropriate size.



**NOTE:** This guide assumes that the rack you use to mount the filer has threaded holes. If the rack does not, then you need to provide clip nuts or nut bars for fastening the screws.



**WARNING:** Because of the weight of the filer, you must work with at least one other person when mounting it to avoid injury.

Follow these steps to mount the filer in a rack:

1. If you haven't done so, remove the back panel of the rack and open the front door.
2. On each front mounting rail of your rack, select four holes that are spaced appropriately for the mounting holes on the filer.
3. Align the holes on the flanges of the filer with the holes you selected in step 2.

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

4. Insert screws into the mounting holes on the flanges of the filer and the mounting rails of the rack as shown in Figure 2-2.



**NOTE:** Install two screws in the bottom holes first. These screws provide the most leverage for the filer and will assist the person supporting its weight.

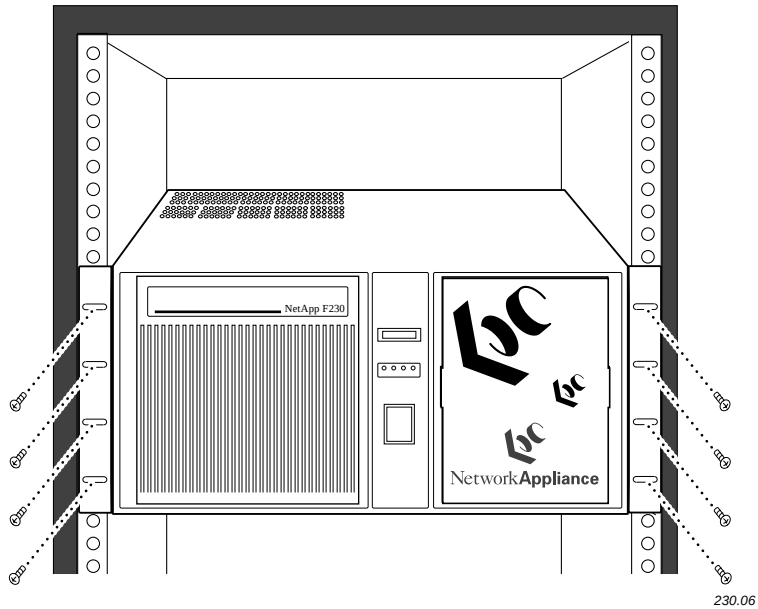


**Figure 2-2. Attaching the filer to the equipment rack**

5. Tighten all the screws.

The procedure for rack-mounting the filer is now complete.

### **Attaching the filer to a power source**

This section assumes that your filer does not use an optional Network Appliance redundant power supply. If you purchased a redundant power supply with your filer, install the redundant power supply after mounting the filer in the equipment rack. For instructions on installing and using the redundant power supply, refer to the documentation that comes with the redundant power supply.

If you aren't using the redundant power supply, follow these steps to attach the filer to a power source:

1. Make sure that the power switch on the filer is in the Off position (O).

See Figure 1-2 on page 1-8 for the location of the AC power switch on the system front panel.

2. Attach the socket end of the power cord to the recessed power plug in the power supply module, which is on the back of the filer.



**CAUTION:** Most units are equipped with an auto-ranging power supply module. However, if your filer comes with a voltage selection switch and you are moving the system between locations that use different voltages, verify that the selection switch is at the appropriate setting.

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 setting the power switch to the On position (I).

The power LED on the front panel will come on.

Turn the system off before proceeding to the next section.

The procedure for installing the filer is now complete.

## Installing the disk shelves

For instructions on installing the disk shelves, refer to the disk shelf documentation that shipped with your filer.



**NOTE:** If you need to install a disk drive that was used by another filer into a new disk shelf while the filer and disk shelves are not powered, erase the disk label on the used disk drive before installing the drive in the new disk shelf. If the filer detects inconsistent disk labels, it may not boot. Refer to the *System Administrator's Guide* for more information about using the `disk_erase_label` command to erase disk labels.

## Installing the serial console

To initially set up the system, you must attach a serial console to the filer. Network Appliance recommends that the console be attached at all times, so that you can enter commands to manage the filer even if you have problems obtaining access to the filer through the network. This section describes how to attach an ASCII terminal<sup>1</sup>, as the serial console, to the filer.



**NOTE:** As an alternative, you can attach a serial concentrator or communications server to the filer. Using either device, you can establish a full-duplex terminal connection with the filer. If you need further information about this configuration, refer to the documentation provided with your serial concentrator or communications server.

Follow these steps to attach the ASCII terminal to the filer:

1. Use the provided 9-pin to 25-pin serial cable to attach the terminal to the serial port marked “Console” on the system back panel.

Refer to Figure 1-3 on page 1-9 for the location of the console port on the NetApp F200 series. Refer to Figure 1-4 on page 1-9 for the location of the console port on the NetApp F300 series.

If the provided serial cable is not compatible with the connector on your terminal, use a null modem cable to attach the terminal to the filer according to the information provided in Table 2-1 and Figure 2-3. The connector on the cable you are attaching to the serial port must be a female connector.



**NOTE:** The filer serial port supports only DTE devices. It doesn’t support DCE devices such as modems. Most terminals are wired as DTE devices.

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<sup>1</sup> An “ANSI terminal” is also an ASCII terminal, which can be used as the console for the filer.

**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          |

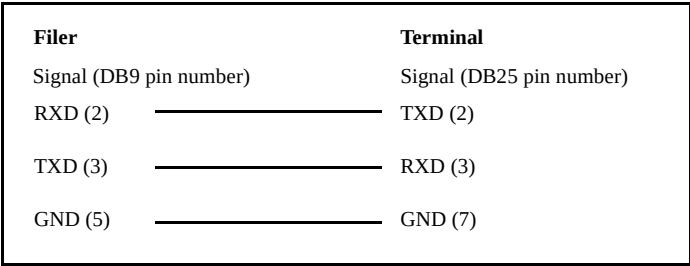


**Figure 2-3. Connecting a terminal to the filer**

2. Attach the keyboard to the terminal, if it is not already attached.
3. Plug in the terminal to a grounded power outlet.

4. Set the terminal characteristics as follows:

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



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

The installation of the serial console is now complete. The next section has instructions for attaching the filer to the network.

## Attaching the filer to the network

You can attach the filer to multiple networks using network adapters on the system board and in expansion slots. Network interfaces are named as follows:

- The Ethernet interface on the system board is named e0.
- Ethernet interfaces on the single-port Ethernet cards are named according to expansion slot numbers. For example, if a single-port Ethernet card is in slot 7, its interface is named e7.
- Ethernet interfaces on the quad-port Ethernet cards are named according to expansion slot numbers and locations on the faceplate of the card (a – d). For example, if a quad-port Ethernet card is in slot 7, its top interface is named e7a and its bottom interface is named e7d.
- FDDI interfaces on FDDI cards are named according to expansion slot numbers. For example, if an FDDI card is in slot 8, its interface is named f8.
- The ATM interface on the ATM card is named according to the expansion slot number. For example, if an ATM card is in slot 8, its interface is named a8.

This section describes how to attach your filer to an Ethernet, FDDI, or ATM network, assuming that a network has been installed at your site. When finished attaching the filer to the network, you are ready to set up your filer software as described in the *System Administrator's Guide*.

### Ethernet network

This section describes the connectors and cabling requirements for attaching the filer to an Ethernet network. Then it describes how to attach the filer to an Ethernet network.

#### Connectors

Use one of the following connection methods to attach the filer to an Ethernet network.

**System board.** Use either the 10Base-T (left) or 100Base-TX (right) connector. Although two connectors are available, you can use only one connector at a time. If two networks are attached to the system board, only the 100Base-TX interface will be activated.

**Single-port Ethernet card with two connectors.** Use either the 10Base-T (upper) or 100Base-TX (lower) connector on the single-port Ethernet card. Although two connectors are available, you can use only one connector at a time.

**Single-port Ethernet card with one connector.** The card automatically determines whether the mode of operation for its single connector is 10Base-T or 100Base-TX.

**Quad-port Ethernet 10Base-T card.** You can use all four connectors at the same time.

**Quad-port Ethernet 10Base-T or 100Base-TX card.** The card automatically selects whether the mode of operation is 10Base-T or 100Base-TX. You can use all four connectors at the same time.

### **Cabling requirements**

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

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

### **Attaching the filer to an Ethernet network**

To attach the filer to an Ethernet network, push the twisted-pair cable connector into the RJ-45 connector on the Ethernet card faceplate or on the back panel of the filer until it clicks and locks in place.

## FDDI network

This section describes the cabling requirements and network configurations for attaching the filer to an FDDI network. Then it describes how to attach the filer to an FDDI network using different types of FDDI cards.

### Cabling requirements

Use the following types of cables to attach 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 an FDDI-fiber card, use duplex 62.5/125 micron or 50/125 micron multimode fiber-optic cable with SC connectors.

### Network configuration

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 2-4 for an example.

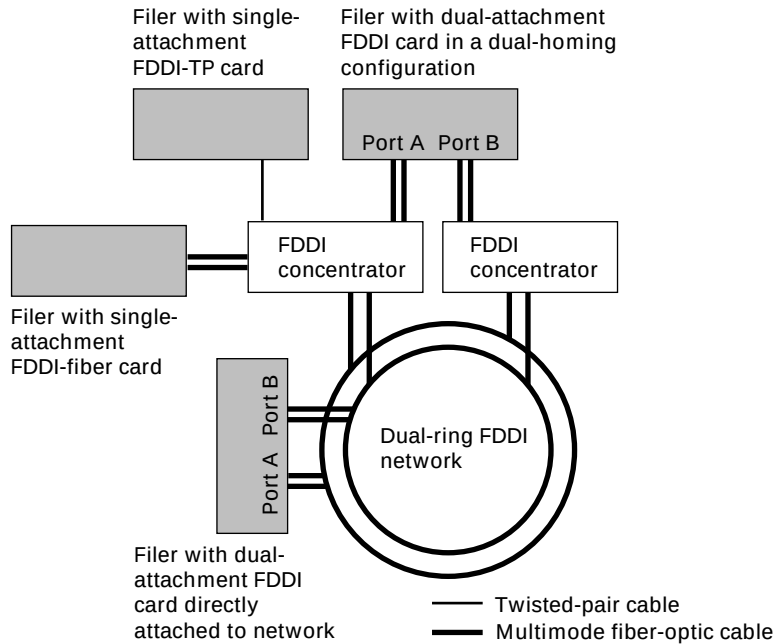


**NOTE:** If you have a dual-attachment FDDI-fiber card, you can also use it in a single-attachment configuration. Connect port B on the card to the FDDI concentrator and leave port A unused. For more information about how to connect port B, refer to “Attaching the filer to an FDDI network” on page 2-12.

**Dual-attachment station.** You can connect a dual-attachment FDDI-fiber card to an FDDI network in one of two ways:

- By connecting the card directly to the primary and secondary FDDI rings using two duplex multimode fiber-optic cables. See Figure 2-4 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 only becomes active if the primary connection (port B) fails. See Figure 2-4 for an example.



230.08

**Figure 2-4. Sample FDDI network configuration**

#### Attaching the filer to an FDDI network

The following sections describe how to attach the filer to an FDDI network using different types of FDDI cards:

- To attach the filer to an FDDI network using the single-attachment FDDI-TP card, push the twisted-pair cable connector into the RJ-45 connector on the card until it clicks and locks in place.
- The single-attachment FDDI-fiber card has a duplex SC connector (see Figure 2-5). (The exact shape of the connectors on the duplex

fiber-optic cable might be different from those illustrated, depending on the cable manufacturer.)

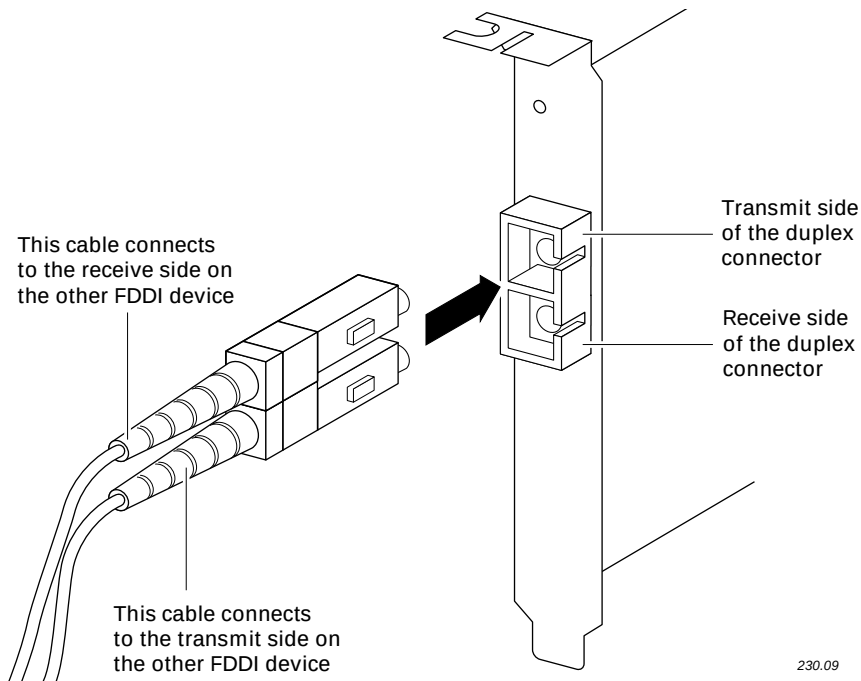


**Figure 2-5. Attaching a duplex fiber-optic cable to a single-attachment FDDI-fiber card**

The top connector is the transmit port and the bottom connector is the receive port. To attach the fiber 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.



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

- The dual-attachment FDDI-fiber card has two duplex SC connectors (see Figure 2-6). (The exact shape of the connectors on the duplex fiber-optic cables might be different from those illustrated, depending on the cable manufacturer.)

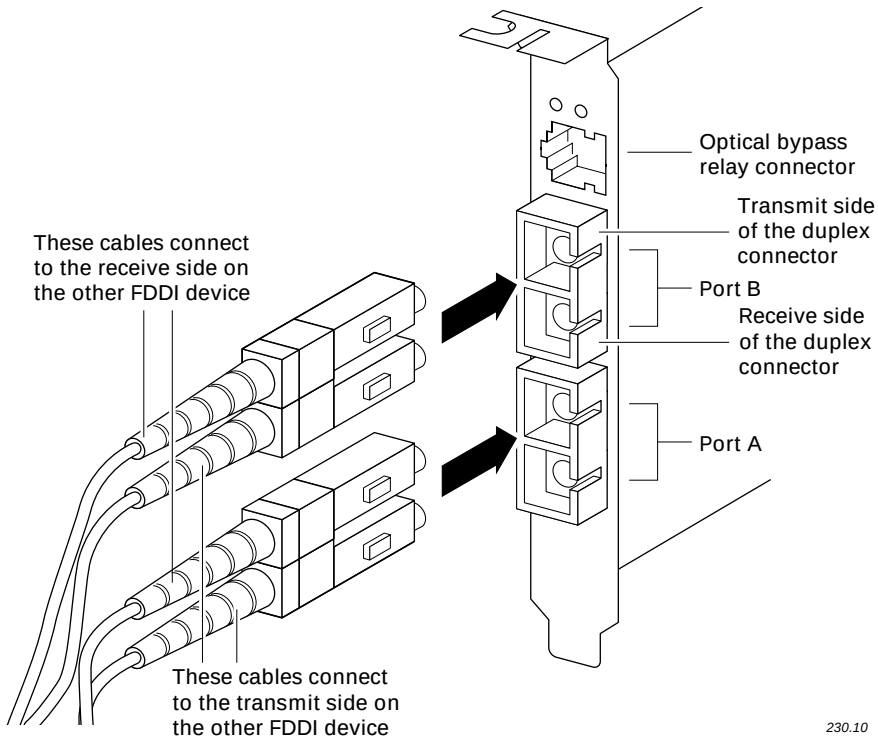


**Figure 2-6. Attaching two duplex fiber-optic cables to a dual-attachment FDDI-fiber card**

The upper duplex connector is for port B and the lower one is for port A. In each duplex SC connector, the top connector is the transmit port and the bottom connector is the receive port. To attach 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.



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

The dual-attachment FDDI-fiber card provides an RJ-12 connector for attaching an optional third-party optical bypass relay to the filer. Read the next section for information about using the RJ-12 connector.

#### **Attaching the filer to a bypass switch**

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 2-7 illustrates the connector for the optical bypass switch and Table 2-2 describes the function of each pin on the connector.

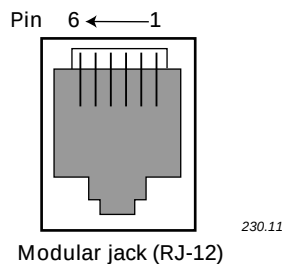


**Figure 2-7. Pins on the bypass switch connector**

**Table 2-2. Pin-out information for the optical bypass connector**

| 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 accompanying the 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 attaching the filer to an ATM network. Then it describes how to attach the filer to an ATM network.

#### **Cabling requirements**

To attach the filer to an ATM network, use a duplex 62.5/125-micron multimode fiber-optic cable with SC connectors.

#### **Attaching the filer to an ATM network**

The ATM card has a duplex SC connector (see Figure 2-8). The connector labeled “T” is the transmit port and the connector labeled “R” is the receive port. (In the figure, the transmit port is on the top and the receive port is on the bottom. The position of the ports might be different on your card.) To attach 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.

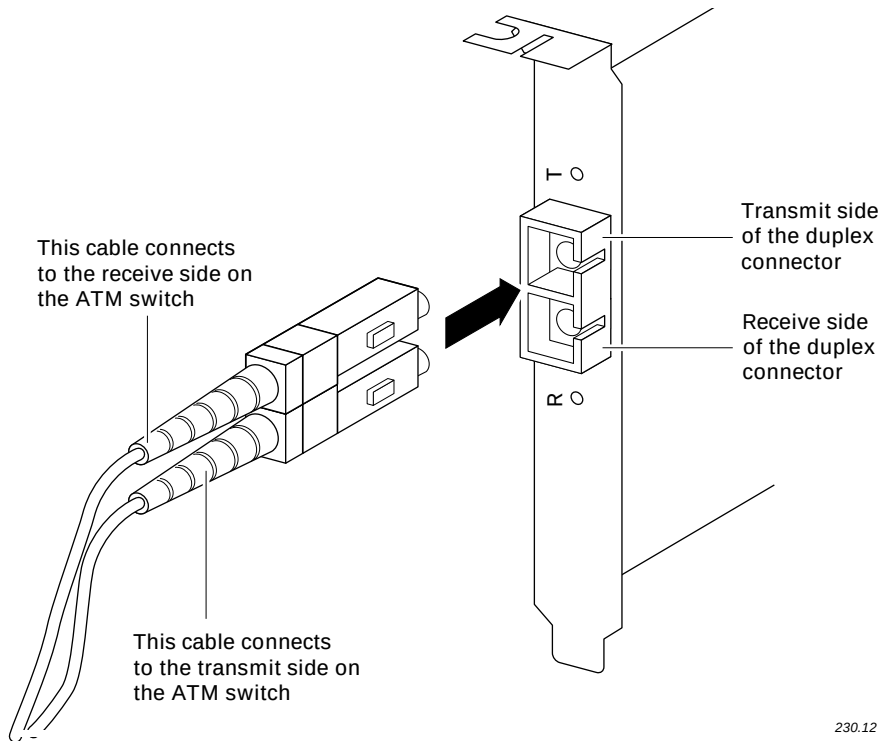


**Figure 2-8. Attaching a duplex fiber-optic cable to an ATM card**



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



## Chapter 3: Storage Devices

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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 attach an optional external tape 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 and for installing operating system upgrades.
- SCSI hard disks installed in external disk shelves.



**CAUTION:** Depending on your filer model, the hard disks may be either narrow SCSI disks or wide SCSI disks. Narrow SCSI disks are not interchangeable with wide SCSI disks. Network Appliance labels each wide SCSI disk as “WIDE SCSI” so that you can differentiate it from a narrow SCSI disk.

- One internal tape drive, which is factory installed as an option.

- External tape stackers or tape drives. Table 3-1 lists the external tape stackers supported by the filer, and Table 3-2 lists the external tape drives supported by the filer. You can purchase an external tape stacker or tape drive from Network Appliance.

**Table 3-1. Supported external tape stackers**

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

**Table 3-2. Supported external tape drives**

| Manufacturer       | Model          |
|--------------------|----------------|
| Digital or Quantum | DLT 2000       |
| Digital or Quantum | DLT 4000       |
| Exabyte            | Exabyte 8500C  |
| Exabyte            | Exabyte 8505   |
| Exabyte            | Exabyte 8505XL |
| Hewlett-Packard    | C1533A         |
| Hewlett-Packard    | C1553A         |



**NOTE:** Do not install both disks and tape drives on the same SCSI bus because tape activity would adversely affect the system's performance.



**CAUTION:** If you attach 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's SCSI card number and SCSI ID number. You can write the address in this format:

*SCSI card number.SCSI ID number*

In some filer screen messages, the SCSI card number is referred to as the "HA#," which stands for "host adapter number." The following sections describe how to determine the disk's SCSI card number and SCSI ID number.



**NOTE:** Like disk drives, tape drives have a SCSI address that consists of the drive's 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 "9b.5" then the drive's SCSI card number is 9b and the drive's SCSI ID number is 5.

### Determining the disk's SCSI card number

SCSI cards are numbered by the slots they occupy. For example, the SCSI adapter on the system board is SCSI 0. 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 9 are SCSI 9a and SCSI 9b.

The disk's SCSI card number is the number of the connector to which the disk and its disk shelf is attached. For example, if a disk is installed in a shelf attached to SCSI 9a, the disk's SCSI card number is 9a.

### Determining the disk's SCSI ID number

The disk's SCSI ID number depends on the type of disk shelf connected to the filer and where the disk is located in the disk shelf. For more information on how to determine the SCSI ID number of a disk, refer to the documentation that shipped with your disk shelf.

## 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 10 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> <b>sysconfig -r</b> |          |           |                |             |
|------------------------------|----------|-----------|----------------|-------------|
| RAID Disk<br>(MB/blks)       | DISK_ID# | HA#.SCSI# | Used (MB/blks) | Phys        |
| -----                        | -----    | -----     | -----          | -----       |
| ---                          |          |           |                |             |
| parity<br>8                  | 0        | 0.0       | 4000/8192000   | 4095/838672 |
| data 1<br>8                  | 1        | 0.1       | 4000/8192000   | 4095/838672 |
| data 2<br>8                  | 2        | 0.2       | 4000/8192000   | 4095/838672 |
| data 3<br>8                  | 3        | 0.3       | 4000/8192000   | 4095/838672 |
| data 4<br>8                  | 4        | 0.4       | 4000/8192000   | 4095/838672 |
| data 5<br>8                  | 9        | 9.a5      | 4000/8192000   | 4095/838672 |
| data 6<br>8                  | 10       | 9.a6      | 4000/8192000   | 4095/838672 |
| data 7<br>8                  | 5        | 9.a0      | 4000/8192000   | 4095/838672 |
| data 8<br>8                  | 6        | 9.a1      | 4000/8192000   | 4095/838672 |
| data 9<br>8                  | 7        | 9.a2      | 4000/8192000   | 4095/838672 |
| spare<br>8                   | 8        | 9.a3      | 4000/8192000   | 4095/838672 |

You can determine from the `sysconfig -r` output that disk 10 corresponds to the disk with SCSI address 9a.6. That is, the disk's SCSI ID is 6 and it is in the disk shelf that's attached to the SCSI 9a connector. Disk SCSI IDs within a disk shelf depend on the type of disk shelf used with your filer. For information on disk numbering within a disk shelf, refer to the Network Appliance disk shelf hardware guide that shipped with your disk shelves.

## Attaching an external tape drive to the filer

This section describes how to attach an optional external tape drive or tape stacker to the filer. Refer to the documentation accompanying your tape drive for information about how to install and configure a tape drive. Refer to “Storage device support” on page 3-1 for the types of external tape stackers and tape drives supported by the filer.

How you attach an external tape drive to the filer depends on the filer model and the type of SCSI connections it supports. Because the supported tape drives and stackers are narrow SCSI devices, they must be attached to a narrow SCSI connector on the back panel of the filer.



**NOTE:** The narrow SCSI connectors on the filers are high-density, 50-pin connectors. If your tape drive comes with a SCSI cable using a different type of connector, you must provide an adapter to attach the drive’s SCSI cable to the filer.

Follow these steps to attach a tape drive to the filer:

1. Execute the `halt` command to shut down the filer, and then turn off power to the filer and its disk shelves.
2. Set the SCSI IDs for the tape drive and the robotic loader (if present in a tape stacker) according to the information in the tape drive documentation. The SCSI IDs can be any of the unused numbers from 0 to 6 (ID 7 is reserved).
3. Use the SCSI cable that comes with your tape drive to attach the tape drive to the appropriate narrow SCSI connector on the back panel of the filer.

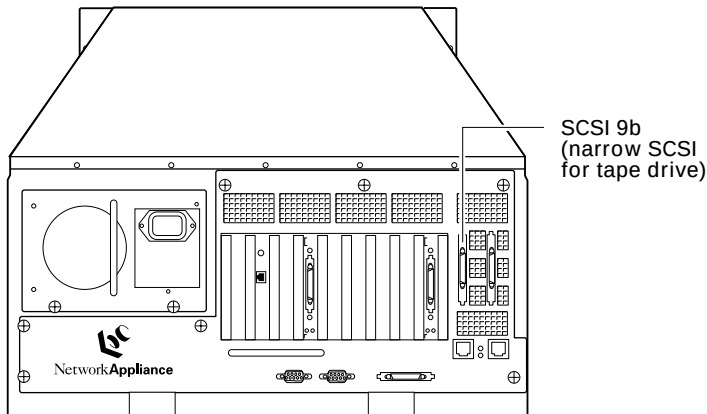


**CAUTION:** Verify that the power to the external tape drive is off before you connect the drive to the filer; otherwise, you could damage the SCSI interface on the filer.



**NOTE:** The length of the SCSI cable used for attaching the tape drive must be nine feet (2.74 meters) or less. Also, it must be a SCSI-2, double-shielded cable.

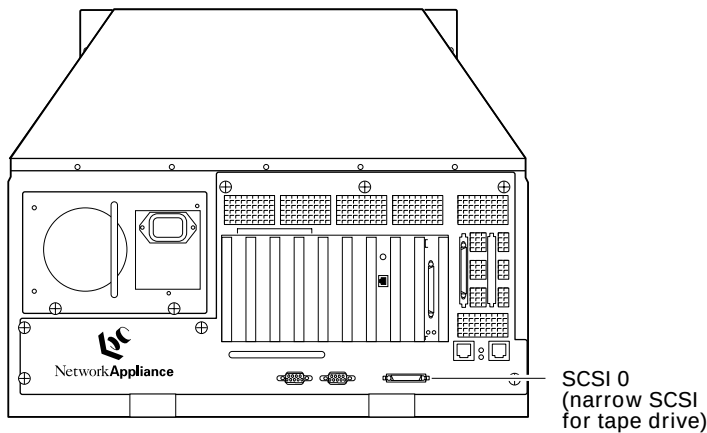
On NetApp F220 and NetApp F330 filers, attach the external tape drive to SCSI 9b on the back panel (see Figure 3-1).



230.13

**Figure 3-1. Attaching a tape drive to a NetApp F330**

On NetApp F230 filers, attach the external tape drive to SCSI 0 (see Figure 3-2).



230.14

**Figure 3-2. Attaching a tape drive to a NetApp F230**

Do not attach the tape drive to any other SCSI connector on the filer.

4. Terminate the SCSI bus at the tape drive.

The terminator you install must be of the “active SCSI terminator” type. Refer to the tape drive documentation for information about terminating the SCSI bus.

The procedure for attaching the tape drive is now complete.

## Chapter 4: Troubleshooting System Hardware

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This chapter describes how to troubleshoot the system hardware based on LED indicators on hardware components and system error messages displayed on the LCD of the filer. It begins by describing the LED indicators. If you need information about only LCD messages, go directly to “LCD messages on the system front panel” on page 4-9.



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

The following hardware components feature LED indicators:

- system front panel
- system board
- some expansion cards

When describing fault conditions indicated by LEDs, this chapter suggests corrective actions as appropriate.



**NOTE:** Some of the corrective actions require you to open the system chassis and reseat expansion cards or replace hardware components. For information on opening the filer, refer to Appendix B, “Opening the System Board Carrier.” For information on replacing a hardware component, refer to the documentation that shipped with the field replaceable unit. For other questions about troubleshooting system problems, contact Network Appliance Technical Support.

## LED indicators on the system front panel

The following lists the three LED indicators on the system front panel from left to right:

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Active LED (green)      | During normal operation, the LED flashes to indicate CPU activity. If there is no CPU activity, the LED is off.                                                                                                                                                                                                                                                                                                                               |
| STDBY/SERV LED (yellow) | <p>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.</p> <p>On the system front panel, the LED is labeled as 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.</p> |
| Power LED (green)       | The LED lights when the system is powered on.                                                                                                                                                                                                                                                                                                                                                                                                 |



**NOTE:** After you power 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 the system board

The SCSI adapter on the system board does not feature LED indicators.

The system board features two green LED indicators that provide link status for the Ethernet adapter on the system board. The LEDs are located between the two Ethernet connectors on the system board. The upper LED is for the 100Base-TX connector (right connector) and the lower LED is for the 10Base-T connector (left connector). When either connector detects good link status, its corresponding LED is on.



**NOTE:** Although the system board has two Ethernet connectors, you can use only one connector at a time. If two networks are attached to the system board, only the 100Base-TX interface will be activated.

## LED indicators on expansion cards

The following describes the LED indicators that are featured on some expansion cards.

### Ethernet cards

Both the single-port and quad-port Ethernet cards feature LED indicators. The LEDs on both cards are described below.

#### Single-port Ethernet card with two connectors

This Ethernet card has one connector for 10Base-T operation and one connector for 100Base-TX operation, and provides four LEDs on its faceplate. The following lists the LEDs from left to right:

|                               |                                                                                                                                |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| 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 to indicate that the card is transmitting traffic.                                                             |
| Receive LED (green)           | The LED flashes to indicate that the card is receiving traffic.                                                                |

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

**Single-port Ethernet card with one connector**

This Ethernet card has one connector for either 10Base-T or 100Base-TX operation, and provides four LEDs on its faceplate. The following list describes the LEDs clockwise from top left:

|               |                                                                                                       |
|---------------|-------------------------------------------------------------------------------------------------------|
| COL (yellow)  | Collision LED. The LED lights to indicate detection of a collision.                                   |
| 100Mb (green) | Media mode LED. The LED lights to indicate 100Base-TX operation. The LED is off for 10Base-T.         |
| LNK (green)   | Link LED. The LED lights to indicate good link is detected; off when link fails (or is not detected). |
| ACT (yellow)  | Network activity LED. The LED lights to indicate network activity.                                    |

**Quad-port Ethernet cards**

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

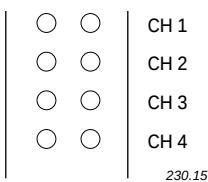


**Figure 4-1. LEDs on the quad-port Ethernet card**

The following list describes how each pair of LEDs functions:

- The left LED (yellow) is the network activity LED. It is on when there is activity on the network.

- The right LED (green) is the twisted-pair link LED. It is on when the link is functioning properly. If the link fails, the LED turns off.

If the twisted-pair link LED turns off, verify that the Ethernet card and network cable are installed securely. If the fault persists, there may be a problem with the card or the network cable.

### **FDDI cards**

Each single-attachment FDDI card provides one LED. The dual-attachment FDDI card provides two LEDs: the left one is for port B and the right one is for port A.

When you use any of the FDDI cards, the LED for each port stays green during normal operation. If it doesn't stay green, refer to Table 4-1 for information about troubleshooting the FDDI card. If the corrective action suggested in Table 4-1 does not solve the problem, contact Network Appliance Technical Support.

**Table 4-1. LED for each port on the FDDI card**

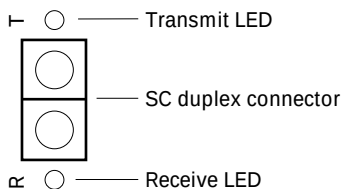
| <b>LED status</b> | <b>Problem and corrective action</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flashes green     | <p>The possible problems are:</p> <ul style="list-style-type: none"> <li>• One of the cables connected to the card is faulty. Try another FDDI cable.</li> <li>• 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 on the network and that the receive port on the card is connected to the transmit port on the other FDDI device.</li> <li>• The concentrator is faulty. Connect the FDDI card to another concentrator.</li> </ul> |

**Table 4-1. LED for each port on the FDDI card (Continued)**

| LED status                                                                | Problem and corrective action                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stays amber                                                               | <p>There is a network problem. Disconnect the card from the network.</p> <p>If the LED flashes green after 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.</p> <p>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.</p> |
| Flashes amber                                                             | <p>The card port is connected to an invalid network topology. Use the card in a proper network configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                  |
| Sequentially cycles to amber, then to green, and then back to amber again | <p>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.</p>                                                                                                                                                                                                                                                                                                                       |
| Stays off                                                                 | <p>Contact Network Appliance Technical Support to determine the cause of the problem.</p>                                                                                                                                                                                                                                                                                                                                                                                                          |

## ATM card

The ATM card provides two LEDs on its faceplate as shown in Figure 4-2. (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.)



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**Figure 4-2. LEDs on the ATM card**

The following describes how each LED functions:

- The LED labeled “T” is the transmit LED. It is green when the card is transmitting traffic. It is off when the card is not transmitting traffic. If the LED turns yellow, 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. It is green when the card is receiving traffic. It is off when the card is not receiving traffic. If the LED turns red, there is no carrier.

## SCSI cards

Both the narrow SCSI card and the wide SCSI card provide two green LEDs on their faceplates: the left LED is for connector A and the right LED is for connector B. Each LED lights when the card detects activity on the corresponding SCSI bus (A or B).



**NOTE:** The SCSI adapter on the system board (SCSI 0) does not feature LED indicators.

## LCD messages on the system front panel

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.

The following describes the different types of messages on the LCD and suggests corrective actions as appropriate.



**NOTE:** Some of the corrective actions require you to open the system chassis and reseal expansion cards or replace hardware components. For information on opening the filer, refer to Appendix B, “Opening the System Board Carrier.” For information on replacing a hardware component, refer to the documentation that shipped with the field replaceable unit. For other questions about troubleshooting system problems, contact Network Appliance Technical Support.

### Startup messages

When the system is verifying its hardware and loading the operating system at power-on, it displays startup messages on the LCD. These messages correspond to messages appearing 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 diskette, 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 diskette, 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 more information about the appropriate memory size, refer to the *Read Me First*.

- Cannot initialize labels

The system cannot initialize disk labels when trying to create a new file system. Normally you don't 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. 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.

- Dirty shutdown in degraded mode

Because you did not shut down the system cleanly while the system was in degraded mode, the file system might 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's SCSI card number and *n* is the drive's SCSI ID number. Replace the drive with one that supports SCSI-2.

To determine the SCSI card number and SCSI ID number of a disk or tape drive, refer to "How disk drives are numbered" on page 3-3.

- 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's SCSI card

number and  $n$  is the drive's SCSI ID number. Check the Network Appliance price list to verify that the drive is supported by the filer.

To determine the SCSI card number and SCSI ID number of a disk or tape drive, refer to "How disk drives are numbered" on page 3-3.

- 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.
- You did not run the `revert_to 3.x` command before downgrading from Release 4.0 or later. Follow the instructions in the *Read Me First* for using the `revert_to 3.x` command and downgrading to an earlier software release.

- Invalid PCI card slot  $n$

An unsupported expansion card has been installed in the filer. In the actual message,  $n$  is the number of the slot where the card is located. Replace the unsupported card with a card that is included in the Network Appliance parts list.

- No disks!

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

- all disks are installed properly in the disk shelf
- both ends of the SCSI cable that attaches the shelf to the system chassis are securely attached

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

- No `/etc/rc`, running setup

The system cannot find the `/etc/rc` file. The system automatically starts the `setup` program and prompts you to re-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. In addition, contact Network Appliance Technical Support to determine if the system board needs to be repaired. Because an Ethernet interface (e0) is present on the system board, this message might be the result of a faulty system board. Using a system with an undetected e0 interface will cause other Ethernet interfaces to be numbered incorrectly.

- 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 SCSI cards are seated properly in the appropriate expansion slots. In addition, contact Network Appliance Technical Support to determine if the system board needs to be repaired. A SCSI controller is built into the system board, and this problem might be the result of it not functioning properly.

- 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 xMB

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 2 MB, 4 MB, or 8 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 processed by the system 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 is possible 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. Enter the host name and workgroup name by using the `cifs setup` command.
- The WINS server has a problem. Refer to the documentation that comes with your WINS server for information about troubleshooting it.

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 listed by the message, 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.

Disk shelves are numbered according to the card to which they are attached. For example, the disk shelf attached to SCSI 0 is shelf 0 and the disk shelf attached to SCSI 9a is shelf 9a.

- Maintenance mode

The system is running in maintenance mode. For more information about maintenance mode, refer to the *System Administrator's Guide*.

- NFS service not enabled

This message is possible 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 how to replace 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!

This message appears when one of the power supplies in the Network appliance redundant power supply unit fails or is powered off. If the power supply has failed, replace it as soon as possible.

- 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.

### **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:

- 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.

- Dumping core

This message appears when the system dumps core during a system panic. Write down the system panic message displayed on the system console and contact Network Appliance Technical Support.

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

- Error dumping core

This message appears when the system is not able to dump core during a system crash; the system restarts without dumping core. Contact Network Appliance Technical Support for help.

- 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 will be 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 contact Network Appliance Technical Support for help.

- System too hot

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

---

```
Testing SIO
Testing LCD
Probing devices
Open Firmware by FirmWorks
Copyright 1995 FirmWorks, all rights reserved.
Testing 256MB
Complete
```

---

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. Call Network Appliance Technical Support to report the problem.

### System LCD

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

```
Checking sensors
Testing clock
Testing floppy
Testing watchdog
Probing devices
```

Testing 256MB  
Complete

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, you'll see different messages from the ones below. Refer to the *System Administrator's Guide* for more information.

---

```
Finding image
Loading 4 4 disk@4
Complete
Starting NetApp Release 4.0.3: Wed Mar 26 05:07:02 PST 1997
Copyright (c) 1992-1997, Network Appliance, Inc.
Scanning for disk drives: .....
Configuring disk drives: 0.0 0.1 0.3 0.4 0.5 0.6 9a.0 9a.1 9a.2
9a.3 9a.4 9a.5 9a.6
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.
Fri Mar 28 14:10:11 GMT [rc]: NetApp Release 4.0.3 boot
complete.
Fri Mar 28 14:10:12 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:

---

```
Fri Mar 28 14:12:13 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: 52154368 (small), 226537472 (large).
Fri Mar 28 22:13:11 GMT [rc]: saving 50M to /etc/crash/core.19-
small
("../common/wafl/wafl.c:345: Assertion failure.")
Fri Mar 28 22:13:38 GMT [rc]: saving 216M to /etc/crash/core.19
("../common/wafl/wafl.c:345: Assertion failure.")
```

---

## System LCD

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 visible.)

```
Finding image
Loading 4 4 disk@4
Scanning for PCI devices
Initializing PCI devices
Checking disk labels
Scanning for disk drives
Spinning up drive 0.0 0.1 0.3 0.4 0.5 0.6 9a.0 9a.1
9a.2 9a.3 9a.4 9a.5 9a.6
Configuring drive 0.0 0.1 0.3 0.4 0.5 0.6 9a.0 9a.1
9a.2 9a.3 9a.4 9a.5 9a.6
Updating disk labels
Checking NVRAM
Marking spare disks
Loading file system
Starting RAID and WAFL
Initializing e3 f7 f8
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  
Saving core dump
```

Once the filer is started, the LCD displays a bar graph showing the number of operations processed by the system 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 Board Carrier

This appendix describes how to open the system board carrier on a NetApp F200 or F300 series filer to gain access to the system board and expansion cards.

Follow these steps to open the system board carrier:

1. Execute the `halt` command at the console prompt to save the contents of the NVRAM to disk and turn off the NVRAM.
2. Turn off filer power by setting the AC power switch on the filer control panel to its Off position.
3. Unscrew the seven captive thumbscrews that secure the system board carrier in the back of the cabinet.

Figure B-1 illustrates the locations of the system board carrier thumbscrews.

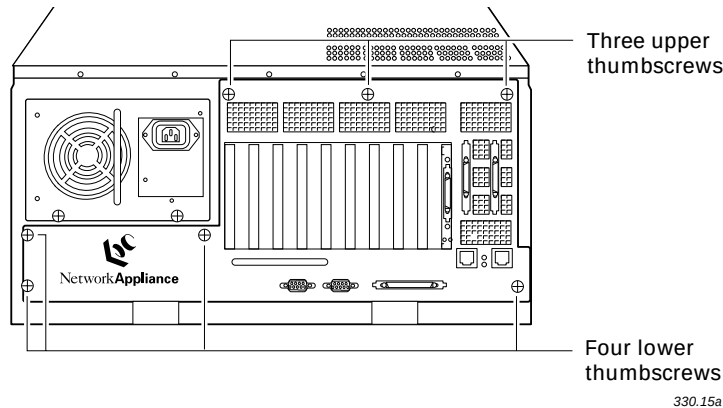


**Figure B-1.** System board carrier thumbscrews



**NOTE:** All of the thumbscrews are torqued at the factory to prevent them from coming loose during shipment. Use a Phillips screwdriver to loosen the thumbscrews the first time you open the system board carrier.

4. Pull the system board carrier out of the cabinet until the slide rails lock (18.5 inches of slide travel).

Figure B-2 illustrates how to open the system board carrier.

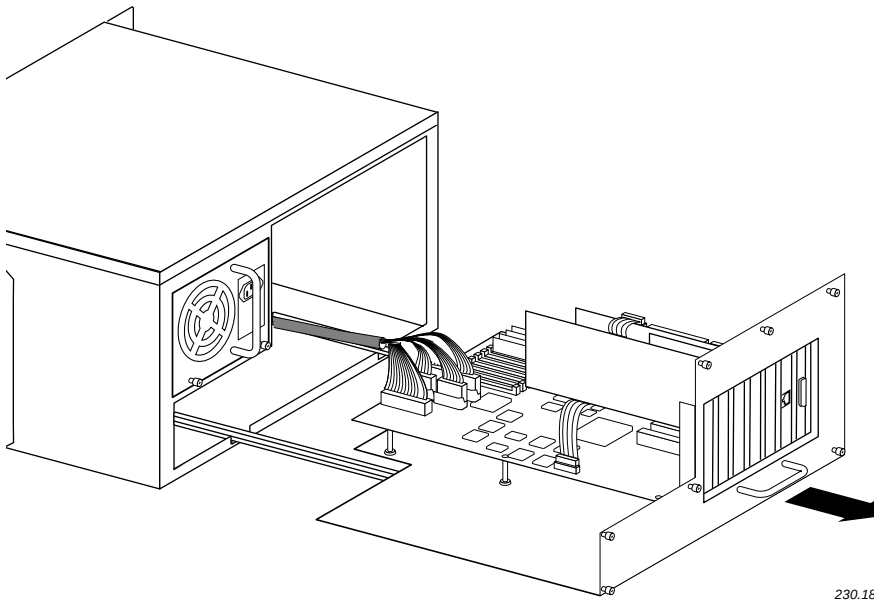


**Figure B-2. Opening the system board carrier**

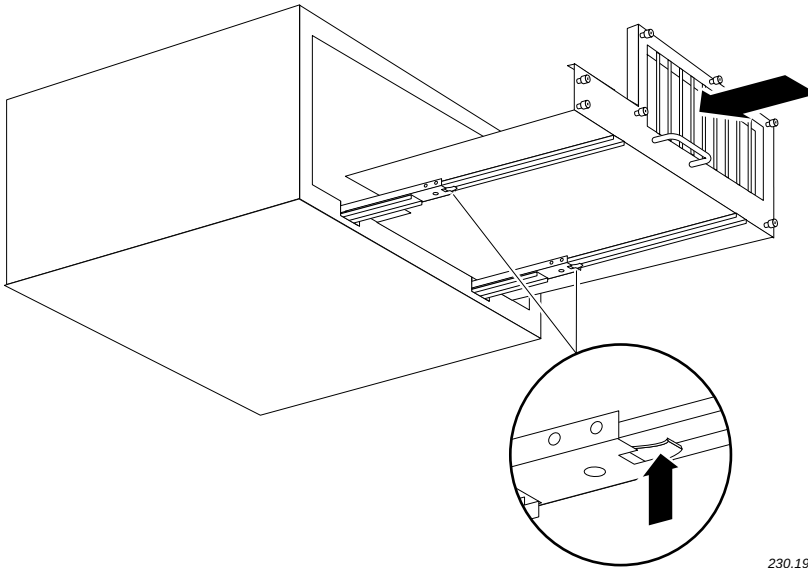


**CAUTION:** The system board, DRAM single in-line memory modules (SIMMs), expansion cards, and many other system components are susceptible to damage from static electricity. We recommend that, except when servicing the power supply, you leave the filer plugged in and connect a wrist strap from your wrist to the filer cabinet whenever you are working inside a filer.

Follow these steps to close and secure the system board carrier:

1. Push in on the slide locks on the bottom of the system board carrier.

Figure B-3 illustrates how to unlock the slides on the system board carrier.



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**Figure B-3. Unlocking the slides on the system board carrier**

2. Push the carrier into the cabinet until the rear panel of the carrier is flush with the rear panel of the cabinet.
3. Fasten the thumbscrews.
4. Power on the filer.



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