StorageWorks by Compaq

Fibre Channel SAN Switch 8-EL

Installation and Hardware Guide

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About This Guide

This guide is designed to be used as step-by-step instructions for installation and as a reference for operation, troubleshooting, and future upgrades.

Related Documents

Table 1: Related Documents	
Document Title	**Part Number**
Compaq *StorageWorks Fibre Channel SAN Switch Management Guide*	AA-RMMJB-TE 207686-002
Compaq *StorageWorks Fibre Channel SAN Switch 8-EL Release Note*s	AA-RMMGD-TE 207688-004
Compaq *StorageWorks Command Console for Hubs, Switches, and Tape Controllers Getting Started Guide*	AA-RHDAD-TE 135265-003
Compaq *StorageWorks SAN Switch Remote Switch Services Installation Guide*	EK-SANRS-AA. C01 165909-003

Text Conventions

This document uses the following conventions to distinguish elements of text:

Keys	Keys appear in boldface. A plus sign (+) between two keys indicates that they should be pressed simultaneously.
USER INPUT	User input appears in a different typeface and in uppercase
FILENAMES	File names appear in uppercase italics.
Menu Options, Command Names, Dialog Box Names	These elements appear in initial capital letters.
COMMANDS, DIRECTORY NAMES, and DRIVE NAMES	These elements appear in upper case. **NOTE:** UNIX commands are case sensitive and will not appear in uppercase.
Type	When you are instructed to *type* information, type the information **without** pressing the **Enter** key.
Enter	When you are instructed to enter information, type the information and then press the **Enter** key.

Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.

> **WARNING:** Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

> **CAUTION:** Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

> **IMPORTANT:** Text set off in this manner presents clarifying information or specific instructions.

> **NOTE:** Text set off in this manner presents commentary, sidelights, or interesting points of information.

Symbols on Equipment

These icons may be located on equipment in areas where hazardous conditions may exist.

Any surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

WARNING: To reduce the risk of injury from electrical shock hazards, do not open this enclosure.

Any RJ-45 receptacle marked with these symbols indicates a Network Interface Connection.

WARNING: To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching.

Power Supplies or Systems marked with these symbols indicate the equipment is supplied by multiple sources of power.

WARNING: To reduce the risk of injury from electrical shock, remove all power cords to completely disconnect power from the system.

Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

WARNING: To reduce the risk of personal INJURY or damage to the equipment, observe local occupational health and safety requirements and guidelines for manual material handling.

Rack Stability

WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

■ The leveling jacks are extended to the floor.

■ The full weight of the rack rests on the leveling jacks.

■ The stabilizing feet are attached to the rack if it is a single rack installations.

■ The racks are coupled together in multiple rack installations.

■ A rack may become unstable if more than one component is extended for any reason. Extend only one component at a time.

Getting Help

If you have a problem and have exhausted the information in this guide, you can get further information and other help in the following locations.

Compaq Technical Support

In North America, call the Compaq Technical Phone Support Center at 1-800-OK-COMPAQ. This service is available 24 hours a day, 7 days a week.

> **NOTE:** For continuous quality improvement, calls may be recorded or monitored.

Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for world wide Technical Support Centers are listed on the Compaq website. Access the Compaq website by logging on to the Internet at http://www.compaq.com.

Be sure to have the following information available before you call Compaq:

■ Technical support registration number (if applicable)

■ Product serial numbers

■ Product model names and numbers

■ Applicable error messages

■ Add-on boards or hardware

■ Third-party hardware or software

■ Operating system type and revision level

■ Detailed, specific questions

Compaq Website

The Compaq website has latest information on this product as well as the latest drivers. You can access the Compaq website by logging on to the Internet at http://www.compaq.com/storage.

Compaq Authorized Reseller

For the name of your nearest Compaq Authorized Reseller:

- In the United States, call 1-800-345-1518.

- In Canada, call 1-800-263-5868.

- Elsewhere, see the Compaq website for locations and telephone numbers.

Overview

This chapter covers the following topics:

- Front Panel
- Features
- Performance
- Switching Function
- Manageability
- Compatibility
- Reliability
- Serviceability

The Compaq *StorageWorks Fibre Channel SAN Switch 8-EL* is a low-cost, high-performance, 8-port, gigabit Fibre Channel switch used to interconnect storage devices, hosts, and servers in a Storage Area Network (SAN). The switch offers full non-blocking performance for all eight ports, with each port capable of delivering 100 megabytes per second (MB/s) full duplex. Cut-through routing guarantees a maximum latency of 2 microseconds from switch port to switch port.

Seven of the eight ports on the switch are fixed short-wave length optical media for interconnecting devices at distances up to 500 m. One port is configured as a removable GigaBit Interface Converter (GBIC) slot providing the flexibility to configure other physical media such as long-wavelength optical.

The switch is designed as a 1U-high device. It may be installed in industry-standard EIA racks or in a tabletop environment. Overall cost is reduced by using reliability components, continuous monitoring of environmental components (fan status and temperature), and a Single Field Replaceable Unit (FRU) design strategy.

The switch supports a Full Fabric capability. Full Fabric allows the Fibre Channel SAN Switch 8-EL to be linked or cascaded to other StorageWorks Fibre Channel switches to build a highly scalable SAN fabric. The Fibre Channel SAN Switch 8-EL supports F-port, FL-port, and E-port connections and Distributed Name Server (DNS).

The base configuration supports one E-port connection. A field upgrade is available to extend E-port connectivity to all ports.

Front Panel

Figure 1-1 shows the front panel of the Fibre Channel SAN Switch 8-EL.
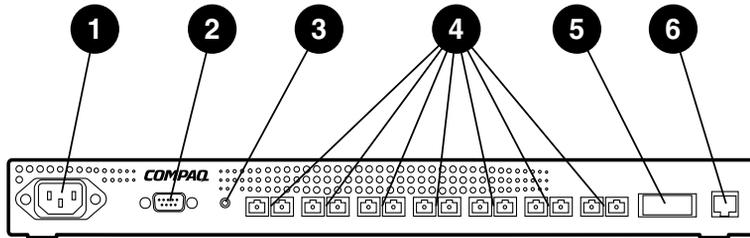
❶ AC power connector

❷ DB9 serial port

❸ Status LED indicator

❹ Optical connection module (fixed) slots

❺ GBIC module (removable) slot

❻ RJ-45 Ethernet port used for switch management

Figure 1–1: Fibre Channel SAN Switch 8-EL

Features

The Fibre Channel SAN Switch 8-EL has the following features:

■ **Simplicity—**The Fibre Channel SAN Switch 8-EL is easy to set up and configure. After the Power-On Self-Test (POST), add the switch's Internet protocol (IP) address. The remainder of the setup is automated.

■ **Intelligence—**The operating system allows discovery of all connected devices and determines optimum data paths without intervention.

■ **Flexibility—**The GBIC modules support single-mode and multi-mode fiber transmission media. The switch's modular construction allows flexibility in creating, upgrading, maintaining, and configuring a fabric.

■ **Reliability—**Highly integrated, reliable, multifunction Application Specific Integrated Circuits (ASIC) devices are used throughout the switch.

■ **High performance—**The low-latency, high-performance design requires no processor data path interaction. The Fibre Channel bandwidth is 100 megabytes per second (MB/s) per port (full duplex).

> **NOTE:** The latency can differ when the device or destination is configured in a loop.

■ **Automated congestion management—**Virtual channels enable the switch to perform sophisticated congestion-management techniques automatically.

■ **Cascading—**Switches can be cascaded for large fabric support. Switches can be interconnected for a large fabric with multiple fabric connections.

■ **Compatibility—**The Fibre Channel SAN Switch 8-EL is designed to operate with other Compaq StorageWorks Fibre Channel Switches using a compatibility mode.

■ **Universal Ports—**Switch ports are designed to support F_, FL_, and E_Port modes of operation. The software automatically selects the optimum mode of operation.

Table 1–1 describes the switch's technical features.

Table 1–1: Fibre Channel SAN Switch 8-EL Technical Features

Feature	Description
Login (FC)	Explicit fabric login is supported.
Data field size	The Fibre Channel frame can be up to 2112 bytes in size. The number of bytes must be a multiple of 4.
Buffering	A total of 128 standard-size, frame buffers are available for each set of 4 Fibre Channel ports.

Table 1–1: Fibre Channel SAN Switch 8-EL Technical Features (Continued)

Feature	Description
Adjustable buffer-to-buffer credit	Buffer-to-buffer credit for each F/FL_Port can be up to 31 credits. For the E_Port, buffer-to-buffer credit can be a total of 31 credits distributed among all 8 virtual channels.
In order frame delivery	The switch delivers the frames to a destination F/FL_Port in the same order received by the source F/FL_Port. The in-order frame delivery is maintained within a fabric of multiple interconnected switches.
Automatic address assignment	Switch port address identifiers are selected using an automatic address assignment protocol. All ports within a fabric are assigned address identifiers. Each individual switch maintains its own address pool for ports within the switch.
Hardware frame routing	The switch implements hardware routing of frames between communicating ports and supports self-routing of frames between the communicating ports. The path selection in a multiswitch configuration is based on a self-routing protocol.
User-defined routing	The switch allows the configuration of user-defined routes. Failed paths are still used in the event of a failure.
Translative mode	Translates 8-bit private loop addresses to 24-bit Phantom Public Addresses to allow fabric-aware devices to access private devices.
Management	The switch can be managed through the SNMP agent, Web Management Tools, or Telnet included in the Compaq *StorageWorks Command Console* software. These items are accessible from the Internet Protocol over the RJ-45 10/100BaseT Ethernet port or any Fibre Channel port. You can use any SNMP-based management product to access the SNMP agent and any supported Web browser to use the Java Web Management Tools.
Name Server	The Name Server feature is based on the Simple Name Server model defined in the Fibre Channel Standard. This function allows external devices to discover other fabric-connected devices. Name Server manages a database that relates external device quantities, including mappings between N/NL_Port 24-bit Fibre Channel physical addresses, Names (WWN), IP addresses, FC-4 device types, and Initial Process Associators. External devices can register and query this information using the Name Server function, which is distributed across switches in a fabric.

Performance

A minimum aggregate routing capacity of 4,000,000 frames per second is specified for Class 2, Class 3, and Class F frames. Non-blocking throughput of up to 16 x 100 MB/s (1.6 gigabytes per second [GB/s]) is provided.

A maximum switch latency of less than two microseconds is specified for Class 2, Class 3, and Class F frames when the output port is free.

Switching Function

The Fibre Channel SAN Switch 8-EL switching function is based on a central memory bank and its associated data path control. Each switch port stores received frames in the central memory, while passing a buffer pointer to the forwarding port's transmitter. The switch uses cut-through routing to route frames from the receiving port to the transmitting port, providing the transmitting port is free, without waiting for the end of the frame to be received. This provides a low-latency data path within the switch. If the transmitting port is busy, the frame can be temporarily stored in the switch's memory bank.

Manageability

The Fibre Channel SAN Switch 8-EL can be managed in-band by using Fibre Channel protocol, or out-of-band by connecting to the 10/100Base-T Ethernet port. Management interfaces include SNMP, Web Management Tools, or Telnet.

Compatibility

The Fibre Channel SAN Switch software (version 2.0 and above) is compatible with the Fibre Channel Switch software (Version 1.6b or 1.6d), allowing both types of switches to operate in the same fabric. To accomplish this compatibility, the Fibre Channel SAN Switch 8-EL must be configured to use a specific addressing mode. This mode is designated "VC-Encoded Address Mode."

> **NOTE:** To determine the SAN compatibility, go to the Compaq Website at:
> http://www.compaq.com/products/storageworks/san/enterprise-san.html.

Invoke this mode using the configure command, as described in Appendix A of the Compaq *StorageWorks Fibre Channel SAN Switch Management Guide*. When using this compatibility mode, the maximum architectural limit switch count in a fabric is reduced to 32, and the maximum number of multicast groups is reduced 31.

NOTE: To determine the number of switches currently supported in a SAN, go to the Compaq Website at:
http://www.compaq.com/products/storageworks/san/enterprise-san.html.

If the compatibility mode is not set, the following error message displays when you interconnect a Fibre Channel SAN Switch 8-EL and a Fibre Channel Switch:

FABRIC, SEGMENTED, LOG_WARNING
Description: Fabric segmented.
Probable Cause: Incompatible fabric parameters/switches or conflict zones.
Action: Reconfigure fabric or zones. See configure command.

Reliability

The following features ensure the switch's reliability:

■ POST

■ BootROM Memory Testing

■ Temperature and fan-speed monitoring

■ Low component count

Serviceability

The following features enhance the switch's serviceability:

■ Simple enclosure

■ Loopback test modes for service

■ User-friendly diagnostics

■ No jumpers or switch settings

■ Error and significantevent logging and reporting

■ witch is the Field Replaceable Units (FRU)

NOTE: For more information about FRUs, see Chapter 6, "Repair and Replacement."

Chapter **2**

Installing the Fibre Channel SAN Switch 8-EL

This chapter covers the following topics:

- Package Contents
- Selecting an Operating Location
- Selecting a Switch Mounting Method
- Installing a GBIC Module
- Cable Specifications
- Connecting the Serial Port and Ethernet Ports
- Fibre Channel SAN Switch 8-EL Connected to a Storage System
- Cascading Switches

Package Contents

The following items are included in the Fibre Channel SAN Switch 8-EL package (see Figure 2–1).
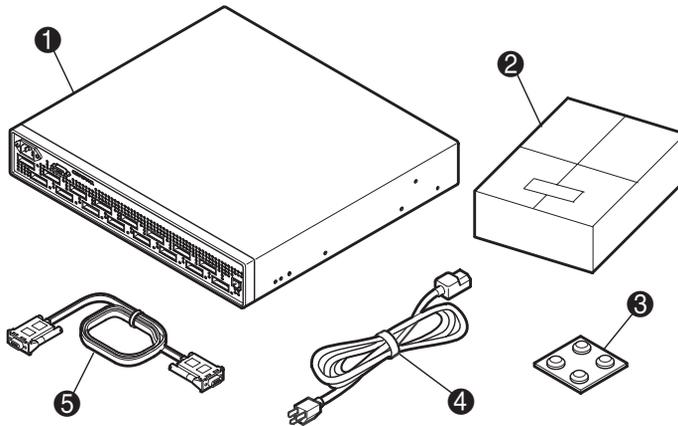
❶	8-Port Fibre Channel Switch	❹	AC power cord
❷	Software and documentation package	❺	Serial cable
❸	Set of 4 rubber feet		

Figure 2–1: Package contents

Selecting an Operating Location

The Fibre Channel SAN Switch 8-EL should be located in a secure or limited-access area to ensure that cable connections are not compromised. The switch must meet the cooling air requirements and power requirements described in the following sections.

Cooling Requirements

Cooling air is drawn into the switch chassis by the three fans mounted on the rear of the chassis. Exhausted air is expelled through vents at the front of the chassis.

> ⚠ **CAUTION:** Do not block the front or rear air vents. The switch uses ambient air for cooling.

Power Requirements

The AC power cord is connected to the switch connector on the left side of the front panel. The AC power source must meet these requirements:

- A properly wired, earth-grounded AC outlet

- Voltage capability of 85-264 VAC

- Input voltage frequency of 47-63 Hz

- Power capability of 75 W, maximum

The switch has a universal power supply capable of functioning worldwide without voltage jumpers or switches. The power supply module is autoranging in terms of accommodating input voltages and line frequencies.

Selecting a Switch Mounting Method

The switch can be placed on a flat surface, such as a tabletop, or mounted in an optional, standard, 19-inch equipment rack with an optional rack mounting kit, part number 167365-B21.

Surface Mounting

To operate the switch on a surface, place the four rubber feet, provided in the package contents, on the bottom surface of the switch.

Rack Mounting

You can install the switch in a RETMA 41U or 42U rack, in a Compaq rack, or in a metric SW600 rack. Refer to the documentation that came in your optional rack-mounting option kit for more information.

Installing a GBIC Module

GBIC-SW Module

The GBIC-SW module with the subscriber connector (SC) color-coded black is based on short wavelength, 850-mm lasers supporting 1.0625 GB/s link speeds. The GBIC-SW module supports 50-micron, multi-mode, fiber-optic cables in lengths up to 500 meters. The GBIC-SW module uses a Class 1 laser, which complies with the 21 CFR, subpart (J) standard as of the date of manufacture. The GBIC-SW module is shipped with a protective plug that should remain in place when no fibre-optic cable is connected to the port.

GBIC modules for the Fibre Channel SAN Switch 8-EL must be ordered separately. The Compaq part number for the shortwave optical GBIC module for multi-mode cable is 380561-B21.

GBIC-LW Module

The GBIC-LW module with the SC color-coded blue is based on long wavelength, 1300-mm lasers supporting 1.0625 GB/s link speeds. The GBIC-LW module supports 9-micron, single-mode, fibre-optic cables in lengths up to 10 kilometers. The GBIC-LW module is shipped with a protective plug that should remain in place when no fibre-optic cable is connected to the port.

Two single-mode GBIC modules and a short single-mode test cable can be ordered in a kit (part number 340412-B21).

In the Switch Management Application page of the Web Management Tools, the GBICs are identified differently depending on the type of GBIC and the supplier. Some examples of the displays include "ID" for VIXEL shortwave GBICs, and "SW" for IBM shortwave GBICs.

The switch can accommodate one GBIC module. A GBIC module is hot-pluggable.

To install a GBIC module:

> $\triangle$ **CAUTION:** The GBIC modules contain static-sensitive components. Use Electrostatic Discharge (ESD) precautions while handling GBIC modules.

1. Insert a GBIC module into the Fibre Channel port on the right side of the front panel. The module is keyed and can only be inserted one way.

> ⚠ **CAUTION:** Do not force the GBIC module into a port if you feel resistance.

2. Fully insert the GBIC module until it is properly seated in the Fibre Channel port. If you are using a GBIC module with a locking bar, lock the modules into place with the locking bar. For other GBIC modules, the latch prongs automatically lock to prevent accidental removal of the GBIC module.

3. Insert a protective plug over the GBIC module's fiber-optic connectors.

Cable Specifications

All cables connect at the front of the switch. Recommended cabling supports the switch's 1.0625 gigabits per second (Gb/s) transfer rate.

Fibre Channel Cables

Optical cables for the switch must be ordered separately. Cables of 500 meters or less should be multi-mode Fibre Channel cables. Cables that are longer than 500 meters should be single-mode. Multi-mode optical cables are connected to the shortwave GBIC module in the switch. Single-mode optical cables are connected to the longwave GBIC module in the switch. Multi-mode cables should use 50/125 optical fibers, SC Duplex connectors with a PC finish. Use of 62.5/125 should be restricted to situations where 62.5/125 optical fiber was previously installed and the link lengths are to be kept shorter than 200 meters. Single-mode cables typically use 9/125 optical fibers for distances up to 10 km.

Table 2–1 lists the cabling specifications for Fibre Channel cables.

<p align="center">**Table 2–1: Fibre Channel Cabling Specifications**</p>

Cable Type	Cable Specifications	Maximum Length	GBIC Module
Shortwave Fibre-Optic	■ Duplex SC plug connectors ■ Multi-mode fiber ■ 50 μm core diameter ■ 125 μm cladding diameter duplex cable	1641-ft (500 m)	780-860 μm without open fiber control (non-OFC)
Longwave Fibre-Optic	■ Duplex SC plug connectors ■ Single-mode fiber ■ 9 μm core diameter ■ 125 μm cladding diameter duplex cable	84,480-ft (10 km)	1270-1350 μm without open fiber control (non-OFC)

Serial Cable

The serial cable is provided with the switch. To order a serial cable through your Compaq sales representative or authorized reseller, use part number 230436-B21. (this replaces 188851-B21).

> **IMPORTANT:** Keep the serial cable in a safe location. If it is lost, you can order another cable through your Compaq authorized reseller.

Power Supply

The switch does not have a power switch. When the power cord is connected to the switch, the switch is powered up.

The Fibre Channel SAN Switch 8-EL meets IEC 61000-4-5 surge voltage requirements; however, there is no other surge protection built into the AC module.

Connecting the Serial Port and Ethernet Ports

The switch has a serial port connection and an Ethernet connection for initial configuration and remote monitoring and testing.

Connecting the Serial Cable

The switch has a serial port for initial configuration of the IP address and for service recovery. Do not use the serial port during normal operation or for regular maintenance. After initial setup, remove the serial port cable and, using the dust cover supplied with the switch, cover the serial port connection during normal switch operation.

The following are the settings for the serial port:

■ 8-bit

■ No parity

■ One-stop bit

■ 9600 baud

■ No flow control

Table 2–2 lists the signal and description of the pinouts.

Table 2–2: Serial Port Pinouts

Pin	Signal	Description
2	TxData	Transmit Data
3	RxData	Receive Data
5	GND	Logic

Connecting the Ethernet

To gain access to the internal SNMP agent in the switch, and for remote Telnet and Web access, connect to an existing Ethernet 10/100Base-T LAN through the front panel RJ-45 connector. This connection works for SNMP, Telnet, and Web access, and can be used for remote monitoring and testing.

Fibre Channel SAN Switch 8-EL Connected to a Storage System

Figure 2–2 shows a configuration of a single Fibre Channel SAN Switch 8-EL connected to a storage system. The system is configured for dual-redundant operation.

❶	Fibre Channel SAN Switch 8-EL	❸	Fibre Channel host adapter
❷	Compaq storage subsystem	❹	Rack-mounted Compaq servers
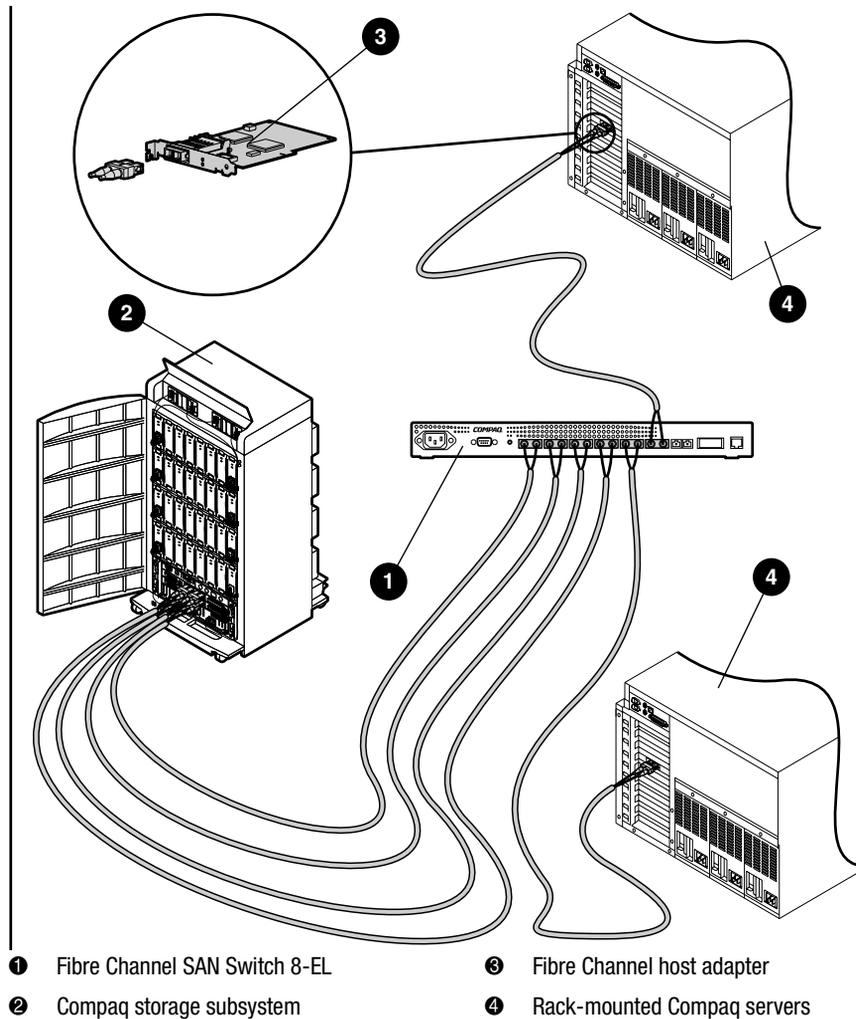
Figure 2–2: Fibre Channel SAN Switch 8-EL connected to a storage system

Installing a Single Fibre Channel SAN Switch 8-EL

To install a single Switch, perform the following steps:

1. Install a Fibre Channel adapter in each server, following the procedure outlined in your adapter documentation.

2. Connect one Fibre Channel cable to each adapter.

3. Connect up to four Fibre Channel cables to the storage system.

4. Connect the free ends of the Fibre Channel cables from the storage system and servers to the Fibre Channel ports on the switch's front panel.

5. Connect the power cord to the AC connector on the switch. The switch performs a Power-On Self-Test (POST), which can take approximately 2.5 minutes.

6. If a malfunction occurs during POST, error messages are written to the switch error log and can be viewed using a Telnet or terminal session when the POST session completes.

7. If the malfunction prohibits the switch from completing the start process (fatal error), the switch stops the start process. If the switch does not fully start, the switch prompt will not be displayed when the serial port is connected.

   NOTE: If a switch boot failure occurs, the switch must be taken offline for repair or replacement. Contact your switch supplier for assistance.

8. The factory set IP address is: 10.77.77.77, and the class C Subnet Mask is: 255.255.255.0.

   a. If the factory set IP address is compatible with your network, connect the Ethernet.

   b. If the factory set IP address is not compatible with your network, follow the procedures outlined in Chapter 3, "Setting up the Fibre Channel SAN Switch 8-EL," to make a serial connection through a workstation and to set the IP address.

9. Monitor the status indicators for port status. See the "Status Indicators" section in Chapter 3, for descriptions of the indicators.

Installing Multiple Switches into an Existing SAN

To install multiple Switches, perform the following steps:

1. Connect the appropriate components as outlined in the "Installing a Single Fibre Channel SAN Switch 8-EL" section.

2. Connect the serial cable, provided in the kit, between a host computer and the serial port of the switch. See Chapter 3, "Setting up the Fibre Channel SAN Switch 8-EL," to make a serial connection through a workstation and to set the IP address.

3. Connect the power cord to the AC connector on the switch. The switch performs POST, which can take approximately 2.5 minutes.

4. If a malfunction occurs during POST, error messages are written to the switch error log and can be viewed by a Telnet or terminal session when the POST session completes.

5. If the malfunction prohibits the switch from completing the start process (fatal error), the switch stops the start process. If the switch does not fully start, the switch prompt will not be displayed when the serial port is connected.

   NOTE: If a switch boot failure occurs, the switch must be taken offline for repair or replacement. Contact Compaq Technical Support for assistance.

6. Power down the new switch and connect the Fibre Channel cables from the SAN to the new switch.

Cascading Switches

The switch supports cascading of up to seven hops.

> **NOTE:** To determine the number of configurations currently supported in a SAN, go to the Compaq Website at:
> http://www.compaq.com/products/storageworks/san/enterprise-san.html.

The Domain ID number uniquely identifies a switch in a fabric. The switch automatically assigns the Domain ID when a switch is first powered on or when the switch disable/enable command is executed. When two switches are cascaded together, there might be an initial Domain ID conflict if the switches were assigned the same Domain ID prior to being cascaded. This can be avoided by changing the Domain ID with the configure command, by disabling and enabling one of the switches, or rebooting one of the switches. Refer to the Compaq *StorageWorks Fibre Channel SAN Switch Management Guide* for more information.

> **NOTE:** Switch parameters for all switches in a SAN must be the same, or the switch may not join the SAN.

Chapter 3

Setting up the Fibre Channel SAN Switch 8-EL

This chapter covers the following topics:

- Making a Serial Connection
- Saving and Restoring Switch Configuration Settings
- Status Indicators

Making a Serial Connection

Use the serial connection on the Fibre Channel SAN Switch 8-EL to verify Power-On Self Test (POST), view and change the IP address of the switch, and reset the switch to factory default values.

To make a serial connection, connect the serial cable that is provided in the kit, part number 230436-B21 (which replaces 188851-B21), to the Fibre Channel SAN Switch 8-EL serial port, and to a COM port on a workstation.

> **NOTE:** The serial port is only used for initial POST verification, initial IP address configuration, and recovery of factory (default) settings.

Connecting Through a Workstation

To execute initial switch operations through a workstation connected to the serial port on the Fibre Channel SAN Switch 8-EL:

1. On the workstation, launch a terminal emulation program.

> **NOTE:** HyperTerminal is the remote communication program provided with Windows 95, Windows 98, Windows 2000 or Windows NT, and can be found on the Accessories menu that displays when you click Start, then Programs.

2. Follow the prompts in the communication program. Be sure to connect using the COM port you used to connect the workstation to the switch.

   The following are settings for the serial port:

   - 8-bit
   - No parity
   - One stop bit
   - 9600 baud
   - No flow control

3. Press the **Enter** key to display the remote communication prompt.

Setting the IP Address

To enable a connection to a Fibre Channel SAN Switch 8-EL, the switch must have a valid IP address. You can set two IP addresses: one for the external out-of-band Ethernet port, and one for in-band Fibre Channel network (IP) access.

A default Ethernet IP address of 10.77.77.77 and a default Fibre Channel network IP address of 255.255.255.0 are preinstalled on the switch. Use the default address for the external Ethernet connection to the network, then change the address with a Telnet command.

You might need to set a compatible network address before you can connect the switch to the network. In this case, set the address using the front panel RS-232 serial connection.

To set the IP address through the serial port:

1. After connecting to the switch through a workstation, enter the user ID:

   admin
   password: password

   The following prompt confirms the connection:

   switchName:userName>

2. At the prompt, enter the Telnet command ipAddrSet. You are prompted for the following:

   Ethernet IP Address [current address shown]: [enter new address if needed]

   Ethernet Subnetmask [current]: [enter new subnet mask if needed]

   Fibre Channel IP Address [current]: [enter new address if needed]

   Fibre Channel Subnetmask [current]: [enter new subnet mask if needed]

   Gateway Address [current]: [enter new address if needed]

3. After you enter the values, disconnect the serial cable and store it in a secure location.

4. Access the switch through the network connection. You can manage the switch using Telnet commands or Web Management Tools.

5. For detailed information on the ipAddrSet command and managing your switch, see the Compaq *StorageWorks Fibre Channel SAN Switch Management Guide*.

6. Write the IP address on the label on the front panel of the switch.

Resetting Factory Defaults

NOTE: See Appendix C, "Specifications," for a list of factory default settings.

If you change a password and forget it, the password can be reset to the factory default.

To revert to factory default values:

1. Power down the switch by unplugging the power cord.

2. Connect the serial cable from the host serial port to the switch serial port.

3. Power up the switch by plugging in the power cord.

4. Establish a connection between the host and the switch using a terminal emulation program such as HyperTerminal.

5. From the host, log in to the switch.

6. When prompted, enter the user ID:

   admin
   password: password

7. Enter the Telnet command configDefault to reset usernames and passwords.

8. For more information on Telnet commands, refer to the Compaq *StorageWorks Fibre Channel SAN Switch Management Guide*.

> △ **CAUTION:** The configDefault command resets the password as well as many other switch parameters. Be sure you understand the effects of this command before you issue it.

NOTE: The configDefault command does not affect the SNMP agent configuration.

9. Close the terminal emulation program, disconnect the serial cable from the workstation and the switch, and cover the serial port.

Saving and Restoring Switch Configuration Settings

NOTE: See Appendix C, "Specifications," for a list of factory default settings.

Configuration settings can be lost upon switch failure. It is recommended that you save your switch configuration settings using the configUpload Telnet command. To restore your saved configuration settings, use the configDownload Telnet command.

configUpload

This command saves the switch configuration to a host file. The upload process uses either FTP (File Transfer Protocol) or the RSHD protocol (TCP service 514). Both of these services are widely available on Unix hosts, but less so on Microsoft Windows hosts.

On Windows NT, the FTP server may have to be installed from the distribution media and enabled, or on Windows NT or Windows 9x there are several good freeware and shareware FTP servers available.

The two utilities supplied for RSHD, *RSHD.EXE* and *CAT.EXE*, currently do not support uploads, only downloads. Therefore, in a Windows environment, FTP must be used and the FTP server must be running before an upload can occur.

The command may be invoked without any parameters, in which case the user is prompted for input, including choice of FTP or RSHD. If invoked with three parameters, RSHD is used; otherwise, the presence of the fourth parameter (FTP password) selects FTP.

Figure 3–1 shows a generic example of the configUpload command.

```
switch:admin>configUpload

Server Name or IP Address [host]:

IP Address for Server:

User Name [user]:

File Name [config.txt]:

Protocol (RSHD or FTP) [rshd]:
```

Figure 3–1: configUpload command example 1

If the upload fails, it is for one of the following reasons:

■ The switch does not recognize the host name.

■ The host IP address can not be contacted.

■ The user does not have permission on the host.

■ The user runs a script that prints something at login.

■ The RSHD or FTP server is not running on the host.

Table 3-1 shows a configuration file that contains two types of lines, comments and name:
value pairs. Comments are written with ([ ) as the first character of the line (when read
back using configDownload, a line beginning with any punctuation character is treated as a
comment).

Table 3–1: Syntax of a Name:Value Pair

Name	Value Pair
line	whitespace name whitespace ":" whitespace value
name	component {"." component}
whitespace	{" " | " "}
component	{"a"-"z" | "A"-"Z" | "0"-"9" | "_" | "-"}
value	{<any character not including "

NOTE: Elements enclosed in curly braces ({...}) indicate zero or more occurrences of the
enclosed elements.

The configuration file is written as three sections. The first section contains the switch
boot parameters (otherwise known as the switch's identity). It has variables such as the
switch's name and IP address. This section corresponds to the first few lines of output of
the configShow command.

The second section contains general switch configuration variables, such as diagnostic settings, fabric configuration settings, and SNMP settings. This section corresponds to the output of the configShow command (after the first few lines), although there are more lines uploaded than shown by the command.

The third section contains the zoning configuration. It corresponds to the output of the cfgShow command.

Parameters

■ host—A host name or IP address in quotes, for example, "citadel" or "192.168.1.48." The configuration file is uploaded to this host.

■ user—A user name in quotes, for example, "jdoe." This user name is used to gain access to the host.

■ file—A file name in quotes; for example, "config.txt." Absolute path names may be specified using forward slash (/). Relative path names create the file in the user's home directory on UNIX hosts, and in the directory where the FTP server is running on Windows hosts.

■ passwd—If present, selects FTP.

Figure 3–2 shows an example of the configUpload command.

```
switch:admin>configUpload
"citadel","jdoe","config.txt","passwd"
upload complete
```

Figure 3–2: configUpload command example 2

configDownload

The download process uses either FTP or the RSHD protocol (TCP service 514) to download a previously saved configuration file from a host system into the switch. Both of these services are widely available on Unix hosts, but less so on Windows hosts. See the Telnet configUpload command section for a description of the configuration file format.

On Windows NT, the FTP server may have to be installed from the distribution media and enabled. There are several good freeware and shareware FTP servers available for Windows NT, Windows 9x, and Windows 2000.

To use RSHD on Windows NT, Windows 9x, or Windows 2000, two utilities are supplied *RSHD.EXE* and *CAT.EXE* with instruction on how to install and run them. The FTP server or RSHD must be running before a download can occur.

The command may be invoked without any parameters, in which case you are prompted for input, including choice or FTP of RSHD. If invoked with three parameters, RSHD is used; otherwise, presence of the fourth parameter (FTP password) selects FTP.

Figure 3–3 shows a generic example of the configDownload command.

```
switch:admin>configDownload
Server Name or IP Address [host]:
IP Address for Server:
IP Address for Server:
IP Address for Server:
User Name [user]:
File Name [config.txt]:
Protocol (RSHD or FTP) [rshd]:
```

Figure 3–3: configDownload command example 1

If the download fails, it is for one of the following reasons:

■ The switch does not recognize the host name.

■ The host IP address can not be contacted.

■ The user does not have permission on the host.

■ The user runs a script that prints something at login.

■ The file does not exist on the host.

■ The file is not a switch configuration file.

■ The RSHD or FTP server is not running on the host.

■ The configuration data contains errors.

> **NOTE:** The switch's identity cannot be changed by the configDownload command. Parameters such as the switch's name and IP address are ignored. They are the lines in the configuration file, which begin "boot."

> **NOTE:** A licenseKey is only accepted if the boot.mac line matches the WorldWide Name of the switch performing the download, otherwise it is ignored.

The download process is additive; for example, the lines read from the file are added to the current switch configuration. It is therefore possible to change a single configuration variable by downloading a file with a single line. All other variables remain unchanged.

This is particularly important to understand when downloading a zoning configuration. Since the new zoning information is added to the current configuration, there may not be any conflicts. If the current zoning configuration is to be replaced, then the key word "clear:" may be inserted into the configuration file immediately before the zoning lines.

Parameters

- host—A host name or IP address in quotes, for example "citadel" or "192.168.1.48." The configuration file is downloaded from this host.

- user—A user name in quotes; for example, "jdoe." This user name is used to gain access to the host.

- file—A file name in quotes, for example "config.txt." Absolute path names may be specified using a forward slash (/). Relative path names look for the file in the user's home directory on UNIX hosts, and in the directory where the FTP or RSHD server is running on Windows hosts.

- passwd—If present, selects FTP.

Figure 3–4 shows an example of the configDownload command.

```
switch:admin>configDownload
"citadel","jdoe","config.txt"
Committing configuration…done.
download complete
```

Figure 3–4: configDownload command example 2

Status Indicators

Each port contains an indicator that shows the status for that port. Table 3–2 contains descriptions of the port status indicators.

Table 3–2: Port Status Indicators

Indicators	Description
No light showing	No light or signal carrier (no module, no cable) for media interface indicators.
Steady yellow	Receiving light or signal carrier, but not online yet.
Slow yellow	Disabled (result of diagnostics or port Disable command). Flashes every 2 seconds.
Fast yellow	Error or fault with port. Flashes every half-second.
Steady green	Online (connected with device over cable).
Slow green	Online but segmented (loopback cable or incompatible switch). Flashes every 2 seconds
Fast green	Internal loopback (diagnostic). Flashes every half-second.
Flickering green	Online and frames flowing through port.
Interleaving green and yellow	Port is bypassed.

The AC module contains an indicator that shows its status. Table 3–3 contains descriptions of the AC module status indicators.

Table 3–3: AC Module Status Indicators

Indicators	Description
No light showing	No power is being supplied to the switch. Check that the power cord is connected to the switch.
Steady green	Receiving power. Switch is online.

Chapter 4

Diagnostics

This chapters covers the following topics:

■ Overview of diagnostic tests

■ Commands

■ Diagnostic Error Messages

Overview

The Fibre Channel SAN Switch 8-EL is designed for maintenance-free operation. The switch's self-diagnostic capabilities aid in isolating equipment or fabric failures. You can perform diagnostics when using a Telnet session.

Isolating a System Fault

Various loopback paths are built into the switch hardware for diagnostic purposes. A loopback path test within the switch verifies the proper internal Fibre Channel port logic functions and the paths between interfaces and central memory. The switch diagnostics also support external loops, which include the motherboard and GBIC modules in cross-port configurations. These port-to-port diagnostics let you check for installed fiber cables and isolate port faults.

Rebooting or Removing Power

Error messages are stored in RAM and are lost when the switch is restarted or power is removed from the switch. Before restarting or removing power from the switch, view the error log messages. You can view the error log by using either the errShow or errDump command. When all data-transferring processes external to the switch are complete, you can remove power from the switch without disrupting the fabric.

Refer to the Compaq *StorageWorks Fibre Channel SAN Switch Management Guide* for more information on these Telnet commands.

Power-On Self Test (POST)

Table 4–1 lists the diagnostic tests automatically run during the POST.

Table 4–1: POST Tests

Test Type	Description	Test Name
Memory test	Checks processor RAM memory	ramTest
Port Register test	Checks the Application Specific Integrated Circuit (ASIC) registers and SRAMs	portRegTest
Central Memory test	Checks the motherboard SRAMs	centralMemoryTest
Control Message Interface (CMI) Conn test	Checks the CMI bus between ASICs	cmiTest
Content-Addressable Memories (CAM) test	Checks the CAM	camTest
Port Loopback test	Checks all of the switch's hardware (frames are transmitted, looped back, and received)	portLoopbackTest

NOTE: POST execution after a cold boot executes the long version of ramTest, while POST execution after a warm boot executes a shorter version of ramTest. A switch rebooted with POST disabled generates the DIAG-POST_SKIPPED error log message.

Commands

The following tests are available from the switch's local Telnet port:

- Memory test (ramTest)
- Port Register test (portRegTest)
- Central Memory test (centralMemoryTest)
- CMI Conn test (cmiTest)
- CAM test (camTest)
- Port Loopback test (portLoopbackTest)
- SRAM Data Retention test (sramRetentionTest)
- CMEM Data Retention test (cmemRetentionTest)
- Cross Port test (crossPortTest)
- Spin Silk test (spinSilk)

Table 4–2 shows the Offline and Online tests.

Table 4–2: Offline and Online Tests

Offline Tests	Offline and Online Tests
portRegTest	ramTest
centralMemoryTest	crossPortTest
cmiTest	
sramRetentionTest	
cmemRetentionTest	
camTest	
portLoopbackTest	
spinSilk	

ramTest

Figure 4–1 shows the ramTest command, which checks processor RAM. This test validates proper memory function.

```
switch:admin> ramTest
Running System DRAM Test ...... passed.
```

Figure 4–1: ramTest command example

> **NOTE:** Related error messages are DIAG-MEMORY, DIAG-MEMSZ, and DIAG-MEMNULL

portRegTest

Figure 4–2 shows the portRegTest command, which check registers and static memory located on the motherboard. Registers are set under firmware control and are used to control the hardware route selection and other internal hardware functions. This test verifies that all registers are accessible.

> **IMPORTANT:** This test cannot be executed on an operational switch. Before issuing the portRegTest command, disable the switch using the switchDisable command.

```
switch:admin> portRegTest
Running Port Register Test .... passed.
```

Figure 4–2: portRegTest command example

> **NOTE:** Related error messages are DIAG-REGERR, DIAG-REGERR_UNRST, and DIAG-BUS_TIMEOUT

centralMemoryTest

Figure 4–3 shows the centralMemoryTest command, which checks the central memory in each ASIC. This test ensures that:

- The built-in, self-repair (BISR) circuit in each ASIC chip does not report failure to repair bad cells (bisr test).

- The data cells can be written uniquely and read correctly (data write/read test).

- The data in any one ASIC can be read from any other ASIC (asic-asic test).

■ Bad parity can be detected and flagged in the error register and an interrupt can be posted (parity error test).

■ Buffer number error can be detected and flagged in the error register and an interrupt can be posted (buffer number error test).

■ Chip number error can be detected and flagged in the error register and an interrupt can be posted (chip number error test).

IMPORTANT: This test cannot be executed on an operational switch. Before issuing the `centralMemoryTest` command, disable the switch using the `switchDisable` command.

---

switch:admin> centralMemoryTest

Running Central Memory Test ... passed.

Figure 4–3: centralMemoryTest command example

NOTE: Related error messages are DIAG-CMBISTRO, DIAG-CMBISRF, DIAG-LCMTO, DIAG-LCMRS, DIAG-LCMEM, DIAG-LCMEMTX, DIAG-CMNOBUF, DIAG-CMERRTYPE, DIAG-CMERRPTN, DIAG-PORTABSENT, DIAG-BADINIT, and DIAG-TIMEOUT

cmiTest

Figure 4–4 shows the cmiTest command, which verifies that control messages can be sent correctly from any ASIC to any other ASIC. This command also executes the checksum test.

IMPORTANT: This test cannot be executed on an operational switch. Before issuing the cmiTest command, disable the switch using the switchDisable command.

---

switch:admin> cmiTest

Running CMI Test .... passed.

Figure 4–4: cmiTest command example

NOTE: Related error messages are DIAG-BADINIT, DIAG-INTNIL, DIAG-CMISA1, DIAG-CMINOCAP, DIAG-CMIINVCAP, DIAG-CMIDATA, and DIAG-CMICKSUM

camTest

Figure 4–5 shows the camTest command. This command verifies that the Source Identifier (SID) translation required by QuickLoop, and implemented using CAMs, is functioning correctly.

IMPORTANT: This test cannot be executed on an operational switch. Before issuing the camTest command, disable the switch using the switchDisable command.

> switch:admin> camTest
>
> Running CAM Test .... passed.

Figure 4–5: camTest command example

NOTE: Related error messages are DIAG-CAMINIT, DIAG-CAMSID, and DIAG-XMIT.

portLoopbackTest

Figure 4–6 shows the portLoopbackTest command. This command verifies the intended function of the switch by sending frames from each port's transmitter back to the same port's receiver through an internal hardware loopback. This command tests the switch circuitry up to the serial output of the ASIC. The command syntax is portLoopbackTest nFrames.

IMPORTANT: This test cannot be executed on an operational switch. Before issuing the portLoopbackTest command, disable the switch using the switchDisable command.

NOTE: If you do not include the nFrames parameter, the loopback test runs continuously until you press **Enter**.

```
switch:admin> portLoopbackTest

Running Port Loopback Test ....

Diags: (Q)uit, (C)ontinue, (S)tats, (L)og: s

Diagnostics Status: Sun Jan 1 00:00:00 2000

port#:  0  1  2  3  4  5  6  7

diags: OK OK OK OK OK OK OK OK

state: UP UP UP UP UP UP UP UP

lm0: 4654 frTx 4654 frRx 0 LLI_errs.

lm1: 4654 frTx 4654 frRx 0 LLI_errs.

lm2: 4654 frTx 4654 frRx 0 LLI_errs.

lm3: 4654 frTx 4654 frRx 0 LLI_errs.

lm4: 4654 frTx 4654 frRx 0 LLI_errs.

lm5: 4654 frTx 4654 frRx 0 LLI_errs.

lm6: 4654 frTx 4654 frRx 0 LLI_errs.

lm7: 4654 frTx 4654 frRx 0 LLI_errs.

Central Memory OK

Total Diag Frames Tx: 38032

Total Diag Frames Rx: 39232

Diags: (Q)uit, (C)ontinue, (S)tats, (L)og: q

  aborted
```

Figure 4–6: portLoopbackTest command example

If the test does not find an error, there is no output. You can choose to continue the test, view statistics, or view an error log. Table 4–3 describes the loopback error message fields.

Table 4–3: portLoopbackTest Command Field Description

Field	Description
Diagnostics Status	The title header displays the time diagShow was executed.
port#	The port number.
diags	The port's current diagnostic status. Possible values include OK or BAD.
state	The port's current state. Possible values include UP (active) or DN (inactive).

Table 4–3: portLoopbackTest Command Field Description (Continued)

Field	Description
lm0-7 (8-port) lm0-15 (16-port)	The frame counts of active ports. The display shows the number of frames transmitted and received, and low-level interface counts (LLI_errs).
Central Memory Status	Central memory status. Possible values include OK or FAULTY.
Total Diag Frames Tx	The total diagnostics frames transmitted (Tx) since boot. This number usually corresponds to the total frames received (Rx) but can differ because of failure modes.
Total Diag Frames Rx	The total diagnostics frames received (Rx) since boot. This number usually corresponds to the total frames transmitted (Tx) but can differ because of failure modes.

NOTE: Related error messages are DIAG-INIT, DIAG-PORTDIED, DIAG-XMIT, DIAG-TIMEOUT, DIAG-ERRSTAT, DIAG-STATS, DIAG-DATA, and DIAG-PORTABSENT

sramRetentionTest

Figure 4–7 shows the sramRetentionTest command. This command which verifies that data written into the ASIC memories are retained, and that data bits do not decrease when read after a delay since the write.

> **IMPORTANT:** This test cannot be executed on an operational switch. Before issuing the sramRetentionTest command, disable the switch using the switchDisable command.

```
switch:admin> sramRetentionTest

Running SRAM Retention Test ... passed.
```

Figure 4–7: sramRetentionTest command example

NOTE: Related error messages are DIAG-REGERR, DIAG-REGERR_UNRST, and DIAG-BUS_TIMEOUT

cmemRetentionTest

Figure 4–8 shows the cmemRetentionTest command. This command verifies that data written into the SRAMs that make up the central memory is retained, and that data bits do not decrease when read after a delay since the write.

IMPORTANT: This test cannot be executed on an operational switch. Before issuing the cmemRetentionTest command, disable the switch using the switchDisable command.

```
switch:admin> cmemRetentionTest
Running cmemRetention Test .. passed.
```

Figure 4–8: memRetentionTest command example

NOTE: Related error messages are DIAG-LCMEM, DIAG-LCMRS, and DIAG-LCMTO.

crossPortTest

Figure 4–9 shows the crossPortTest command, which verifies the intended function of the switch. Each port's transmitter sends frames by means of the GBIC module and external cable to another port's receiver. This test uses the entire path of the switch.

You can connect any port to any other port in the same switch provided the connection is of the same technology; for example, GBIC-SW ports to GBIC-SW ports, and GBIC-LW ports to GBIC-LW ports.

IMPORTANT: All ports on the switch must be connected if the GBIC mode is disabled or if the switch shows an error condition. When running the CrossPortTest, set the operating mode value to 0 or 1.

```
switch:admin> crossPortTest
Running Cross Port Test ...........
switchName: JR-6011
switchType: 3.1
switchState: Testing
switchRole: Disabled
switchDomain: 1 (unconfirmed)
switchId: fffc01
switchWwn: 10:00:00:60:69:00:60:11
port 0: sw Testing Loopback->1
port 1: sw Testing Loopback->0
port 2: sw Testing Loopback->7
port 3: sw Testing Loopback->6
port 4: sw Testing Loopback->5
port 5: sw Testing Loopback->4
port 6: sw Testing Loopback->3
port 7: sw Testing Loopback->2
Port SNMPPhysicalFlags
-------------------------------
0: TestingIn_Sync PRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED CBL_LB
LOGIN
1: TestingIn_SyncPRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED CBL_LB
LOGIN
2: TestingIn_SyncPRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED CBL_LB
LOGIN
3: TestingIn_SyncPRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED CBL_LB
LOGIN
4: TestingIn_SyncPRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED CBL_LB
LOGIN
5: Testing In_SyncPRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED CBL_LB
LOGIN
6: TestingIn_SyncPRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED CBL_LB
LOGIN
7: TestingIn_SyncPRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED CBL_LB
LOGIN
```

Figure 4–9: crossPortTest command example

> **NOTE:** Related error messages are DIAG-INIT, DIAG-PORTDIED, DIAG-XMIT, DIAG-TIMEOUT, DIAG-ERRSTAT, DIAG-STATS, DIAG-PORTWRONG, DIAG-DATA, and DIAG-PORTABSENT

crossPortTest Modes

The Cross Port Test behaves differently according to the activated modes.

switchEnabled or switchDisabled mode

Need at least 1 port(s) connected to run this test.

■ **ONLINE** mode (switch enabled before executing the test)—In the ONLINE mode, only ports cable loopbacked to ports in the same switch are tested. The test ignores ports connected outside of the switch. To be successful, the test must find at least one port (if the singlePortAlso mode is active) or two ports (if the singlePortAlso mode is not active) cable loopbacked to each other. If not, the test displays the following message:

OR

Need at least 2 port(s) cross-connected to run this test.

■ **OFFLINE** mode (switch disabled before executing the test)—In the OFFLINE mode, all ports cable loopbacked to similar ports in the same switch are tested. The test aborts if one or more ports are not connected. If any pair of ports is improperly connected (improperly seated GBIC modules or cables, bad GBIC modules or cables, improper connection of SW to LW, and so on), the following message displays:

One or more ports is not active, please doublecheck fibers on all ports.

singlePortAlso mode

Specify the singlePortAlso mode by executing the CrossPortTest with a second argument value of one:

    sw:admin> crossPortTest 0, 1

In this mode, the Cross Port test allows a port to be cable loopbacked to itself (port M is connected to port M), in addition to the supported cross connection (port M is connected to port N). This configuration can be used to isolate bad ports.

GBIC mode

Activate the GBIC mode by executing the following command before executing the Cross Port test:

sw:admin> setGbicMode 1

When activated, only ports with GBIC modules are tested. The state of the GBIC mode is activated until it is disabled as follows:

sw:admin> setGbicMode 0

An example mode of operation would be to disable the switch, set the GBIC mode to 1, and execute the Cross Port test with singlePortAlso mode activated to limit testing to:

■ Ports with GBIC modules installed

■ Ports properly cable loopbacked

■ Ports connected to themselves (single port connections)

The command syntax is

crossPortTest <nFrames>, <0 or 1>

where <nFrames> determines the number of frames to run, and <0 or 1> determines if a single port connection is allowed (0=not allowed, 1=allowed). If you do not include the <nFrames> parameter, the test runs until you press **Enter**.

spinSilk

Figure 4–10 shows the spinSilk command, which verifies the intended function of the switch. Each port's transmitter sends frames by means of the GBIC module and external cable, to another port's receiver at full hardware speed (1 GB/s). The entire path of the switch is exercised. Because the processor does not compare data on each frame, the Spin Silk test does not report the DIAG-DATA error. Other error messages defined for the Cross Port test and the corresponding probable causes and actions are applicable to the Spin Silk test.

The state of the GBIC mode affects the operation of the Spin Silk test. To activate the GBIC mode, execute the following command prior to executing the crossPortTest command:

switch:admin> setGbicMode 1

When activated, only ports with GBIC modules installed are included in the Spin Silk test's list of ports to test. For example, if only ports 0 and 3 have GBIC modules installed and the GBIC mode is activated, the Spin Silk test limits testing to ports 0 and 3. The state of the GBIC mode is saved in flash memory. The GBIC mode stays activated (even after reboots or power cycles) until you disable it with the following command:

sw:admin> setGbicMode 0

An example mode of operation would be to disable the switch, set the GBIC mode to 1, and execute the Spin Silk test to limit testing to:

■ Ports with GBIC modules installed

■ Ports that are properly cable loopbacked

> **IMPORTANT:** This test cannot be executed on an operational switch. Before issuing the spinSilk command, disable the switch using the switchDisable command.

> **NOTE:** When running the Spin Silk test, you must set the operating mode value to 0 or 1. Using operating mode 0 when running the Spin Silk test is recommended.

The command syntax is:

spinSilk nMillions

where nMillions is the number of frames for the test to execute expressed in millions of frames. If you do not include the nMillions parameter, the Spin Silk test runs until you press **Enter**.

spinSilk command example
switch:admin> spinSilk 2
Running Spin Silk ....
One moment please ...
switchName: SR-7371
switchType: 2.2
switchState: Testing
switchRole: Disabled
switchDomain: 1 (unconfirmed)
switchId: fffc01
switchWwn: 10:00:00:60:69:00:73:71
port 0: cu Testing Loopback->15
port 1: sw Testing Loopback->11
port 2: sw Testing Loopback->7
port 3: lw Testing Loopback->4
port 4: lw Testing Loopback->3
port 5: sw Testing Loopback->9
port 6: sw Testing Loopback->14
port 7: sw Testing Loopback->2
port 8: sw Testing Loopback->13
port 9: sw Testing Loopback->5
port 10: sw Testing Loopback->12
port 11: sw Testing Loopback->1
port 12: sw Testing Loopback->10
port 13: sw Testing Loopback->8
port 14: sw Testing Loopback->6
port 15: cu Testing Loopback->0
Transmitting ... done.
Spinning ...

spinSilk command example (Continued)
port 15 Rx/Tx 1 of 2 million frames.
port 0 Rx/Tx 1 of 2 million frames.
port 1 Rx/Tx 1 of 2 million frames.
port 2 Rx/Tx 1 of 2 million frames.
port 3 Rx/Tx 1 of 2 million frames.
port 4 Rx/Tx 1 of 2 million frames.
port 5 Rx/Tx 1 of 2 million frames.
port 6 Rx/Tx 1 of 2 million frames.
port 7 Rx/Tx 1 of 2 million frames.
port 8 Rx/Tx 1 of 2 million frames.
port 9 Rx/Tx 1 of 2 million frames.
port 10 Rx/Tx 1 of 2 million frames.
port 11 Rx/Tx 1 of 2 million frames.
port 12 Rx/Tx 1 of 2 million frames.
port 13 Rx/Tx 1 of 2 million frames.
port 14 Rx/Tx 1 of 2 million frames.
port 8 Rx/Tx 2 of 2 million frames.
port 9 Rx/Tx 2 of 2 million frames.
port 10 Rx/Tx 2 of 2 million frames.
port 11 Rx/Tx 2 of 2 million frames.
port 12 Rx/Tx 2 of 2 million frames.
port 13 Rx/Tx 2 of 2 million frames.
port 14 Rx/Tx 2 of 2 million frames.
port 15 Rx/Tx 2 of 2 million frames.
port 0 Rx/Tx 2 of 2 million frames.
port 1 Rx/Tx 2 of 2 million frames.
port 2 Rx/Tx 2 of 2 million frames.
port 3 Rx/Tx 2 of 2 million frames.
port 4 Rx/Tx 2 of 2 million frames.
port 5 Rx/Tx 2 of 2 million frames.
port 6 Rx/Tx 2 of 2 million frames.
port 7 Rx/Tx 2 of 2 million frames.)

spinSilk command example (Continued)
Diagnostics Status: Thu Jul 30 14:43:36 1998
port#: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
diags: OK OK OK OK OK OK OK OK OK OK OK OK OK OK OK
state: UP UP UP UP UP UP UP UP UP UP UP UP UP UP UP UP
lm0: 2044334 frTx 2053602 frRx 0 LLI_errs. <looped-15>
lm1: 2046987 frTx 2049307 frRx 0 LLI_errs. <looped-11>
lm2: 2046259 frTx 2050415 frRx 0 LLI_errs. <looped-7>
lm3: 2048907 frTx 2038532 frRx 0 LLI_errs. <looped-4>
lm4: 2038717 frTx 2049093 frRx 0 LLI_errs. <looped-3>
lm5: 2049555 frTx 2052277 frRx 0 LLI_errs. <looped-9>
lm6: 2048260 frTx 2047600 frRx 0 LLI_errs. <looped-14>
lm7: 2051407 frTx 2047246 frRx 0 LLI_errs. <looped-2>
lm8: 2055484 frTx 2048350 frRx 0 LLI_errs. <looped-13>
lm9: 2053018 frTx 2050297 frRx 0 LLI_errs. <looped-5>
lm10: 2048345 frTx 2048404 frRx 0 LLI_errs. <looped-12>
lm11: 2051282 frTx 2048962 frRx 0 LLI_errs. <looped-1>
lm12: 2048944 frTx 2048885 frRx 0 LLI_errs. <looped-10>
lm13: 2049535 frTx 2056672 frRx 0 LLI_errs. <looped-8>
lm14: 2049481 frTx 2050141 frRx 0 LLI_errs. <looped-6>
lm15: 2056950 frTx 2047666 frRx 0 LLI_errs. <looped-0>
Central Memory OK
Total Diag Frames Tx: 130432
Total Diag Frames Rx: 134752

Figure 4–10: spinSilk command example 1

NOTE: Related error messages are DIAG-INIT, DIAG-PORTDIED, DIAG-XMIT, DIAG-PORTSTOPPED, DIAG-ERRSTAT, DIAG-ERRSTATS, and DIAG-PORTABSENT

diagClearError

Figure 4–11 shows the diagClearError command, which clears diagnostic errors detected on a specified port. Issuing this command clears the port status but does not clear the error logs or change the port's condition. The command syntax is diagClearError <port #>. Without the <port #> parameter, all errors are cleared.

```
switch:admin> diagClearError
```

Figure 4–11: diagClearError command example

diagDisablePost

Figure 4–12 shows the diagDisablePost command, which disables POST processing. The boot time without POST processing is approximately 50 to 55 seconds. A switch restarted without POST generates the DIAG-POST_SKIPPED error.

> **NOTE:** Always execute POST processing to ensure the operational status of the switch.

```
switch:admin> diagDisablePost
Committing configuration...done.
On next reboot, POST will be skipped.
```

Figure 4–12: diagDisablePost command example

diagEnablePost

Figure 4–13 shows the diagEnablePost command, which enables POST processing. The start time with POST processing is approximately 110 to 120 seconds for warm POST, and 165 to 175 seconds for cold POST. POST processing is enabled by default.

```
switch:admin> diagEnablePost
Committing configuration...done.
On next reboot, POST will be executed.
```

Figure 4–13: diagEnablePost command example

setGbicMode

The GBIC mode, when enabled, forces the Cross Port test or the Spin Silk test to limit testing to only ports with detected GBIC modules. To enable GBIC mode, execute the setGbicMode 1 command.

```
switch:admin> setGbicMode 1
```

Figure 4–14: setGbicMode 1 command example

To disable GBIC mode, execute the setGbicMode 0 command.

```
switch:admin> setGbicMode 0
```

Figure 4–15: setGbicMode 0 command example

supportShow

The supportShow command prints switch information for debugging purposes. The command executes the following commands in the order shown:

- version
- tempShow
- psShow
- licenseShow
- diagShow
- errDump
- switchShow
- portFlagsShow
- portErrShow
- mqShow
- portSemShow
- portShow
- portRegShow
- portRouteShow
- fabricShow
- topologyShow
- qlShow
- nsShow
- nsAllShow
- cfgShow
- configShow
- faultShow
- traceShow
- portLogDump

Figure 4–16 shows the supportShow command. The command syntax is

supportShow <firstPort>, <lastPort>, <numLog>

Table 4–4 describes the supportShow command fields.

```
switch:admin> supportShow
VxWorks: 5.3.1
Firmware: v2.0_beta3
Made on: Fri Mar 19 16:29:55 PST 1999
Flash: Fri Mar 19 16:30:19 PST 1999
BootProm: Tue Dec 29 17:32:38 PST 1998
none:
No licenses
28 29 30 29 27 Centigrade
82 84 86 84 80 Fahrenheit
Power Supply #1 is absent
Power Supply #2 is OK
```

Figure 4–16: supportShow command example

Table 4–4: supportShow Field Descriptions

Field	Description
firstPort	The first port in a range of ports about which information is printed. The default (if no operand is specified) is to print the state of port 0. If only firstPort is specified, only the information for firstPort is printed.
lastPort	The last port in a range of ports about which information is printed. If firstPort is specified but lastPort is not specified, only firstPort information is printed for the port-based commands (portShow, portRegShow, and portRouteShow).
nLog	Number of lines of portLogDump to print: ■ 0 means dump all lines (default) ■ N means dump the last N lines ■ <0 means skip portLogDump

diagShow

Figure 4–17 shows the `diagShow` command, which summarizes the diagnostics results, including POST results, since the switch was last started. Table 4–5 describes the fields.

The `diagShow` command can be looped. For example, `diagShow 4` executes `diagShow` every four seconds until you stop it by pressing **Enter**. This command can be used to isolate a bad GBIC module. A port with a changing LLI_errs value is prefixed by (**) in the display.

```
switch:admin> diagShow
Diagnostics Status: Sun Jan 1 00:00:00 2000
port#: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
diags: OK OK OK OK OK OK OK OK OK OK OK OK OK OK OK OK
state: UP UP UP UP UP UP UP UP UP UP UP UP UP UP UP UP
lm0: 39624101 frTx 40128685 frRx 0 LLI_errs. <looped-15>
lm1: 39309877 frTx 40007305 frRx 0 LLI_errs  <looped-11>
lm2: 39750791 frTx 39885106 frRx 0 LLI_errs. <looped-6>
lm3: 39501243 frTx 40065867 frRx 0 LLI_errs. <looped-4>
lm4: 40066092 frTx 39501463 frRx 0 LLI_errs. <looped-3>
lm5: 40075160 frTx 40257190 frRx 0 LLI_errs. <looped-8>
lm6: 39886034 frTx 39751716 frRx 0 LLI_errs. <looped-2>
lm7: 39989371 frTx 39960595 frRx 0 LLI_errs. <looped-12>
lm8: 40257892 frTx 40075855 frRx 0 LLI_errs. <looped-5>
lm9: 39154671 frTx 40250787 frRx 0 LLI_errs. <looped-14>
lm10: 39767848 frTx 39798346 frRx 0 LLI_errs. <looped-13>
lm11: 40009605 frTx 39312144 frRx 0 LLI_errs. <looped-1>
lm12: 39961890 frTx 39990666 frRx 0 LLI_errs. <looped-7>
lm13: 39799377 frTx 39768879 frRx 0 LLI_errs. <looped-10>
lm14: 40252478 frTx 39156315 frRx 0 LLI_errs. <looped-9>
lm15: 40132745 frTx 39628100 frRx 0 LLI_errs. <looped-0>
Central Memory OK
Total Diag Frames Tx: 419264
Total Diag Frames Rx: 447200
```

Figure 4–17: diagShow command example

Table 4–5: diagShow Command Field Descriptions

Field	Description
Diagnostics Status	The title header displays the time diagShow was executed.
port#	The port number.
diags	The port's current diagnostic status. Possible values include OK or BAD.
state	The port's current state. Possible values include UP (active) or DN (inactive).
lm0-7 (8-port) lm0-15 (16-port)	The frame counts of active ports. The display shows the number of frames transmitted and received, and low-level interface counts (LLI_errs).
Central Memory Status	Central memory status. Possible values include OK or FAULTY.
Total Diag Frames Tx	The total diagnostics frames transmitted (Tx) since start. This number usually corresponds to the total frames received (Rx), but can differ because of failure modes.
Total Diag Frames Rx	The total diagnostics frames received (Rx) since start. This number usually corresponds to the total frames transmitted (Tx), but can differ because of failure modes.

Diagnostic Error Messages

Error messages are stored in volatile RAM and are lost when you restart or turnoff the switch. Access the error message log to view error messages before powering down the switch.

Error messages are displayed through a Telnet session. The messages are stored in the switch log and display when you execute the errShow or errDump command.

> **NOTE:** If you run the `portStatsShow` command or the `diagShow` command before running a test, errors can display as a result of the normal synchronization process. These errors should be addressed if the number of errors found increases when running the `portStatsShow` command again.

Where multiple probable cause and corrective actions follow an error message, they are listed with the most probable cause and action first and the least probable cause and action last.

If a port fails a diagnostic test, the port is marked BAD in the status display and is ignored until the system is restarted. To retest a port that has been marked BAD, clear the port and set it to OK using the `diagClearError` (port #) command. This command clears the port

status, but does not clear the error logs or changes the port's condition. Only use the `diagClearError` (**port #**) command during diagnostic procedures to reset a bad port for retesting.

For more detailed error message information, see Chapter 5, "Error Messages."

Using Fabric Watch Error Messages

This chapter covers the following topics:

■ Switch Error Message Formats

■ Diagnostic Error Message Formats

■ Error Message Numbers

Switch Error Message Formats

There is one error message format for the switch whether you are gathering information from the local RS-232 serial port or using a remote Telnet session. In all cases, the last error encountered is the first error displayed. A buffer holds up to 64 messages. If the 64-message limit is exceeded, the messages are overwritten in a first-in, first-out sequence.

The errShow command displays all detected errors. The error counter goes to a maximum of 999. The following information displays for each detected error:

■ Number of errors detected

■ Task ID and task name (task names are displayed using the vertical bar (l) command)

■ Error type, date and time, error level, and description

■ Number of occurrences (shown in brackets following the date and time stamp)

The error message display pauses after each error and prompts you to press **Enter** to continue or **Q** to quit. Continue pressing **Enter** until the **=>** prompt is displayed. Only diagnostic errors are assigned error numbers. If no errors encountered, the message "No Error" displays.

To display error messages through Telnet:

1. At the prompt, enter errShow.

2. Press the **Enter** key to scroll through the error list.

Diagnostic Error Message Formats

If any port fails a diagnostic test, the port is marked BAD in the display. To retest a port that has been marked BAD, clear the port and set the port to OK using the diagClearError (port#) command. This command clears the port status only and does not clear the logs or change the port's condition. The diagClearError (port#) command should only be used during diagnostic procedures to reset a bad port for retesting. Some messages contain the following abbreviations:

■ sb = should be

■ er = bits in error

> **NOTE:** If you run the portStatsShow or the diagShow command before you run a test, errors can display as a result of the normal synchronization process. These errors should be addressed if the number of errors found increases when running the portStatsShow command again.

Table 5–1: Probable Failure Actions

Failed Test	Action
ramTest	Replace DRAM module or switch assembly.
portRegTest	Replace switch assembly.
centralMemoryTest	Replace switch assembly.
cmiTest	Replace switch assembly.
cmemRetentionTest	Replace switch assembly.
sramRetentionTest	Replace switch assembly.
camTest	Replace switch assembly.
portLoopbackTest	Replace switch assembly.
crossPortTest	Replace switch assembly, GBIC, or fiber cable.
spinSilk	Replace switch assembly, GBIC, or fiber cable.

Error Message Numbers

An error number (ERR#xxxx) displays at the end of diagnostic error messages. Use the Table 5-2 to match each error number with the test that caused the error. Definitions of error names and necessary actions to correct each error are listed in Table 5-3.

Table 5–2: Error Message Numbers

Error Number	Test Name	Error Name
0001	n/a	DIAG-CLEAR_ERR
0004	n/a	DIAG-POST_SKIPPED
0B15	sramRetentionTest	DIAG-REGERR
0B16		DIAG-REGERR_UNRST
0B0F		DIAG-BUS_TIMEOUT
1F25	cmemRetentionTest	DIAG-LCMRS
1F26		DIAG-LCMTO
1F27		DIAG-LCMEM
0110	ramTest	DIAG-MEMORY
0111		DIAG-MEMSZ
0112		DIAG-MEMNULL
0415	portRegTest	DIAG-REGERR
0416		DIAG-REGERR_UNRST
040F		DIAG-BUS_TIMEOUT
1020	centralMemoryTest	DIAG-CMBISRTO
1021		DIAG-CMBISRF
1025		DIAG-LCMRS
1026		DIAG-LCMTO
1027		DIAG-LCMEM
1028		DIAG-LCMEMTX
1029		DIAG-CMNOBUF
102A		DIAG-CMERRTYPE
102B		DIAG-CMERRPTN
102C		DIAG-INTNOTCLR
1030		DIAG-BADINT
106F		DIAG-TIMEOUT

Table 5–2: Error Message Numbers (Continued)

Error Number	Test Name	Error Name
2030	cmiTest	DIAG-BADINT
2031		DIAG-INTNIL
2032		DIAG-CMISA1
2033		DIAG-CMINOCAP
2034		DIAG-CMIINVCAP
2035		DIAG-CMIDATA
2036		DIAG-CMICKSUM
223B	camTest	DIAG-CAMINIT
223C		DIAG-CAMSID
2640	portLoopbackTest	DIAG-ERRSTAT (ENCIN)
2641		DIAG-ERRSTAT (CRC)
2642		DIAG-ERRSTAT (TRUNC)
2643		DIAG-ERRSTAT (2LONG)
2644		DIAG-ERRSTAT (BADEOF)
2645		DIAG-ERRSTAT (ENCOUT)
2646		DIAG-ERRSTAT (BADORD)
2647		DIAG-ERRSTAT (DISCC3)
264F		DIAG-INIT
265F		DIAG-PORT_DIED
266E		DIAG-DATA
266F		DIAG-TIMEOUT
2660		DIAG-STATS (FTX)
2661		DIAG-STATS (FRX)
2662		DIAG-STATS (C3FRX)
2670		DIAG-PORTABSENT
2671		DIAG-XMIT

Table 5–2: Error Message Numbers (Continued)

Error Number	Test Name	Error Name
3040	crossPortTest	DIAG-ERRSTAT (ENCIN)
3041		DIAG-ERRSTAT (CRL)
3042		DIAG-ERRSTAT (TRUNC)
3043		DIAG-ERRSTAT (2LONG)
3044		DIAG-ERRSTAT (BADEOF)
3045		DIAG-ERRSTAT (ENCOUT)
3046		DIAG-ERRSTAT (BADORD)
3047		DIAG-ERRSTAT (DISC3)
304F		DIAG-INIT
305F		DIAG-PORTDIED
3060		DIAG-STATS (FTX)
3061		DIAG-STATS (FRX)
3062		DIAG-STATS (C3FRX)
306E		DIAG-DATA
306F		DIAG-TIMEOUT
3070		DIAG-PORTABSENT
3071		DIAG-XMIT
3078		DIAG-PORTWRONG
384F	spinSilk	DIAG-INIT
385F		DIAG-PORTDIED
3840		DIAG-ERRSTAT (ENCIN)
3841		DIAG-ERRSTAT (CRC)
3842		DIAG-ERRSTAT (TRUNC)
3843		DIAG-ERRSTAT (2LONG)
3844		DIAG-ERRSTAT (BADEOF)
3845		DIAG-ERRSTAT (ENCOUT)
3846		DIAG-ERRSTAT (BADORD)
3847		DIAG-ERRSTAT (DISCC3)
3870		DIAG-PORTABSENT
3871		DIAG-XMIT
3874		DIAG-PORTSTOPPED

Error Message Tables

Table 5–3 defines each diagnostic error name and describes the actions necessary to correct each error.

Table 5–3: Diagnostic Error Messages

Message	Description	Probable Cause	Action
DIAG-BADINT Err#1030, 2030 [centralMemoryTest, cmiTest]	The port received an interrupt when it was not expecting one.	ASIC failure	Replace switch assembly.
DIAG-BUS_TIMEOUT Err#0B0F, 4040F [portRegTest, sramRetentionTest]	An ASIC register or ASIC SRAM did not respond to an ASIC data access.	ASIC failure	Replace switch assembly.
DIAG-CAMINIT Err#223B [camTest]	The port failed to initialize due to one of the following reasons: ■ Switch is not disabled. ■ Diagnostic queue is absent. ■ Malloc failed. ■ Chip is not present. ■ Port is not in loopback mode. ■ Port is not active.	Software operational setup error or switch failure	Retry, restart, or replace switch assembly.
DIAG-CAMSID Err#223C [camTest]	An ASIC failed SID NO translation test.	ASIC failure	Replace switch assembly.
DIAG-CLEAR_ERR Err#0001	A port's diag error flag (OK or BAD) is cleared.	Informational Only	No action required.
DIAG-CMBISRF Err#1021 [centralMemoryTest]	An ASIC's Central Memory SRAMs did not complete the BISR within the time-out period.	ASIC failure	Replace switch assembly.
DIAG-CMBISRTO Err#1020 [centralMemoryTest]	An ASIC's Central Memory SRAMs did not complete the BISR within the time-out period.	ASIC failure	Replace switch assembly.

Table 5–3: Diagnostic Error Messages (Continued)

Message	Description	Probable Cause	Action
DIAG-CMERRPTN Err#102B [centralMemoryTest]	An error was detected at the wrong port.	ASIC failure	Replace switch assembly.
DIAG-CMERRTYPE Err#102A [centralMemoryTest]	A port received the wrong CMEM error type.	ASIC failure	Replace switch assembly.
DIAG-CMICKSUM Err#2036 [cmiTest]	A CMI message received a failed bad checksum test.	ASIC or motherboard failure	Replace switch assembly.
DIAG-CMIDATA Err#2035 [cmiTest]	CMI data received did not match the data transmitted.	ASIC or motherboard failure	Replace switch assembly.
DIAG-CMIINVCAP Err#2034 [cmiTest]	An unintended ASIC erroneously received a CMI capture flag.	ASIC or motherboard failure	Replace switch assembly.
DIAG-CMINOCAP Err#2033 [cmiTest]	A CMI intended receiver ASIC failed to receive a CMI capture flag.	ASIC or motherboard failure	Replace switch assembly.
DIAG-CMISA1 Err#2032 [cmiTest]	An attempt to send a CMI message from ASIC to ASIC failed.	ASIC failure	Replace switch assembly.
DIAG-CMNOBUF Err#1029 [centralMemoryTest]	A port could not receive a buffer.	ASIC failure	Replace switch assembly.
DIAG-DATA Err#266E, 306E [portLoopbackTest, crossPortTest]	The payload received by a port did not match the payload transmitted.	Motherboard, GBIC module, or fiber cable failure	Replace switch assembly, GBIC module, or fiber cable.

Table 5–3: Diagnostic Error Messages (Continued)

Message	Description	Probable Cause	Action
DIAG-ERRSTAT Err#2640-2647, 3040- 3047, 3840-3847 [portLoopbackTest, crossPortTest, spinSilk]	The Port Error Statistics counter is non-zero, which means an error was detected when receiving frames. One of the following status errors occurred. ■ Enc_in **–** Encoding error, inside frame ■ CRC_err **–** Cyclic redundancy check on frame failed ■ TruncFrm **–** Truncated frame ■ FrmTooLong **–** Frame too long ■ BadEOF **–** Bad end of file ■ Enc_out **–** Encoding error, outside frame ■ BadOrdSet **–** Bad symbol on fiber-optic cable ■ DiscC3 **–** Discarded Class 3 frames	ASIC, motherboard, GBIC module, or fiber cable failure	Replace switch assembly, GBIC module, or fiber cable.
DIAG-INIT Err#264F, 304F, 384F [portLoopbackTest, crossPortTest, spinSilk]	A port failed to activate in the loopback mode requested.	ASIC, motherboard, GBIC module, or fiber cable failure	Replace switch assembly, GBIC module, or fiber cable.
DIAG-INTNIL Err#2031 [cmiTest]	An ASIC failed to receive a CMI error (interrupt).	ASIC failure	Replace switch assembly.
DIAG-INTNOTCLR Err#102C [centralMemoryTest]	The interrupt bit could not be cleared.	ASIC failure	Replace switch assembly.

Table 5–3: Diagnostic Error Messages (Continued)

Message	Description	Probable Cause	Action
DIAG-LCMEM Err#1027 [centralMemoryTest, cmemRetentionTest]	Data read from the Central Memory location did not match data previously written into the same location.	ASIC failure	Replace switch assembly.
DIAG-LCMEMTX Err#1F27, 1028 [centralMemoryTest]	A Central Memory transmit path failed; ASIC 1 failed to read ASIC 2 through the transmit path.	Motherboard failure	Replace switch assembly.
DIAG-LCMRS Err#1F25, 1025 [centralMemoryTest, cmemRetentionTest]	The Central Memory read short; M bytes were requested but less than M bytes were received.	ASIC failure	Replace switch assembly.
DIAG-LCMTO Err#1F26, 1026 [centralMemoryTest, cmemRetentionTest]	The Central Memory timed out; the data transfer initiated did not complete within the time-out period.	ASIC failure	Replace switch assembly.
DIAG-MEMNULL Err#0112 [ramTest]	The test failed to malloc.	Motherboard failure	Replace switch assembly.
DIAG-MEMSZ Err#0111 [ramTest]	The memory size to be tested is less than or equal to zero.	Motherboard failure	Replace switch assembly.
DIAG-MEMORY Err#0110 [ramTest]	Data read from the RAM location did not match previously written data into the same location.	CPU RAM failure	Replace switch assembly or DRAM module.
DIAG-PORTABSENT Err#2670, 3070, 3870 [portLoopbackTest, crossPortTest, spinSilk]	A port is not present.	ASIC or motherboard failure	Replace switch assembly.

Table 5–3: Diagnostic Error Messages (Continued)

Message	Description	Probable Cause	Action
DIAG-PORTDIED Err#265F, 305F, 385F [portLoopbackTest, crossPortTest, spinSilk]	A port in loopback mode went inactive.	ASIC, GBIC module, or fiber cable failure	Replace switch assembly, GBIC module, or fiber cable.
DIAG-PORTSTOPPED Err#3874 [spinSilk]	A port is no longer transmitting: the Number Of Frames Transmitted counter is stuck at N frames.	ASIC, GBIC module, or fiber cable failure	Replace switch assembly, GBIC module, or fiber cable.
DIAG-PORTWRONG Err#3078 [crossPortTest]	A frame was erroneously received by port M instead of the intended port N.	ASIC failure	Replace switch assembly.
DIAG-POST_SKIPPED Err# 0004 [switch initialization]	POST is skipped. A message recommends that POST be executed.	Informational Only	No action required.
DIAG-REGERR Err#0B15, 0415 [portRegTest, sramRetentionTest]	Data read from an ASIC register or an ASIC SRAM did not match data previously written into the same location.	ASIC failure	Replace switch assembly.
DIAG-REGERR_UNRT Err#0B16, 0416 [portRegTest, sramRetentionTest]	A port failed to unreset.	ASIC failure	Replace switch assembly.
DIAG-STATS Err#2660-2662, 3060 –3062 [portLoopback Test, crossPortTest]	The port counter value did not match the number of frames actually transmitted. Possible counters reporting: ■ FramesTx – number of frames transmitted ■ FramesRx – number of frames received ■ Cl3FrmRx – number of Class 3 frames received	ASIC, GBIC module, or fiber cable failure	Replace switch assembly, GBIC module, or fiber cable.

Table 5–3: Diagnostic Error Messages (Continued)

Message	Description	Probable Cause	Action
DIAG-TIMEOUT Err#266F, 306F, 386F [portLoopbackTest, crossPortTest, centralMemoryTest]	For portLoopbackTest and crossPortTest; A port failed to receive a frame within the time-out period. For centralMemoryTest: A port failed to detect an interrupt within the time-out period.	ASIC, GBIC module, or fiber cable failure	Replace switch assembly, GBIC module, or fiber cable.
DIAG-XMIT Err#2271, 2671, 3071, 3871 [portLoopbackTest, crossPortTest, spinSilk, camTest]	A port failed to transmit a frame.	ASIC failure	Replace switch assembly.

Table 5–4 defines each system error name and describes the actions necessary to correct each error.

Table 5–4: System Error Messages

Message	Description	Probable Cause	Action
CONFIG CORRUPT	The switch configuration information has become irrevocably corrupted.	OS error	The system resets to default configuration settings.
CONFIG OVERFLOW	The switch configuration information has grown too large to be saved, or has an invalid size.	OS error	Contact Customer Support.
CONFIG VERSION	The switch has encountered an unrecognized version of the switch configuration.	OS error	The system resorts to default configuration settings.
FABRIC, SEGMENTED, LOG_WARNING	The fabric is segmented.	■ Fabric parameters or switches not compatible ■ Conflict zones	Reconfigure the fabric or zones.

Table 5–4: System Error Messages (Continued)

Message	Description	Probable Cause	Action
FABRIC, NO_ALIASID, LOG_WARNING	There is no free multicast alias.	Too many multicast groups in use	Remove some of the groups.
FABRIC, BADILS, LOG_WARNING	There is a bad ISL-ELS size.	The ISL-ELS payload is wrong.	Contact Customer Support.
FLASH, BAD_MIRROR, LOG_WARNING	The system's flash memory has encountered an error.	OS error	The system attempts to recover from its mirrored backup; contact customer support.
RPC, SVC_EXIT	An RPC service daemon has terminated prematurely or unexpectedly.	OS error	Contact Customer Support.
RPC, SVC_REG	An RPC service daemon could not establish service for a particular protocol handler.	OS error	Contact Customer Support.
TEMP, 1_FAILED, LOG_WARNING	The switch overheated.	Fan failure	Contact Customer Support.
TEMP, 2_FAILED, LOG_ERROR	The switch overheated.	Fan failure	Contact Customer Support.
TEMP, 3_FAILED, LOG_CRITICAL	The switch overheated.	Fan failure	Contact Customer Support.
TEMP, 4_FAILED, LOG_CRITICAL	The switch overheated.	Fan failure	Contact Customer Support.
TEMP, 5_FAILED, LOG_CRITICAL	The switch overheated.	Fan failure	Contact Customer Support.
FANS, 1_FAILED, LOG_WARNING	The switch overheated.	Fan failure	Contact Customer Support.
FANS, 2_FAILED, LOG_ERROR	The switch overheated.	Fan failure	Contact Customer Support.
FANS, 3_FAILED, LOG_CRITICAL	The switch overheated.	Fan failure	Contact Customer Support.
FANS, 4_FAILED, LOG_CRITICAL	The switch overheated.	Fan failure	Contact Customer Support.

Table 5–4: System Error Messages (Continued)

Message	Description	Probable Cause	Action
FANS, 5_FAILED, LOG_CRITICAL	The switch overheated.	Fan failure	Contact Customer Support.
FANS, 6_FAILED, LOG_CRITICAL	The switch overheated.	Fan failure	Contact Customer Support.
POWER, 1_FAILED, LOG_CRITICAL	A switch power failure occurred.	Power supply failure	Contact Customer Support.
POWER, 2_FAILED, LOG_CRITICAL	A switch power failure occurred.	Power supply failure	Contact Customer Support.
FCIU, IUBAD, L, S	The IU is invalid.	OS error	Contact Customer Support.
FCIU, IUCOUNT, L, S	The total number of Ius Count is less than 0.	OS error	Contact Customer Support.
FCPH, EXCHBAD, L, S	There was a bad exchange.	OS error	Contact Customer Support.
FCPH, EXCHFREE, L, S	Unable to free an exchange.	OS error	Contact Customer Support.
MQ, QWRITE, L, M	The message queue overflowed.	Task blocked	Contact Customer Support.
MQ, QREAD, L, M	The message queue is unread.	OS error	Contact Customer Support.
MQ, MSGTYPE, E, M	There is an unknown message type.	OS error	Contact Customer Support.
SEMA, SEMGIVE, L, M	Unable to give a semaphore.	OS error	Contact Customer Support.
SEMA, SEMTAKE, L, M	Unable to take a semaphore.	OS error	Contact Customer Support.
SEMA, SEMFLUSH, L, M	Unable to flush a semaphore.	OS error	Contact Customer Support.
PANIC, TASKSPAWN, LOG_PANIC	The task creation failed.	OS error	Contact Customer Support.
PANIC, SEMCREATE, LOG_PANIC	Semaphore creation failed.	OS error	Contact Customer Support.
PANIC, SEMDELETE, LOG_PANIC	Semaphore deletion failed.	OS error	Contact Customer Support.

Table 5–4: System Error Messages (Continued)

Message	Description	Probable Cause	Action
PANIC, QCREATE, LOG_PANIC	The message queuer failed.	OS error	Contact Customer Support.
PANIC, QDELETE, LOG_PANIC	Message queuer deletion failed.	OS error	Contact Customer Support.
PANIC, MALLOC, LOG_PANIC	Memory allocation failed.	OS error	Contact Customer Support.
PANIC, FREE, LOG_PANIC	Memory free failed.	OS error	Contact Customer Support.
PANIC, INCONSISTENT, LOG_PANIC	Data is out of sync.	OS error	Contact Customer Support.
PANIC, INTCONTEXT, LOG_PANIC	Data is out of sync.	OS error	Contact Customer Support.
PANIC, ZOMTIMSET, LOG_PANIC	There was an attempt to set a zombie timer.	OS error	Contact Customer Support.
PANIC, ZOMTIMKILL, LOG_PANIC	The zombie timer was destroyed.	OS error	Contact Customer Support.
PANIC, FREETIMRLSD, LOG_PANIC	The free timer was released.	OS error	Contact Customer Support.
PANIC, TIMEUSECNT, LOG_PANIC	The timer use count was exceeded.	OS error	Contact Customer Support.
PANIC, LSDB_CKSUM, LOG_PANIC	The Link State Database checksum failed.	OS error	Contact Customer Support.
SYS, NOMEM, LOG_CRITICAL	There is no memory.	OS error	Contact Customer Support.
SYS, SYSCALL, LOG_ERROR	The system call failed.	OS error	Contact Customer Support.
SYS, BADPTR, LOG_ERROR	There is a bad system pointer.	OS error	Contact Customer Support.
SYS, INTRPT, LOG_CRITICAL	There was a bad system interrupt.	OS error	Contact Customer Support.
SYS, FLASHRD, LOG_ERROR	There was a FLASH memory reading error.	OS error	Contact Customer Support.

Table 5–4: System Error Messages (Continued)

Message	Description	Probable Cause	Action
SYS, FLASHWR, LOG_ERROR	There was a FLASH memory writing error.	OS error	Contact Customer Support.
TIMERS, ENQFAIL, LOG_CRITICAL	There was an invalid time-out value.	OS error	Contact Customer Support.
TIMERS, MSG,LOG_WARNING	There was an invalid message.	OS error	Contact Customer Support.
FLANNEL, PHANTOM, LOG_WARNING	A port's PLT limit was exceeded.	OS error	Contact Customer Support.
ASIC, MINI_BUFFER, LOG_WARNING	An ASIC failed.	Bad motherboard	Contact Customer Support.
LSDB, LSID, LOG_ERROR .	The Link State ID is out of range.	OS error	Contact Customer Support.
LSDB, NOLOCALENTRY, LOG_CRITICAL	There is no database entry for local Link State Record.	OS error	Contact Customer Support.
LSDB, NOLSR, LOG_WARNING	There is no Link State Record for the domain.	OS error	Contact Customer Support.
LSDB, MAXINCARN, LOG_WARNING	The Local Link State Record reached maximum incarnation.	OS error	Contact Customer Support.
FLOOD, INVLSU, LOG_WARNING	The received LSU was discarded.	OS error	Contact Customer Support.
FLOOD, INVLSR, LOG_WARNING	There is an unknown LSR type.	OS error	Contact Customer Support.
FLOOD, LSRLEN, LOG_ERROR	The LSU has an excessive length.	OS error	Contact Customer Support.
HLO, INVHLO, LOG_ERROR	An invalid Hello was received from a port.	OS error	Contact Customer Support.
HLO, HLOTIMEOUT, LOG_ERROR	An incompatible Hello time-out was received from a port.	OS error	Contact Customer Support.
HLO, DEADTIMEOUT, LOG_ERROR	Incompatible inactivity time-out received from a port.	OS error	Contact Customer Support.
FSPF, SCN, LOG_WARNING	There is an illegal SCN.	OS error	Contact Customer Support.

Table 5–4: System Error Messages (Continued)

Message	Description	Probable Cause	Action
FSPF, NBRCHANGE, LOG_WARNING	The wrong neighbor ID is in a Hello message from a port.	OS error	Contact Customer Support.
FSPF, INPORT, LOG_ERROR	The input port is out of range.	OS error	Contact Customer Support.
FSPF, VERSION, LOG_ERROR	The FSPF version is not supported.	OS error	Contact Customer Support.
FSPF, SECTION, LOG_ERROR	The section ID is wrong.	OS error	Contact Customer Support.
FSPF, REMDOMAIN, LOG_ERROR	The remote Domain ID is out of range.	OS error	Contact Customer Support.
NBFSM, NGBRSTATE, LOG_ERROR	Input to neighbor FSM is wrong.	OS error	Contact Customer Support.
MCAST, ADDPORT, LOG_WARNING	A port failed to add.	OS error	Contact Customer Support.
MCAST, REMPORT, LOG_WARNING	A port failed to remove.	OS error	Contact Customer Support.
MCAST, ADDBRANCH, LOG_ERROR	A branch failed to add.	OS error	Contact Customer Support.
MCAST, REMBRANCH, LOG_ERROR	A branch failed to remove.	OS error	Contact Customer Support.
MCAST, NOPARENT, LOG_ERROR	There is a null parent.	OS error	Contact Customer Support.
MCAST, NOPARENTLSR, LOG_ERROR	There is a null lsrP.	OS error	Contact Customer Support.
UCAST, ADDPATH, LOG_CRITICAL	A path failed to add.	OS error	Contact Customer Support.
UCAST, ADDPORT, LOG_WARNING	A port failed to add.	OS error	Contact Customer Support.
UCAST, REMPORT, LOG_WARNING	A port failed to remove.	OS error	Contact Customer Support.
UCAST, RRTIM, LOG_CRITICAL	There is an invalid reroute timer ID.	OS error	Contact Customer Support.

Table 5–4: System Error Messages (Continued)

Message	Description	Probable Cause	Action
UCAST, SPFCOST, LOG_WARNING	There is no minimum cost path in the candidate.	OS error	Contact Customer Support.
UCAST, RELICPDB, LOG_WARNING	A relic PDB sent to the Domain.	OS error	Contact customer support.
QL, QUICKLOOP	The QuickLoop partner switch is running a version earlier than v2.1.3 of the software.	OS error	Upgrade the Fabric Operating System version.

Chapter **6**

Repair and Replacement

This chapter covers the following topics:

■ Replacing a GBIC Module

■ Replacing a Switch

⚠ **WARNING:** Do not attempt to open this product. There are no user-serviceable parts inside. Refer all service to a Compaq authorized service provider.

Your switch contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. There is risk of fire and burns if the battery pack is not handled properly. To reduce the risk of personal injury:

Do not attempt to recharge the battery.

Do not expose to temperatures higher than 60°C.

Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.

Replace only with the Compaq spare designated for this product.

WARNING: Batteries, battery packs, and accumulators should not be disposed of with general household waste. To forward them for recycling or proper disposal, please use a public collection system or return them to either Compaq, your authorized Compaq Partners, or their agents.

Replacing a GBIC Module

The GBIC module is installed and removed by sliding it into and out of the motherboard slot on the front of the unit. A GBIC module is hot-pluggable.

> ⚠ **CAUTION:** The GBIC module contains static-sensitive components. Use electrostatic discharge (ESD) precautions while handling the GBIC module.

NOTE: The SAN Switch 8-EL has one removable GBIC.

Removing a GBIC Module

If you are using a GBIC module with a locking bar, pull down the metal swing bar on the front of the GBIC and pull out the bar. Carefully move the GBIC module from side to side slightly to unseat it. Figure 6–1 shows a GBIC module with locking bar.
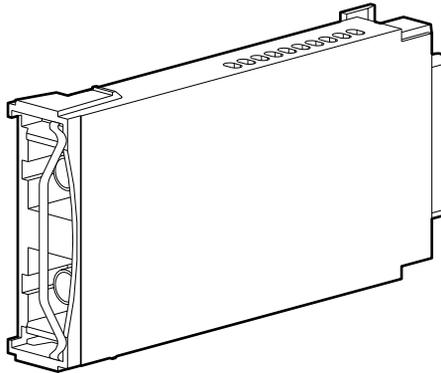
Figure 6–1: GBIC module with a locking bar

If you are using any other type of GBIC module, squeeze the side prongs and carefully pull out the GBIC module. Figure 6–2 shows a squeeze-prong GBIC module.
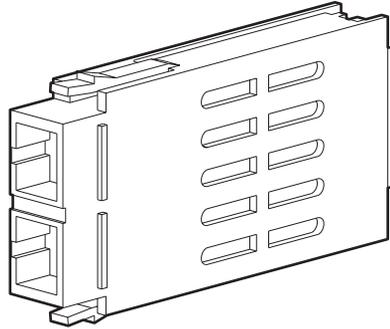
Figure 6–2: Squeeze-prong GBIC module

Installing a GBIC Module

Insert the GBIC module into the port until its connector is firmly seated in the port. If you are using a GBIC module with a locking bar, lock the module into place with the locking bar. For other GBIC modules, the latch prongs automatically lock to prevent accidental removal of the GBIC module.

> **NOTE:** The GBIC module is keyed so it can be inserted only one way. Do not force the insertion if the module does not slide in easily.

Replacing a Switch

To replace the switch assembly:

1. If possible, save the switch configuration settings using the configUpload Telnet command. See the "Saving and Restoring Switch Configuration Settings" section in Chapter 3 for more detailed information.

2. Unplug the power cord.

3. Label or mark the Fibre Channel cables.

4. Remove the Fibre Channel cables.

5. Remove the GBIC module. See the "Removing a GBIC Module" section in this chapter.

6. Replace the switch assembly.

7. Plug in the power cord.

8. If the switch is in a single-switch configuration, restore the switch configuration settings using the configDownload Telnet command. See the "Saving and Restoring Switch Configuration Settings" section in Chapter 3 for more detailed information.

9. If the switch is in a multiple-switch configuration, clear the new switch configuration settings with the cfgClear Telnet command. The new switch will acquire the configuration settings from the other switches in the SAN once the Fibre Channel cables are re-attached).

    See Appendix A of the Compaq *StorageWorks Fibre Channel SAN Switch Management Guide* for detailed information on these Telnet commands.

10. Install the GBIC module. See the "Installing a GBIC Module" section in this chapter for the installation procedure.

11. Plug in the Fibre Channel cables, as indicated on the label.

See Chapter 3, "Setting Up the Fibre Channel SAN Switch 8-EL," for information on setting up the switch.

Chapter **7**

Upgrading Firmware

This chapter covers the following topics:

■ Downloading Firmware from the Compaq Website

■ Upgrading Firmware Using Web Management Tools

■ Upgrading Firmware Using a Telnet Command

The Fibre Channel SAN Switch 8-EL comes with preloaded firmware. In most cases there is no need to update the firmware on the new switch. The firmware version can be determined by using:

■ The version Telnet command.

■ The Switch Management Application page in Web Management Tools.

Refer to the Compaq *StorageWorks Fibre Channel SAN Switch Management Guide* for more information on Telnet commands and Web Management Tools.

Downloading Firmware from the Compaq Website

To download the firmware from the Compaq website, go to www.compaq.com/products/storageworks.

The website contains the required loaders and instructions for downloading the firmware into a switch.

Upgrading Firmware Using Web Management Tools

Use the Firmware Upgrade page in Web Management Tools to download firmware upgrades.

To download the firmware:

1. Copy the files *Rshd.exe* and *Cat.exe* to the root directory on the host system. These files are found in:

   D:\DSGGB\Firmware\NTIntel\Rshd.exe
   D:\DSGGB\Firmware\NTIntel\Cat.exe
   D:\DSGGB\Firmware\NTIntel\V2.x.x

   where D:\ is the drive letter for the CD and V2.x.x is the latest version of firmware.

2. Double-click *Rshd.exe*. RSHD is a server program that allows the switch to request the firmware from the host over an Ethernet connection. Leave RSHD running in a separate window.

3. Click the switch for which firmware you want to upgrade. The Switch Management Application page displays.

4. Click the Admin button from the Switch Management Application page.

5. Click the Firmware Upgrade tab. The following screen is displayed:

Figure 7–1: Firmware Upgrade screen example

6. Enter the host name or host IP address in the Host Name or Host IP field.

   NOTE: For Windows 9x, Windows 2000, and Windows NT only, enter the IP address.

7. Enter a user name in the Remote User Name field.

   NOTE: For Windows 9x, Windows 2000, and Windows NT only, enter the default user name.

8. In the Download File From field, enter the path name from to the firmware location.

IMPORTANT: You must use the UNIX style of forward slash (/) for the path name.

NOTE: When the firmware file is located in the same directory as the Cat.exe and Rshd.exe files, the directory path can be omitted.

9. Click the Download Flash Now! button.

IMPORTANT: Prior to downloading the firmware, the Rshd.exe program must be running from the same directory that contains the Cat.exe program or the FTP server must be running.

The firmware is downloaded. Use this procedure for each switch to be upgraded.

Upgrading Firmware Using a Telnet Command

Use the `firmwareDownload` command in a Telnet session to download new firmware into flash memory. This command can be executed on an operational switch. A restart is required to initiate the new firmware after the download has completed.

The firmware can be downloaded from a UNIX host, Windows 95 host, or Windows NT host. For a UNIX host, no special software is needed. For Windows 95 or Windows NT, a daemon to support a Remote Shell is required. Firmware is downloaded through an RCP command running on top of TCP between the switch and the host.

To upgrade the firmware of a Fibre Channel SAN Switch 8-EL, use the latest version of the Fibre Channel SAN Switch CD. Use one of the following three procedures, depending whether you host uses Windows NT Intel, Windows NT Alpha, or Tru64 UNIX.

Windows NT Intel Host

To load the firmware from a Compaq PC running Windows NT Intel:

1. Copy the files *Rshd.exe* and *Cat.exe* to the root directory on the host system. These files are found in the CD-ROM provided with the switch.

2. Double-click *Rshd.exe*. RSHD is a server program that allows the switch to request the firmware from the host over an Ethernet connection. Leave RSHD running in a separate window.

3. Click Start, then Run and enter TELNET.

4. Click Connect, then Remote System.

5. In the Host Name field, type the IP address of your Fibre Channel SAN Switch 8-EL and click the Connect button.

6. Log in as:

   admin
   password: password

7. At the prompt, type:

   firmwareDownload "192.168.60.200", "administrator" , "v2.x.x"

   where "192.168.60.200" is the IP address of your host computer, "administrator" is the account you are using to run *Rshd.exe*, and "v2.x.x" is the firmware image to be downloaded to the switch.

   > **NOTE:** Rshd.exe must be run from the directory that contains the Cat.exe file.

8. The output displays as follows:

   1330320+203572+427356
   writing flash 0 ....
   writing flash 1 ....
   download complete
   switch:admin>

9. Click the RSHD window and click File, then Exit.

10. Click the Telnet window and enter reboot. The switch reboots and copies the firmware into RAM.

Windows NT Alpha Host

To load the firmware from a host running Windows NT Alpha:

1. Copy the files *Rshd.exe* and *Cat.exe* to the root directory on the host system. These files are found in the CD –ROM provided with the switch.

2. Double-click *Rshd.exe*. RSHD is a server program that allows the switch to request the firmware from the host over an Ethernet connection. Leave RSHD running in a separate window.

3. Click Start, then Run and enter TELNET.

4. Click Connect, then Remote System.

5. In the Host Name field, type the IP address of your Fibre Channel SAN Switch 8-EL and click the Connect button.

6. Log in as:

   admin
   password: password

7. At the prompt, type

   firmwareDownload "192.168.60.200", "administrator" , "v2.x.x"

   where "192.168.60.200" is the IP address of your host computer, "administrator" is the account you are using to run *Rshd.exe*, and "v2.x.x" is the firmware image to be downloaded to the switch.

   NOTE: Rshd.exe must be run from the directory that contains the Cat.exe file.

8. The output displays as follows:

   1330320+203572+427356
   writing flash 0 ....
   writing flash 1 ....
   download complete
   switch:admin>

9. Click the RSHD window and click File, then Exit.

10. Click the Telnet window and enter reboot. The switch reboots and copies the firmware into RAM.

Compaq Tru64 UNIX Host

To load the firmware from a host running Compaq Tru64 UNIX:

1. Mount the CD device by using the following command:

   mount –t cdfs –r /dev/rz5c /mnt

   where "5" is the unit number of your CD drive.

2. Change to the CD directory by entering:

   cd mnt

3. To copy the firmware to the host system, enter the following command:

   cp DSGGB/Firmware/V2.x.x mary/tmp/V2.x.x

   where "mary" is the user name on the Tru64 host system and V2.x.x is the firmware image to be downloaded to the switch.

   NOTE: The Fibre Channel SAN Switch 8-EL uses the remote shell capabilities of UNIX to log in to the Tru64 UNIX host and copy the firmware image. The user (mary) and the switch's IP address must be in the .rhosts file on the Tru64 UNIX host to allow login without a password.

4. Establish a Telnet connection to the switch by entering:

    telnet <switch_hostname>
    user: admin
    pswd: <password>

    > **NOTE:** You can substitute the IP address of the switch for <switch_hostname>.

5. To download the firmware from the host system to the switch flash memory, enter the following command line at the <switch>:admin> prompt:

    firmwareDownload "16.140.32.60", "mary", "/tmp/v2.x.x"

    where "16.140.32.60" is the IP address of the host system with the firmware image, "mary" is the user to RSH, and "/tmp/v2.x.x" is the firmware image to be loaded into the switch flash ROM.

    > **NOTE:** The quotation marks are very important in the `firmwareDownload` command line. RSH without a password must be enabled for the user that RSH is executing under. To enable RSH without a password, add the switch IP name to ~<user>/.rhosts). The format of `.rhosts` is: hostname [user].

6. Enter `reboot` at the Telnet prompt. The switch reboots and copies the firmware into RAM.

Appendix **A**

Regulatory Compliance Notices

This appendix covers the following topics:

Regulatory Compliance Identification Numbers

For the purpose of regulatory compliance certifications and identification, your Compaq StorageWorks SAN Switch 8-EL is assigned a Compaq series number. The Compaq series number for this product is Series NA2103. The SAN Switch 8-EL series number can be found on the product label, along with the required approval markings and information. When requesting certification information for this product, always refer to this series number. This series number should not be confused with the marketing name or model number for your Compaq StorageWorks SAN Switch 8-EL.

Federal Communications Commission Notice

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment (for example, personal computers). The FCC requires devices in both classes to bear a label indicating the interference potential of the device as well as additional operating instructions for the user.

The rating label on the device shows the classification (A or B) of the equipment. Class B devices have an FCC logo or FCC ID on the label. Class A devices do not have an FCC logo or ID on the label. After the class of the device is determined, refer to the corresponding statement in the sections below.

Class A Equipment

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

Class B Equipment

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or

television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

■ Reorient or relocate the receiving antenna.

■ Increase the separation between the equipment and receiver.

■ Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

■ Consult the dealer or an experienced radio or television technician for help.

Declaration of Conformity for Products Marked with the FCC Logo—United States Only

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions regarding your product, contact:

Compaq Computer Corporation
P. O. Box 692000, Mail Stop 530113
Houston, Texas 77269-2000

or call 1-800-652-6672 (1-800-OK COMPAQ).

> **NOTE:** For continuous quality improvement, calls may be recorded or monitored.

For questions regarding this FCC declaration, contact:

Compaq Computer Corporation
P. O. Box 692000, Mail Stop 510101
Houston, Texas 77269-2000

or call (281) 514-3333

To identify this product, refer to the part, series, or model number found on the product.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Compaq Computer Corporation may void the user's authority to operate the equipment.

Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

Canadian Notice (Avis Canadien)

Class A Equipment

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Class B Equipment

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union Notice

Products with the CE Marking comply with both the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European Norms (the equivalent international standards are in parenthesis):

■ EN55022 1998 (CISPR 22) - Electromagnetic Interference

- EN55024: 1998 (IEC61000-4-2, IEC61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6, IEC61000-4-8, IEC61000-4-11) - Electromagnetic Immunity

- EN60950 (IEC950) - Product Safety

- Power Quality (IEC61000-3-2) Harmonics and (IEC61000-3-3) Voltage Fluctuations and Flicker

- Also approved under UL 1950, 3rd Edition/CSA C22.2 No. 950-95, Safety of Information Technology Equipment

Japanese Notice

ご使用になっている装置にVCCIマークが付いていましたら、次の説明文を
お読み下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準
に基づくクラスB情報技術装置です。この装置は、家庭環境で使用すること
を目的としていますが、この装置がラジオやテレビジョン受信機に近接して
使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

VCCIマークが付いていない場合には、次の点にご注意下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に
基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波
妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ず
るよう要求されることがあります。

Taiwanese Notice

警告使用者：

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

Laser Devices

All Compaq systems equipped with a laser device comply with safety standards, including International Electrotechnical Commission (IEC) 825. With specific regard to the laser, the equipment complies with laser product performance standards set by government agencies as a Class 1 laser product. The product does not emit hazardous light; the beam is totally enclosed during all modes of customer operation and maintenance.

Laser Safety Warnings

> ⚠ **WARNING:** To reduce the risk of exposure to hazardous radiation:
>
> **Do no**t try to open the laser device enclosure. There are no user-serviceable components inside.
>
> **Do not** operate controls, make adjustments, or perform procedures to the laser device other than those specified herein.
>
> **Allow only** Compaq authorized service technicians to repair the laser device.

Compliance with CDRH Regulations

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States.

Compliance with International Regulations

All Compaq systems equipped with laser devices comply with appropriate safety standards including IEC 825.

Laser Product Label

The following label or equivalent is located on the surface of the Compaq supplied laser device.

CLASS 1 LASER PRODUCT

This label indicates that the product is classified as a CLASS 1 LASER PRODUCT. This label appears on a laser device installed in your product.

Laser Information

Laser Type	Semiconductor GaAlAs
WaveLength	780 nm +/- 35 nm
Divergence Angle	53.5 degrees +/- 0.5 degrees
Output Power	Less than 0.2 mW or 10,869 W·m-2 sr-1
Polarization	Circular 0.25
Numerical Aperture	0.45 inches +/- 0.04 inches

Battery Replacement Notice

Your switch is equipped with either a lithium manganese dioxide, a vanadium pentoxide, or an alkaline internal battery or battery pack. There is a danger of explosion and risk of personal injury if the battery is incorrectly replaced or mistreated. Replacement is to be done by a Compaq authorized service provider using the Compaq spare designated for this product. For more information about battery replacement or proper disposal, contact your Compaq authorized reseller or your authorized service provider.

> ⚠ **WARNING:** Your switch contains either an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. There is risk of fire and burns if the battery pack is not handled properly. To reduce the risk of personal injury:
>
> **Do not** attempt to recharge the battery.
>
> **Do not** expose to temperatures higher than 60°C.
>
> **Do not** disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
>
> Replace only with the Compaq spare designated for this product.

WARNING: Batteries, battery packs, and accumulators should not be disposed of with general household waste. To forward them for recycling or proper disposal, please use a public collection system or return them to either Compaq, your authorized Compaq Partners, or their agents.

Appendix **B**

Electrostatic Discharge

This appendix covers the following topics:

■ Precautions Against Electrostatic Discharge

■ Grounding Methods

Precautions Against Electrostatic Discharge

To prevent damaging the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage, observe the following precautions:

■ Avoid hand contact by transporting and storing products in static-safe containers.

■ Keep electrostatic-sensitive parts in their containers until the parts arrive at static-free workstations.

■ Place parts on a grounded surface before removing the parts from their containers.

■ Avoid touching pins, leads, or circuitry.

■ Always make sure you are properly grounded when touching a static-sensitive component or assembly.

Grounding Methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

■ Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm plus or minus 10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.

■ Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.

■ Use conductive field service tools.

■ Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have your Compaq authorized reseller install the part.

> **NOTE:** For more information on static electricity, or for assistance with product installation, contact your Compaq authorized reseller.

Appendix **C**

Specifications

This appendix covers the following topics:

■ Switch Specifications

■ Environmental Specifications

■ Physical Dimensions

■ Power Supply Requirements

■ Factory Default Settings

Switch Specifications

The specifications for the Fibre Channel SAN Switch 8-EL are listed in Table C–1.

Table C–1: Fibre Channel SAN Switch 8-EL Specifications

Specification	Description
Fabric initialization	Complies with FC-SW 3.2
IP over Fibre Channel (FC-IP)	Complies with FC-IP 2.3 of the FCA profile
System architecture	Non-blocking shared-memory switch
System processor	Superscalar 33-Mhz Intel i960RP
Number of Fibre Channel ports	8 ports (7 Fixed Optical, 1GBIC)
Modes of operation	Fibre Channel Class-2 service and Fibre Channel Class-3 connectionless service
Aggregate switch I/O bandwidth	8 Gigabits per second, full duplex
Frame buffers	16 buffers per port at 2112 bytes per frame

Table C–1: Fibre Channel SAN Switch 8-EL Specifications (Continued)

Specification	Description
Port to port latency	Less than 2 microseconds with no contention
Data transmission range	Up to 13 m (42.65 ft) for passive copper
	Up to 33 m (108.27 ft) for active copper
	Up to 500 m (1,625 ft.) for short-wavelength optical link
	Up to 10 kilometers (32,820 ft.) for long-wavelength optical link
Chassis type	Back-to-front airflow (AC power connection out front)

Environmental Specifications

The acceptable environmental ranges for the switch are shown in Table C–2.

Table C–2: Environmental Specifications

Specification	Value
Temperature (operating)	10°C to 40 °C
Temperature (nonoperating)	-35°C to 65 °C
Operating humidity	5% to 85% noncondensing @ 40°C
Nonoperating humidity	95% RH nonconducting @ 40°C
Operating altitude	0 to 3 kilometers above sea level
Nonoperating altitude	0 to 12 kilometers above sea level
Operating shock	4g, 11MS duration, half sine
Nonoperating shock	20g, 11MS duration, sq.wave
Operating vibration	5, 5-500-5Hz@1.0 octave/minute
Nonoperating vibration	10, 5-500-5Hz@1.0 octave/minute

Physical Dimensions

The switch may be configured for either rack mount or desktop use. Table C–3 lists the physical dimensions.

Table C–3: Physical Specifications

Rack Mount Dimensions	1U, 19-in. rack mount (EIA compliant)
Weight	W: 4.1 kg (9 lbs.)

Power Supply Requirements

The switch has a universal power supply capable of functioning worldwide without voltage jumpers or switches. The power supply module is autoranging in terms of accommodating input voltages and line frequencies
(see Table C–4).

Table C–4: Power Supply Requirements

Quantity	Requirement
Total power	75 watts maximum
Input voltage	85 VAC minimum auto-ranging to 264 VAC maximum
Input line frequency	47 Hz minimum to 63 Hz maximum
Harmonic distortion	Power factor correction per IEC1000-3-2
BTU rating	110 watts x 3.412 BTU/hr/watts = 375 BTU/hr

Factory Default Settings

The factory default settings for the switch are listed in Table C-5.

Table C–5: Factory Default Settings

Parameter	Compaq Default (All switches)
Ethernet IP address	10.77.77.77
Ethernet Subnetmask	255.255.255.0
Fibre Channel IP address	0.0.0.0
Fibre Channel Subnetmask	None
Gateway address	Varies with model
Domain	1
BB credit	16
R_A_TOV	10000
E_D_TOV	2000
Data field size	2112
Non-SCSI Tachyon mode	0
Disable device probing	0
VC-Encoded address mode	0
Per-Frame route priorities	0
VC priorities	0,1,2,2,2,2,3,3
Disable fan frames	0
Reset to default	N/A
Command name	Default setting
Switch Name	Switch
Worldwide Name	Unique to each switch
Firmware version	v2.4.x or later
Firmware date	N/A
Flash date	N/A
Boot prom date	N/A
Licenses	Web Tools, Fabric and Zoning
diag.postDisable	0
fabric.ops.mode.fcpProbeDisable	0
fabric.ops.mode.isolate	0

Table C–5: Factory Default Settings (Continued)

Parameter	Compaq Default (All switches)
fabric.ops.mode.unicastOnly	0
fabric.ops.mode.SeqSwitching	0
fabric.ops.mode.longDistance	0 (1 if Extended Fabric is enabled)
fabric.ops.mode.useCsCtl	0
route.delayReroute	iodset 1
route.embeddedPortBcast	1
route.stickyRoutes	0
rpc.rstatd	0
rpc.rusersd	0
Flags	0000
Syslogd_ip	0.0.0.0
op_mode	0000
vc_link_ctl	0000
vc_class2	0002
vc_class3	0003
vc_config	C0
vc_multicast	0007
Frm collection	piling
Alt bb_credit	0000
Open bb_credit	0004
Send FAN frames	yes
Always send RSCN	1
Diag_alpa	1
Csum	5150
Text off	00000020
Text addr	10330000
Text size	0000d990
Data off	0000d9b0
Data addr	1033d9c0
Data size	00001b48

Table C–5: Factory Default Settings (Continued)

Parameter	Compaq Default (All switches)
Magic	2112
OemLogoSet	1
Fakemodel	2
Software Readable Serial Number	Compaq switch serial number
Supress F Class	0
SYNC IO Mode	0
DISABLE RLS PROBE	OFF
OPEN SEND CLS:	0
rpc.rapid	1
Translative mode Disable	0

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