Compaq StorageWorks

SAN Switch 8

Installation and Hardware Guide

First Edition (September 1999)
Part Number EK-BCP24-IA / 161355-001
Compaq Computer Corporation

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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.

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 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 electric shock hazards. Enclosed area contains no operator-serviceable parts.

WARNING: To reduce the risk of injury from electric 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 electric 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 electric 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 installation.
- 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. For continuous quality improvement, calls may be recorded or monitored.

Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for worldwide Technical Support Centers are listed on the Compaq website. Access the Compaq website 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 number
- Product model name and numbers
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

Compaq Website

The Compaq website has information on this product as well as the latest drivers and Flash ROM images. You can access the Compaq website at http://www.compaq.com.

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.

Chapter **1**

Introduction

The Compaq StorageWorks SAN Switch 8 is an 8-port Fibre Channel switch targeted at such applications as Microsoft Windows NT, Unix, OVMS, or other operating systems connecting three to five servers, storage units, and tape devices.

Compaq StorageWorks SAN Switch 8

The SAN Switch 8 consists of a motherboard with connections for up to eight Giga Bit Interface Converter (GBIC) modules, one or two power supplies, a fan assembly, and a chassis with a serial port and an RJ-45 Ethernet connection. The switch's management function lets you monitor frame throughput, error statistics, fabric topology, fans, cooling, media type, port status, and a variety of other information to aid in system debugging and performance analysis.

Front Panel

The following figure shows the front view of the SAN Switch 8. The following table describes the switch's key features.

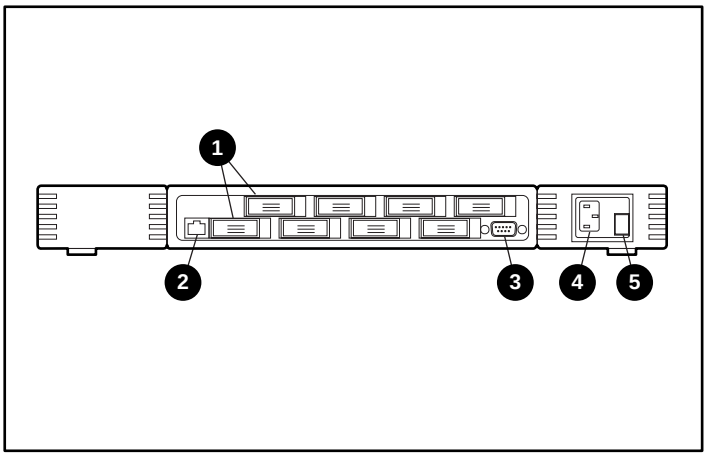


Figure 1-1. Storage switch front panel

Table 1-1
Front Panel Features

Identifier	Description	Function
❶	Fibre Channel ports	Connects the switch to devices
❷	RJ-45 Ethernet connector	Connects the switch to the network for out-of-band (Ethernet) management
❸	Serial port	Configures the IP address
❹	Power supply	Connects the switch to the power source
❺	Power ON/OFF switch	Turns the unit on and off

Note: Fibre Channel ports are numbered sequentially starting with zero for the far left port. The switch faceplate includes an imprint of each port number.

Note: The serial port is only used for recovering factory (default) settings and initial configuration of the switch's IP address.

Compaq StorageWorks SAN Switch 8 Features

The SAN Switch 8 has the following features:

- **Simplicity—**The SAN Switch 8 is easy to set up and configure. After the Power-On Self-Test (POST), just 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 Circuit (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 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 SAN Switch 8 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.

The following table describes the switch's technical features.

Table 1-2
SAN Switch 8 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 receive frame buffers are available for each set of 4 Fibre Channel ports.
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 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 to private devices.

continued

Table 1-2
SAN Switch 8 Technical Features *continued*

Feature	Description
Management	The switch can be managed through Telnet, the SNMP agent, or Web Management Tools included in the 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, World Wide Names, 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 8 x 100 MB/s (0.8 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.

Manageability

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

Reliability

The following features help to ensure the switch's reliability:

- Power-On Self-Test (POST)
- BootROM Memory Testing
- Temperature and fan-speed monitoring
- Low component count
- Optional dual-redundant hot-pluggable power supplies

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 significant event logging and reporting
- Modular Field Replaceable Units (FRUs)

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

Switch Components

The following figure shows the top view of the SAN Switch 8. Table 1-3 describes the key components.

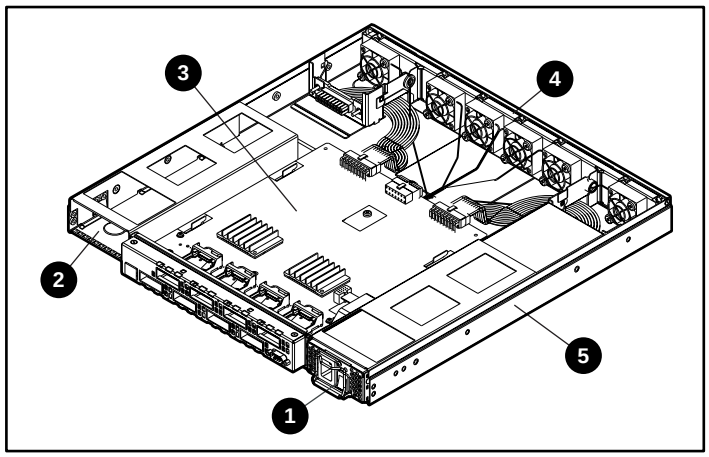


Figure 1-2. Switch components

Table 1-3
SAN Switch 8 Components

Identifier	Description
❶	Power supply
❷	Dual power supply compartment or optional redundant power supply
❸	Motherboard
❹	Fan assembly
❺	Chassis

Note: The SAN Switch 8 can support a dual-redundant power supply configuration with hot-pluggable power supplies.

GBIC Modules

The SAN Switch 8 accommodates up to eight GBIC modules. All interfaces have status lights on the front panel for quick, visual checks of the GBIC modules' status and activity. If your installation requires less than eight GBIC modules, a metal spring-loaded door protects the unused port positions.

Shortwave (GBIC-SW) and longwave (GBIC-LW) GBIC modules are supported. The following figure shows a GBIC module.

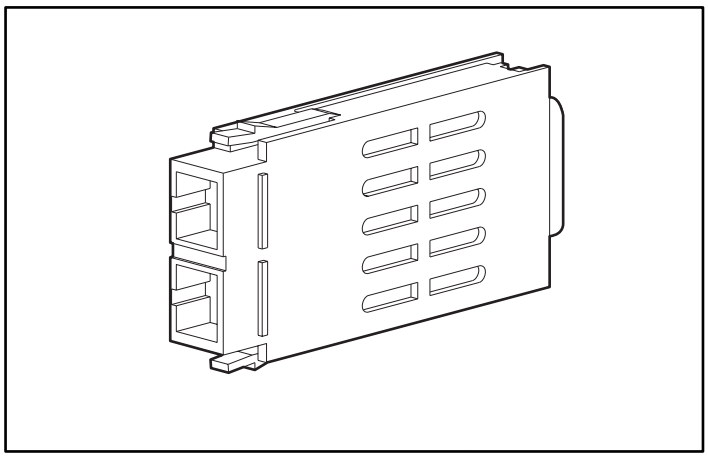


Figure 1-3. Giga Bit Interface Converter (GBIC) module

GBIC-SW Module

The GBIC-SW module with the subscriber connector (SC) color-coded black is based on short wavelength 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 fiber optic cable is connected to the port.

GBIC-LW Module

The GBIC-LW module with the subscriber connector (SC) color-coded blue is based on long wavelength 1300nm lasers supporting 1.0625 GB/s link speeds. The GBIC-LW module supports 9-micron single-mode fiber 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 fiber optic cable is connected to the port.

Switching Function

The SAN Switch 8 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.

Chapter **2**

Installation

Package Contents

Make sure the following items are included in the SAN Switch 8 package:

- An 8-port Fibre Channel switch ❶
- One AC power cord ❷
- A software and documentation package ❸

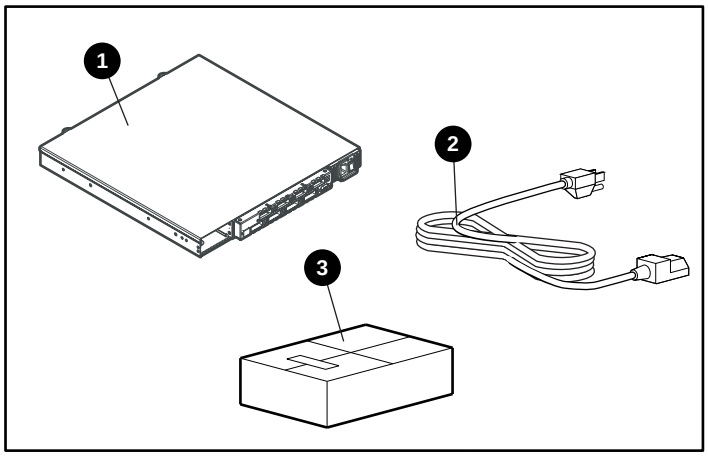


Figure 2-1. Switch kit contents

Selecting an Operating Location

The switch 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 six fans mounted near the rear of the chassis. Exhausted air is expelled through vents at the front of the chassis. The combined air flow through the switch is 75 cubic feet per minute (cfm), with nominal bulk flow of 15 cfm.

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 right side of the switch front panel. If you have dual-redundant power supplies, the second AC cord is connected to the switch connector on the left side of the switch front panel. Each AC power source must meet these requirements:

- A properly wired, earth-grounded AC outlet
- Voltage capability of 100-240 VAC
- Input voltage frequency of 47-63 Hz
- Power capability of 100 watts, maximum

The switch has an autoranging power supply that automatically accepts voltages within its range. There is no provision for surge protection built into the switch power supply, so the AC source should include provisions to ensure clean AC power.

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.

Surface Mounting

To operate the switch on a surface, you do not need to perform additional steps. Continue the installation procedure with "Installing GBIC Modules," later in this chapter.

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 rack-mounting option kit for more information.

Installing GBIC Modules

The SAN Switch 8 can accommodate up to 8 GBIC modules. GBIC modules are hot-pluggable. To install a GBIC module:

CAUTION: The GBIC modules contain static-sensitive components. Use electrostatic discharge (ESD) precautions while handling GBIC modules.

1. Insert a GBIC module into a Fibre Channel port. 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 IBM GBIC modules, 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.
4. Repeat the procedure for each GBIC module to be installed.

Cable Specifications

All cables connect at the front of the switch. Recommended cabling supports the switch's 1.0625-GB/s transfer rate.

Fibre Channel Cables

The following table lists the cabling specifications for Fibre Channel cables.

Table 2-1
Fibre Channel Cabling Specifications

Cable Type	Cable Specifications	Maximum Length	GBIC Module
Shortwave Fiber Optic	■ Duplex SC plug connectors ■ Multi-mode fiber ■ 50 µm core diameter ■ 125 µm cladding diameter duplex cable	1,641 ft (500 m)	780-860 µm without open fiber control (non-OFC)
Longwave Fiber 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 Cables

The switch uses a standard serial cable with a male 9-pin D-Subminiature connector. The switch requires only pins 2, 3, and 5. The pin designations are listed in the following table.

Table 2-2
Serial Cable Pin Designations

Pin	Signal	Description
1	DCD	Carrier Detect
2	TxData	Transmit Data
3	RxData	Receive Data
4	DTR	Data Terminal Ready
5	GND	Logic Ground
6	DSR	Data Set Ready
7	RTS	Request to Send
8	CTS	Clear To Send
9	RI	Ring Indicator

Connecting the Storage Subsystem and Host

The storage subsystem and host devices connect to the GBIC modules in the switch's Fibre Channel ports. Cable connectors are keyed and must be inserted properly into the GBIC module connectors. Remove the protective cover from the GBIC connector and make sure that the surfaces of all cable and GBIC module connectors are clean and free of dust and debris. Figure 2-2 shows the cable connections.

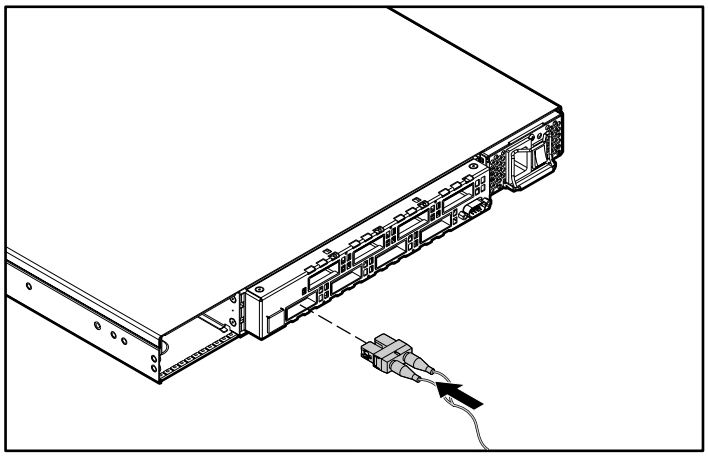


Figure 2-2. Connecting a cable to a GBIC module in a Fibre Channel port

Connecting the Power Cable

Connect the AC power cable to the AC connector on the front-right side of the switch. If you have dual-redundant power supplies, connect the second power cable to the AC connector on the front-left side of the switch.

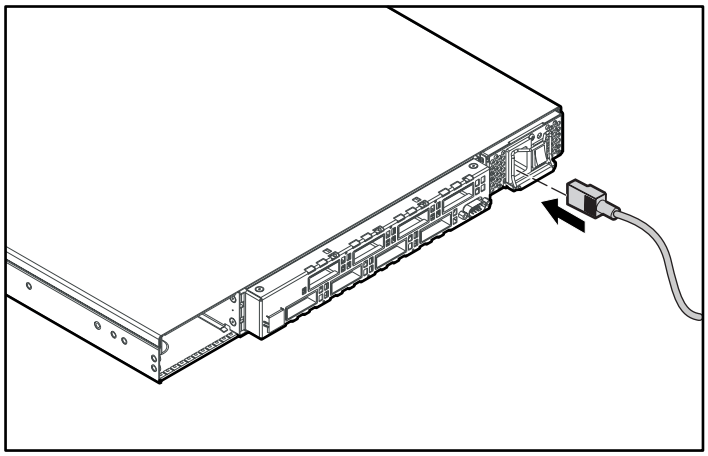


Figure 2-3. Connecting the power cable

Connecting the Serial Cable

Connect the serial port to the COM port of a workstation using a standard serial cable with a DB9 connector.

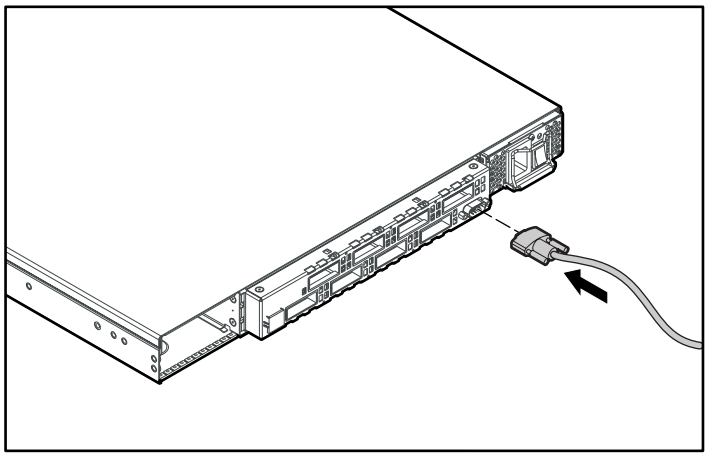


Figure 2-4. Connecting the serial cable

Connecting the Ethernet Cable

Connect the switch to an Ethernet 10/100BaseT network by plugging the Ethernet cable into the RJ-45 connector. This connection allows access to the switch's internal SNMP agent and remote Telnet and Web access.

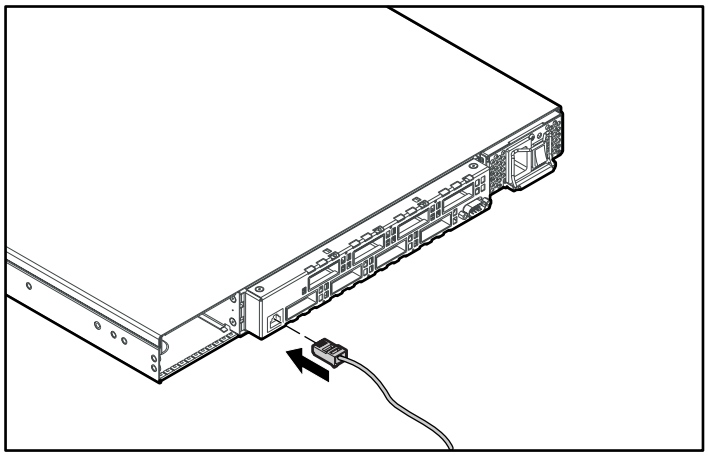


Figure 2-5. Connecting the Ethernet cable

Chapter 3

Setup

To set up the switch and prepare for switch management:

1. Power on the switch.
2. Make a serial connection to the switch.
3. Initiate a Telnet session.

Powering Up the Switch

Turn on the AC power switch located on each power supply. The switch automatically runs the Power-On Self-Test (POST) and the LED indicators become active.

Front Panel LED Indicators

The color and flash speed of the front panel LED indicators signify the status of each Fibre Channel port. Table 3-1 summarizes the possible LED states.

Table 3-1
Front Panel LED Indicators

LED Indicators	Definition
No light showing	No light or signal carrier (no GBIC module or cable installed) for media interface LEDs
Steady amber	Receiving light or signal carrier, but not online yet
Slow flashing amber	Disabled, flashes every 2 seconds
Fast flashing amber	Error or fault with port, flashes every ½ second
Steady green	Online (connected to device over cable)
Slow flashing green	Online but cannot make a proper fabric connection (loopback cable is not installed, fabric is segmented, or switch is connected to an incompatible switch), flashes every 2 seconds
Fast flashing green	Internal loopback (diagnostic), flashes every ½ second
Flickering green	The port is active and transferring data and frame traffic

Making a Serial Connection

The switch is connected to a COM port of a workstation using a standard serial cable. Through this connection, you can verify POST, view and change the IP address of the switch, and reset the switch to factory default values.

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 of a switch:

1. On the workstation, launch a remote communication program.

   NOTE: HyperTerminal is the remote communication program provided with Windows 95/98/NT and can be found on the Accessories menu that displays when you click Start and select 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.
3. Change the port settings to communicate at 9600 bits per second.
4. Press **Enter** to display the remote communication prompt.

Verifying the Power-On Self-Test

The switch employs POST to determine its operating status and isolate problems. When a test completes successfully, the message “Passed” displays through the serial connection.

If POST is completed successfully, the switch is ready to operate. Should the switch fail to complete POST successfully, the green power LED indicator on the front panel will flash. This indicates a fault in one of the initial stages of POST and signifies that the processor is unable to bring up the operating environment. If this error occurs, the switch could require repair.

If the switch’s operating system completely boots but other errors are encountered during POST, those errors are logged in the system error log. Use a Telnet session to view the error log.

NOTE: Error messages are stored in RAM and are lost when power is removed from the switch. Access the error message log to view any error messages before removing power from the switch.

Setting the IP Address

The switch’s IP address is used to establish a network connection to the switch through the external Ethernet connection. To change the IP address to a compatible network address before connecting the switch to the network, use the front panel RS-232 serial port.

To set the IP address using the serial port:

1. Enter the ipAddrSet command at the prompt switchName:userName>.
2. Enter the Fibre Channel IP address and subnet mask, and the Ethernet IP address, subnet mask, and gateway address when prompted.
3. For future reference, copy the new IP address to the label provided on the top front edge of the switch.
4. Close the remote communication program and disconnect the serial cable from the workstation and the switch.

NOTE: For dust and ESD protection, the switch includes a cover for the serial port. Always cover the serial port when not in use.

Resetting Factory Defaults

If you change a password and forget it, the password can be reinitialized. To reset factory defaults:

1. Establish remote communication from a workstation to the switch's serial port using a standard serial cable with a DB9 connector.
2. When the prompt switchName:userName> displays, enter the configDefault command. The switch's default values are restored.

CAUTION: The configDefault command resets the password as well as many other switch parameters. Do not issue this command without understanding its effects.

3. Close the remote communication program, disconnect the serial cable from the workstation and the switch, and cover the serial port.

Initiating a Telnet Session

A Telnet session is initiated through an Ethernet connection between the network and the switch's Ethernet RJ-45 connector.

NOTE: The serial port connection and the Ethernet connection cannot be active at the same time. The Ethernet connection takes priority, so the serial port is terminated when an Ethernet connection is made.

Through a Telnet session you can manage the switch, perform diagnostics, and view error messages. To initiate a Telnet session:

1. Launch Telnet from a workstation connected to the network.

   NOTE: For Windows 95/98/NT, select Run from the Start menu. Type Telnet, then click OK.

2. From Telnet, use the IP address to connect to the switch.

   NOTE: For Windows 95/98/NT, select Remote System from the Connect menu on the Telnet window. Enter the IP address of the switch in the Host Name box.

3. Press **Enter** to display the login prompt. At the prompt, enter admin.
4. At the password prompt, enter password.
5. When the prompt switchName:userName> displays, enter a Telnet command. You can change the password using the passwd command.

For more information on managing the switch remotely, refer to the *Compaq StorageWorks SAN Switch Fabric Operating System Management Guide* or the *Compaq StorageWorks SAN Switch QuickLoop Management Guide* that came with your switch.

Chapter **4**

Diagnostics

This chapter discusses diagnostic testing using Telnet commands. See Chapter 5, “Error Messages,” for information about the error messages generated by diagnostic tests.

Diagnostic Overview

The Compaq StorageWorks SAN Switch 8 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 in to 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.

Removing Power

Error messages are stored in RAM and are lost when power is removed from the switch. Access the error message log to view any error messages before removing power from the switch. When all data-transferring processes external to the switch are complete, removing power from the switch does not disrupt the fabric.

Power-On Self-Tests

The following table lists the diagnostic tests automatically run during the Power-On Self-Test (POST).

Table 4-1
POST Tests

Test Type	Description	Test Name
Memory test	Checks processor RAM memory	ramTest
Port Register test	Checks the ASIC registers and SRAMs	portRegTest
Central Memory test	Checks the motherboard SRAMs	centralMemoryTest
CMI Conn test	Checks the CMI bus between ASICs	cmiTest
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.

Diagnostic 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
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 checks 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 Application Specific Integrated Circuit (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 uniquely written 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 correctly sent from any ASIC to any other ASIC. This command also tests the checksum check.

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, which verifies that the SID translation required by QuickLoop and implemented using content addressable memories (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, which verifies the intended functional operation 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.

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 Descriptions

Field	Description
Diagnostics Status	The title header displays the time diagShow was executed.
port#	The port number.
diags	Port's current diagnostic status. Possible values include OK or BAD.
state	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 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, which verifies that data written into the ASIC memories are retained and that data bits do not decrease when read after some amount of 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, which 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 some amount of 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. cmemRetentionTest 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 functional operation 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 exercises 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.

NOTE: 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 Cross Port test, 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 SNMP    Physical        Flags
--------------------------------
  0: Testing  In_Sync      PRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED CBL_LB LOGIN
  1: Testing  In_Sync      PRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED CBL_LB LOGIN
  2: Testing  In_Sync      PRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED CBL_LB LOGIN
  3: Testing  In_Sync      PRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED CBL_LB LOGIN
  4: Testing  In_Sync      PRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED CBL_LB LOGIN
  5: Testing  In_Sync      PRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED CBL_LB LOGIN
  6: Testing  In_Sync      PRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED CBL_LB LOGIN
  7: Testing  In_Sync      PRESENT 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

- 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:

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

  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 fibres on all ports.
  ```

singlePortAlso mode

Specify the singlePortAlso mode by executing the Cross Port test 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 present 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
- Port 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, Figure 4-11, and Figure 4-12 show the spinSilk command, which verifies the intended functional operation 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**.

```
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 ...
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.
```

Figure 4-10. spinSilk command example 1

```
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.
(SCREEN CONTINUED ON NEXT PAGE)
```

Figure 4-11. spinSilk command example 1 (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  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 4-12. spinSilk command example 2

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

diagClearError

Figure 4-13 shows the diagClearError command, which clears diagnostic errors detected on a specified port. Issuing this command does not clear the error log. The command syntax is diagClearError <port #>. Without the <port #> parameter, all errors are cleared.

```
switch:admin> diagClearError
```

Figure 4-13. diagClearError command example

diagDisablePost

Figure 4-14 shows the diagDisablePost command, which disables POST processing. The boot time without POST processing is approximately 50 to 55 seconds. A switch rebooted without POST generates the DIAG-POST_SKIPPED error.

NOTE: Always execute POST processing to ensure the operational status of the switch during the power up stage.

```
switch:admin> diagDisablePost

Committing configuration...done.

On next reboot, POST will be skipped.
```

Figure 4-14. diagDisablePost command example

diagEnablePost

Figure 4-15 shows the diagEnablePost command, which enables POST processing. The boot 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 4-15. diagEnablePost command example

diagShow

Figure 4-16 shows the diagShow command, which summarizes the diagnostics results, including POST results, since the switch was last booted. The following table 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 4-16. diagShow command example

Table 4-4
diagShow Command Field Descriptions

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

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 4-17. setGbicMode 1 command example

To disable GBIC mode, execute the setGbicMode 0 command.

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

Figure 4-18. 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 4-19 shows the supportShow command. The command syntax is:

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

Table 4-5 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 4-19. supportShow command example

Table 4-5
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

Diagnostic Error Messages

Error messages are stored in volatile RAM and are lost when you remove power from 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 system log and display when you execute the errShow 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, it is marked BAD in the status display and is ignored until the system is rebooted. 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 change 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."

Chapter **5**

Error Messages

This chapter explains the error message formats and possible errors associated with switch diagnostics. This section includes:

- System error message formats
- Diagnostic error message formats
- Error message tables

System 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. Up to 64 messages are held in a buffer. 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 i 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 => displays. 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. Type <CR> to scroll through the error list.

Diagnostic Error Message Formats

If any port fails a diagnostic test, it 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 motherboard assembly
portRegTest	replace motherboard assembly
centralMemoryTest	replace motherboard assembly
cmiTest	replace motherboard assembly
cmemRetentionTest	replace motherboard assembly
sramRetentionTest	replace motherboard assembly

continued

Table 5-1
Probable Failure Actions *continued*

Failed Test	Action
camTest	replace motherboard assembly
portLoopbackTest	replace motherboard assembly
crossPortTest	replace motherboard assembly, GBIC, or fiber cable
spinSilk	replace motherboard assembly, GBIC, or fiber cable

Error Message Numbers

An error number (ERR#xxxx) displays at the end of diagnostic error messages. Use the following table 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 the "Error Message Table" section of this chapter.

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

continued

Table 5-2
Error Message Numbers *continued*

Error Number	Test Name	Error Name
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
103O		DIAG-BADINT
106F		DIAG-TIMEOUT
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

continued

Table 5-2
Error Message Numbers *continued*

Error Number	Test Name	Error Name
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

continued

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

continued

Table 5-2
Error Message Numbers *continued*

Error Number	Test Name	Error Name
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 Table

Table 5-3 defines each 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 motherboard 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 motherboard assembly
DIAG-CAMINIT Err#223B [camTest]	The port failed to initialize due to one of the following reasons: ■ Switch not disabled ■ Diagnostic queue absent ■ Malloc failed ■ Chip is not present ■ Port is not in loopback mode ■ Port is not active	Software operational setup error or motherboard failure	Retry, reboot or replace motherboard assembly
DIAG-CAMSID Err#223C [camTest]	An ASIC failed SID NO translation test.	ASIC failure	Replace motherboard assembly
DIAG-CLEAR_ERR Err#0001	A port's diag error flag (OK or BAD) is cleared.	Informational Only	None required
DIAG-CMBISRF Err#1021 [centralMemoryTest]	An ASIC's Central Memory SRAMs did not complete the BISR within the timeout period.	ASIC failure	Replace motherboard assembly

continued

Table 5-3
Diagnostic Error Messages *continued*

Message	Description	Probable Cause	Action
DIAG-CMBISRTO Err#1020 [centralMemoryTest]	An ASIC's Central Memory SRAMs did not complete the BISR within the timeout period.	ASIC failure	Replace motherboard assembly
DIAG-CMERRPTN Err#102B [centralMemoryTest]	An error was detected at the wrong port.	ASIC failure	Replace motherboard assembly
DIAG-CMERRTYPE Err#102A [centralMemoryTest]	A port received the wrong CMEM error type.	ASIC failure	Replace motherboard assembly
DIAG-CMICKSUM Err#2036 [cmiTest]	A CMI message received a failed bad checksum test.	ASIC or motherboard failure	Replace motherboard assembly
DIAG-CMIDATA Err#2035 [cmiTest]	CMI data received did not match the data transmitted.	ASIC or motherboard failure	Replace motherboard assembly
DIAG-CMIINVCAP Err#2034 [cmiTest]	An unintended ASIC erroneously received a CMI capture flag.	ASIC or motherboard failure	Replace motherboard assembly
DIAG-CMINOCAP Err#2033 [cmiTest]	A CMI intended receiver ASIC failed to receive a CMI capture flag.	ASIC or motherboard failure	Replace motherboard assembly
DIAG-CMISA1 Err#2032 [cmiTest]	An attempt to send a CMI message from ASIC to ASIC failed.	ASIC failure	Replace motherboard assembly
DIAG-CMNOBUF Err#1029 [centralMemoryTest]	A port could not receive a buffer.	ASIC failure	Replace motherboard assembly

continued

Table 5-3
Diagnostic Error Messages *continued*

Message	Description	Probable Cause	Action
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 motherboard assembly, GBIC module, or fiber cable
DIAG-ERRSTAT Err#2640-2647, 3040- 3047, 3840-3847 [portLoopbackTest, crossPortTest, spinSilk]	The Port Error Statistics counter is non-zero, meaning 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 motherboard 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 motherboard assembly, GBIC module, or fiber cable

continued

Table 5-3
Diagnostic Error Messages *continued*

Message	Description	Probable Cause	Action
DIAG-INTNIL Err#2031 [cmiTest]	An ASIC failed to receive a CMI error (interrupt).	ASIC failure	Replace motherboard assembly
DIAG-INTNOTCLR Err#102C [centralMemoryTest]	The interrupt bit could not be cleared.	ASIC failure	Replace motherboard assembly
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 motherboard 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 motherboard 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 motherboard assembly
DIAG-LCMTO Err#1F26, 1026 [centralMemoryTest, cmemRetentionTest]	The Central Memory timed out: the data transfer initiated did not complete within the timeout period.	ASIC failure	Replace motherboard assembly
DIAG-MEMNULL Err#0112 [ramTest]	The test failed to malloc.	Motherboard failure	Replace motherboard assembly
DIAG-MEMSZ Err#0111 [ramTest]	The memory size to be tested is less than or equal to zero.	Motherboard failure	Replace motherboard assembly

continued

Table 5-3
Diagnostic Error Messages *continued*

Message	Description	Probable Cause	Action
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 motherboard assembly or DRAM module
DIAG-PORTABSENT Err#2670, 3070, 3870 [portLoopbackTest, crossPortTest, spinSilk]	A port is not present.	ASIC or motherboard failure	Replace motherboard assembly
DIAG-PORTDIED Err#265F, 305F, 385F [portLoopbackTest, crossPortTest, spinSilk]	A port was in loopback mode and then went inactive.	ASIC, GBIC module, or fiber cable failure	Replace motherboard 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 motherboard 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 motherboard assembly
DIAG-POST_SKIPPED Err# 0004 [switch initialization]	POST is skipped. A message recommends that POST be executed.	Informational Only	None 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 motherboard assembly

continued

Table 5-3
Diagnostic Error Messages *continued*

Message	Description	Probable Cause	Action
DIAG-REGERR_UNRST Err#0B16, 0416 [portRegTest, sramRetentionTest]	A port failed to unreset.	ASIC failure	Replace motherboard 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 motherboard assembly, GBIC module, or fiber cable
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 motherboard 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 motherboard assembly
CONFIG CORRUPT	The switch configuration information has become irrevocably corrupted.	OS error	The system resorts 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

continued

Table 5-3
Diagnostic Error Messages *continued*

Message	Description	Probable Cause	Action
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
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

continued

Table 5-3
Diagnostic Error Messages *continued*

Message	Description	Probable Cause	Action
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
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

continued

Table 5-3
Diagnostic Error Messages *continued*

Message	Description	Probable Cause	Action
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
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

continued

Table 5-3
Diagnostic Error Messages *continued*

Message	Description	Probable Cause	Action
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 read error.	OS error	Contact customer support
SYS, FLASHWR, LOG_ERROR	There was a FLASH memory write error.	OS error	Contact customer support
TIMERS, ENQFAIL, LOG_CRITICAL	There was an invalid timeout 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

continued

Table 5-3
Diagnostic Error Messages *continued*

Message	Description	Probable Cause	Action
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
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

continued

Table 5-3
Diagnostic Error Messages *continued*

Message	Description	Probable Cause	Action
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
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

Chapter **6**

Repair and Replacement

Repair and Replacement Overview

This chapter covers the recommended and supported field repair and replacement procedures for the Compaq StorageWorks SAN Switch 8. This chapter includes:

- Field Replaceable Units
- Replacing the Power Supply
- Replacing a GBIC Module
- Removing and Replacing the Switch Cover
- Replacing the Fan Assembly
- Replacing the Motherboard
- Replacing the Chassis

NOTE: Any switch repair or part replacement that is not explained in this chapter must be performed at the factory or an authorized repair facility.

Field Replaceable Units

Table 6-1 lists the field replaceable units (FRUs) and their related part numbers available for the SAN Switch 8. Contact your sales representative for price, delivery, and shipping information.

Table 6-1
Field Replaceable Units

Description	Part Number
Motherboard	159661-001 (29-34646-01)
Power Supply	159663-001 (29-34648-01)
Fan Assembly	159662-001 (29-34647-01)
Chassis	159664-001 (29-34649-01)
GBIC-SW	234458-001 (FE-09086-01)
GBIC-LW	FD-89504-01

Replacing the Power Supply

There are no user-serviceable parts inside the power supply chassis. Opening the power supply voids its warranty and certification. The entire power supply unit can be removed according to the procedure outlined in the following section.

Removing the Power Supply

To remove the switch's power supply:

1. Turn off the power to the power supply you are removing.
2. Remove the power cord attached to the power supply.
3. Pull down the metal handle on the top of the power supply unit.

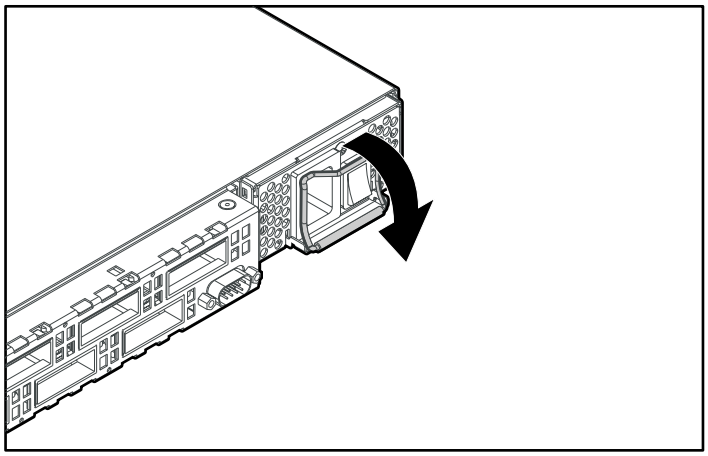


Figure 6-1. Metal handle on the power supply

4. Gently pull out the unit.

NOTE: If you feel resistance when removing the power supply, pull the handle at an upward angle and slide the unit out.

Installing the Power Supply

To install a new power supply:

1. Slide the new power supply into its slot until the unit is flush with the front panel.
2. Lock the metal handle into the power supply by pushing the handle up and locking it into place.
3. Reattach the power cord to the power supply.
4. Turn on the power to the switch. The switch automatically runs POST when power is applied to the switch.

   NOTE: If you have a dual-redundant power supply configuration, the switch will only run POST if both power supplies are turned off and then turned on.

5. Check for error messages through Telnet.

Replacing a GBIC Module

The GBIC modules are installed and removed by sliding them into and out of the motherboard slots on the front of the unit. GBIC modules are hot-pluggable.

CAUTION: The GBIC modules contain static-sensitive components. Use electrostatic discharge (ESD) precautions while handling GBIC modules.

Removing a GBIC Module

If you are using an IBM GBIC module, pull down the metal swing bar on the front of the GBIC and pull out the bar. Carefully wiggle the GBIC module from side to side to unseat it. The following figure shows an IBM GBIC module.

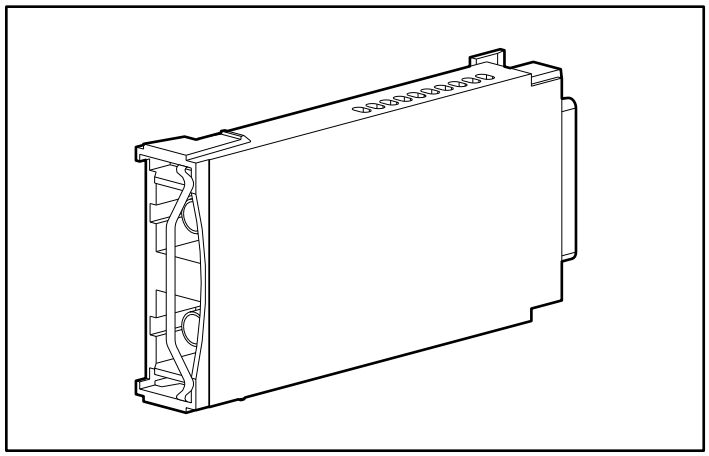


Figure 6-2. IBM GBIC module

If you are using any other type of GBIC module, squeeze the side prongs and carefully pull out the GBIC module. Figure 6-3 shows a squeeze-prong GBIC module.

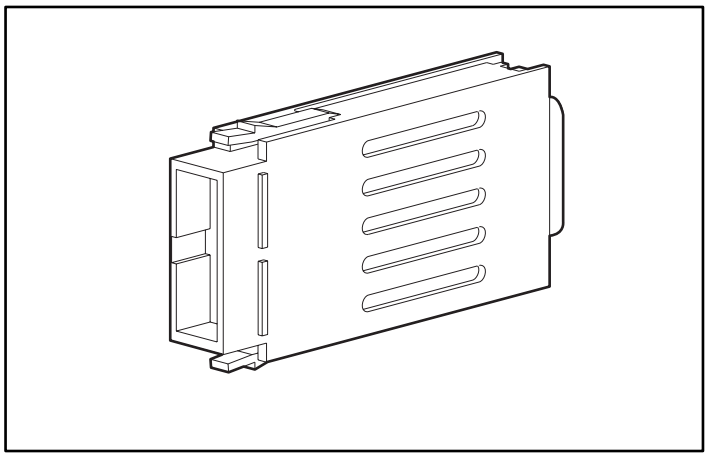


Figure 6-3. Squeeze-prong GBIC module

Installing a GBIC Module

Insert the GBIC module into the appropriate port until its connector is firmly seated in the port. If you are using an IBM GBIC module, 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.

Removing the Switch Cover

To remove the switch cover:

1. Unscrew the two captive screws at the rear of the unit by turning them a quarter turn to the left.
2. Slide the cover at least ½ inch toward the rear of the unit.
3. Lift off the cover.

CAUTION: Always wear a ground wrist strap when opening the switch's cover to avoid electrostatic discharge.

CAUTION: Attempting to remove the cover without first sliding the cover ½ inch to the rear can damage the cover.

Replacing the Switch Cover

To replace the switch cover:

1. Place the cover on the switch leaving ½ inch hanging over the front of the unit.
2. Slide the cover back until it slips down into the grooves on the top of the chassis.
3. Press the cover down.
4. Gently slide the cover forward into the front panel until it engages.
5. Fasten the two captive screws on the back of the chassis by turning them a quarter turn to the right.

Replacing the Fan Assembly

To replace the fan assembly, remove the switch's cover and the existing fan assembly, then install a new fan assembly and replace the switch's cover.

NOTE: You do not need to power off the switch to replace the fan assembly. The switch can safely run for up to 25 minutes under average conditions while the fan assembly is being replaced.

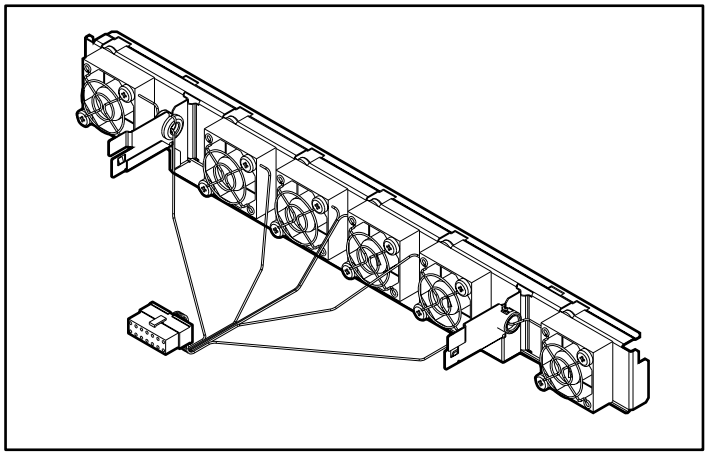


Figure 6-4. Fan assembly

Removing the Fan Assembly

To remove the fan assembly:

1. Remove the switch cover. For detailed instructions, see “Removing the Switch Cover,” earlier in this chapter.
2. Unplug the fan assembly’s wiring harness from the center of the motherboard by depressing the locking hook on the top of the connector. Pull the connector out of the motherboard. Do not pull the connector wires.

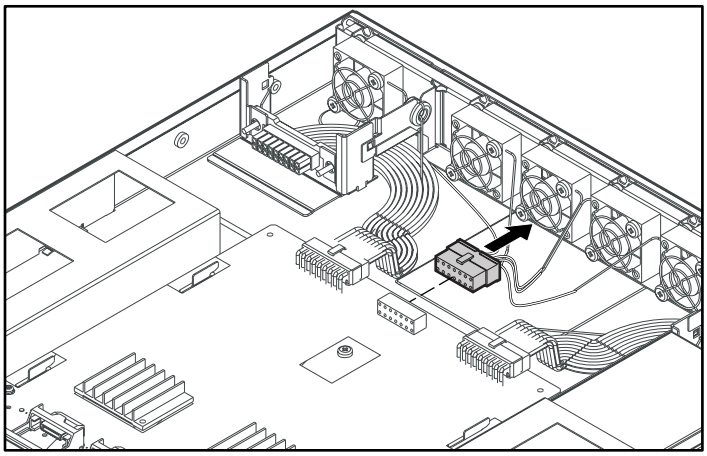


Figure 6-5. Disconnecting the wiring harness

3. If your unit does not have metal tabs, pull the fan assembly straight up and out of the switch. Go to with the next section, “Installing the Fan Assembly.”

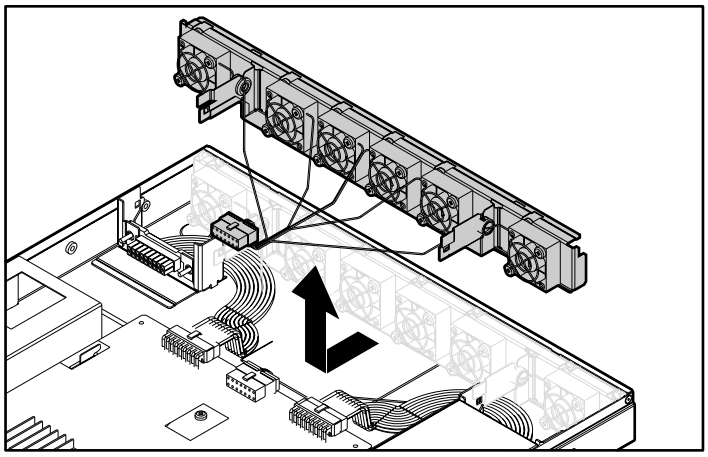


Figure 6-6. Removing the fan assembly

4. If your unit has metal tabs, clear the metal tabs in front of the fan assembly by gently pushing the top of the tab toward the outside of the unit and the bottom of the tab to the inside of the unit.

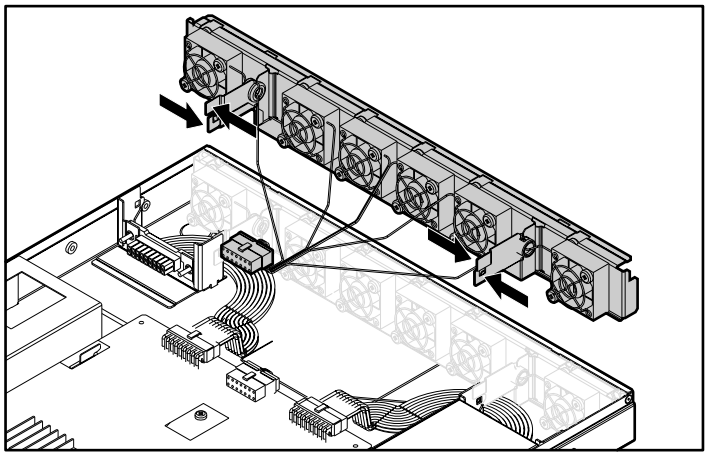


Figure 6-7. Releasing the tabs on the fan assembly

5. After releasing the tabs, gently rotate the bottom of the fan assembly toward the front of the switch.

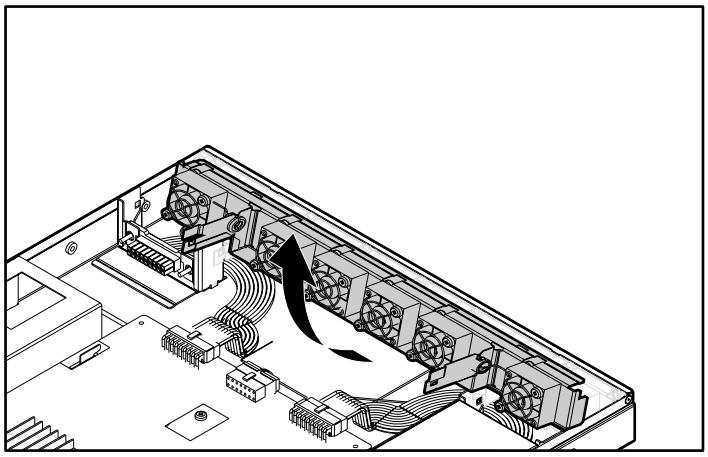


Figure 6-8. Rotating the fan assembly

6. Pull the fan assembly up and back until you can slide it off the metal slats attached to the back of the chassis.

Installing the Fan Assembly

To install the fan assembly:

1. If your unit does not have metal slats, insert the fan assembly straight down into the switch, moving the wiring harness to the side. Go to Step 4.
2. If your unit has two metal slats protruding from the back of the chassis, tilt the fan assembly slightly up and slide it onto the slats.
3. Lower the fan assembly onto the metal tabs protruding from the back of the power supply chassis, moving the wiring harness to the side.
4. Attach the fan assembly's wiring harness to the center connection on the motherboard.
5. Check to make sure that the fan assembly is operational.
6. Replace the switch cover. For detailed instructions, see "Replacing the Switch Cover," earlier in this chapter.

Replacing the Motherboard

To replace the motherboard, remove the switch's cover and the motherboard, then install the new motherboard and replace the switch's cover.

CAUTION: Always wear a ground wrist strap when opening the switch's cover to avoid electrostatic discharge.

NOTE: You need a #2 and a #4 Phillips head screwdriver to remove and install a motherboard.

Removing the Motherboard

CAUTION: The motherboard contains static-sensitive components. Use electrostatic discharge (ESD) precautions when handling the motherboard.

1. Turn off all the power to the switch.
2. Remove all power cables and fiber optic cables attached to the front panel.
3. Remove the switch cover. See "Removing the Switch Cover," earlier in this chapter.
4. Remove all GBIC modules. See "Removing a GBIC Module," earlier in this chapter.
5. Disconnect the fan assembly wiring harness from the middle back edge of the motherboard. Do not pull the connector wires.
6. Disconnect the power supply connectors from the back corner edges of the motherboard.
7. Disconnect the serial port ribbon cable from the right front side of the motherboard.
8. Remove the four Phillips screws from the motherboard.
9. Slide the motherboard forward so it will clear the metal guides on the right and left sides of the motherboard.

10. Lift the back end of the motherboard about 45° over the metal guides and slide it back until it lifts out of the chassis.

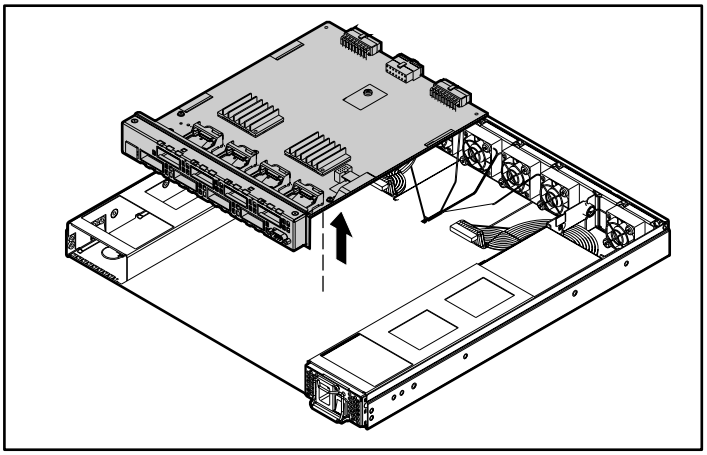


Figure 6-9. Removing the motherboard

11. Remove the new motherboard from its antistatic bag and place the old motherboard into the bag.

Installing the Motherboard

1. Lay the serial port ribbon cable to the side by placing it over the power supply.
2. Tilt the front end of the motherboard down about 45° and slide it into the front panel of the switch. Lower the rear end of the motherboard so that the metal guides on the chassis fit into the slots on the motherboard.
3. Slide the motherboard forward against the front panel until the screw holes line up.
4. Install the four Phillips screws into the motherboard. The #4 Phillips head screw goes into the center back hole on the motherboard and the #2 Phillips head screws go into the three holes at the front of the motherboard.
5. Reconnect the serial port ribbon cable to the motherboard. The cable connector is keyed with the red strip going to pin 1 on the connector and gently lay the excess ribbon cable between the motherboard and chassis to prevent cable damage.
6. Reconnect the power supply connectors.
7. Reconnect the fan assembly connector.

8. Replace the switch's cover. See "Replacing the Switch Cover," earlier in this chapter.
9. Reinstall the GBIC modules. See "Installing a GBIC Module," earlier in this chapter.
10. Reconnect all external cabling.
11. Turn on the switch's power supplies. The switch automatically runs POST.
12. Check for error messages through Telnet.

Replacing the Chassis

To replace the chassis assembly, you must remove the switch's GBIC modules, cover, motherboard, power supply or supplies, and fan assembly from the current chassis, and install them into the new chassis assembly.

Removing the Switch Components

To remove the switch components:

1. Turn off the power to the switch.
2. Remove all external cabling from the front panel.
3. Remove the power supply or supplies. See "Removing the Power Supply," earlier in this chapter.
4. Remove all GBIC modules. See "Removing a GBIC Module," earlier in this chapter.
5. Remove the switch cover. See "Removing the Switch Cover," earlier in this chapter.
6. Remove the fan assembly. See "Removing the Fan Assembly," earlier in this chapter.
7. Remove the motherboard. See "Removing the Motherboard," earlier in this chapter.

Installing the Switch Components

To install the switch components into a new chassis:

1. Install the motherboard. See “Installing the Motherboard,” earlier in this chapter.
2. Install the fan assembly. See “Installing the Fan Assembly,” earlier in this chapter.
3. Replace the switch cover. See “Replacing the Switch Cover,” earlier in this chapter.
4. Install the GBIC modules. See “Installing a GBIC Module,” earlier in this chapter.
5. Install the power supply or supplies. See “Installing the Power Supply,” earlier in this chapter.
6. Reconnect all external cabling.
7. Turn on the power to the switch. The switch automatically runs POST.
8. Check for error messages through Telnet.

Appendix **A**

Regulatory Compliance Notices

Regulatory Compliance Identification Numbers

For the purpose of regulatory compliance certifications and identification, your Compaq StorageWorks SAN Switch 8 is assigned a Compaq Series Number. The Compaq Series Number for this product is: Series NA2102. The Compaq StorageWorks SAN Switch 8 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.

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 (that is, 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 which class (A or B) the equipment falls into. Class B devices have an FCC logo or FCC ID on the label. Class A devices do not have an FCC ID on the label. Once the class of the device is determined, refer to the following corresponding statement.

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). 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.

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.

Mouse Compliance Statement

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.

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 (in brackets are the equivalent international standards):

- EN55022 (CISPR 22) - Electromagnetic Interference
- EN50082-1 (IEC801-2, IEC801-3, IEC801-4) - Electromagnetic Immunity
- EN60950 (IEC950) - Product Safety

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 not 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

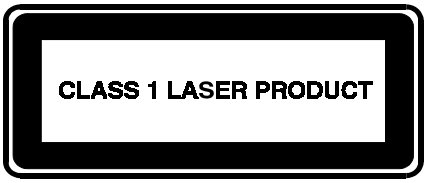
The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States.

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.



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
Wave Length	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

Appendix ***B***

Electrostatic Discharge

To prevent damage to the system, heed 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 can damage system boards or other static-sensitive devices. This type of damage can 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 they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be 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 ± 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 a 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

General Specifications

Table C-1
Switch Specifications

Specification	Description
ANSI Fibre Channel protocol for SCSI (FCP)	Complies with ANSI Standard to transmit SCSI commands and data
ANSI Fibre Channel protocol	Fibre Channel ANSI Standard (FC-PH)
Fabric initialization	Complies with FC-SW 3.2
IP Over Fibre Channel (FC-IP)	Complies with 2.3 of the FCA profile
System architecture	Nonblocking shared-memory switch
System processor	Superscalar 33-MHz Intel i960RP
Number of Fibre Channel ports	8 ports
Fibre Channel port speed	1.0625 GB/s, full duplex
Modes of operation	Fibre Channel Class-2 service and Fibre Channel Class-3 connectionless service
Aggregate switch I/O bandwidth	8 GB/s, full duplex

continued

Table C-1
Switch Specifications *continued*

Specification	Description
Frame buffers	16 buffers per port at 2112 bytes per frame
Fabric latency	<2 microseconds with no contention
Data transmission range	Up to 1,625 ft (500 m) for short-wavelength optical link Up to 84,480 ft (10 km) for long-wavelength optical link
Chassis types	Back-to-front airflow (power supply out front)

Fabric Management Specifications

Table C-2
Fabric Management Specifications

Standard Features	Description
Fabric management	Simple Name Server, Alias Server, SNMP, Telnet, World Wide Web
User interface	RJ-45 front panel connector for 10/100BaseT Ethernet or in-band
Serial port	Local front panel RS-232 port for recovering factory settings

Safety Specifications

Table C-3
Safety Specifications

Country	Specification	EMC
Canada	CSA 22.2 No. 950 Third Edition	CSA C108.8 Class A
United States	UL 1950 Third Edition	FCC Part 15 Class A
Japan	EN60950+A1+A2+A3+A4+A11	VCCI Class A
International	EN60950+A1+A2+A3+A4+A11	EN55022 Level A/CISPR22 Class A

continued

Table C-3
Safety Specifications *continued*

Country	Specification	EMC
United Kingdom/Ireland	EN60950+A1+A2+A3+A4+ A11;73/23/EEC	EN55022 Level A; 89/336/EEC
France	EN60950+A1+A2+A3+A4+ A11;73/23/EEC	EN55022 Level A; 89/336/EEC
Germany	EN60950+A1+A2+A3+A4+ A11;73/23/EEC	EN55022 Level A; 89/336/EEC
Austria	EN60950+A1+A2+A3+A4+ A11;73/23/EEC	EN55022 Level A; 89/336/EEC
Spain/Portugal/Italy	EN60950+A1+A2+A3+A4+ A11;73/23/EEC	EN55022 Level A; 89/336/EEC
Sweden	EN60950+A1+A2+A3+A4+ A11;73/23/EEC	EN55022 Level A; 89/336/EEC
Norway	EN60950+A1+A2+A3+A4+ A11	
Finland	EN60950+A1+A2+A3+A4+ A11;73/23/EEC	EN55022 Level A; 89/336/EEC
Denmark	EN60950+A1+A2+A3+A4+ A11;73/23/EEC	EN55022 Level A; 89/336/EEC
Australia		AS/NZS 3548:1995 Class A
New Zealand		AS/NZS 3548:1995 Class A

Optical Port Specifications

The Fibre Channel interfaces of a Compaq StorageWorks SAN Switch 8 system are equipped with optical port interfaces that use a shortwave (780 to 850 nm) or long wavelength (1270 to 1350 nm) laser transmitter. The laser complies with 21 CFR (J) Class 1 laser safety requirements. The Fibre Channel interfaces use Non-Open Fibre Control Optical GBIC modules in the switch circuit. Safe Class 1 operation is guaranteed by limiting optical power emitted by the port, thereby eliminating the need for physical shutters. The optical GBIC module uses the duplex-SC connector scheme.

Environmental Specifications

The Compaq StorageWorks SAN Switch 8 primary operating environments are server rooms, network equipment closets, and office environments. The acceptable environmental ranges for the switch are listed in the following table.

Table C-4
Environmental Specifications

Specification	Value
Temperature (operating)	32°F to 104°F (0°C to 40°C)
Temperature (non-operating)	-31°F to 149°F (-35°C to 65°C)
Operating humidity	5% to 85% RH noncondensing @ 104°F (40°C)
Nonoperating humidity	95% RH noncondensing @ 104°F (40°C)
Operating altitude	0 to 9,843 ft (0 to 3 km) above sea level
Nonoperating altitude	0 to 39,372 ft (0 to 12 km) above sea level
Operating shock	5g, 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

Dimensions

Table C-5
Dimensions

Feature	Description
Rack-mount dimensions	1U, 19-in. rack mount (EIA compliant) H: 1.71 in. (43.4 mm), W: 16.88 in. (428.8 mm), D: 17.72 in. (450.0 mm)
Surface-mount dimensions	H: 1.86 in. (47.2 mm), W: 16.88 in. (428.8 mm), D: 17.72 in. (450.0 mm)
Weight	17 lb

Power Supply

The SAN Switch 8 has a Universal Power Supply capable of functioning worldwide without voltage jumpers or switches. The supply is autoranging in terms of accommodating input voltages and line frequencies. The power supply meets the requirements outlined in the following table.

Table C-6
Power Supply Requirements

Feature	Requirement
Total power	100 watts
Input voltage	85 to 265 VAC
Input line frequency	47 to 63 Hz
Inrush current	10 amps peak > 300 usec - hot/cold start
Harmonic distortion	Active power factor correction per IEC1000-3-2
Input line protection	Fused in both hot and neutral lines
Maximum dimensions	H: 1.5 in. (38.1 mm), W: 3.5 in. (88.9 mm), L: 11 in. (279.4 mm)
Redundancy	Dual power supplies - Hot-pluggable

The power supply plugs directly into the enclosure through the front panel, mating to an internal blind-mate connector. The power supply supports a dual-redundant power supply configuration in which the supplies are hot-pluggable.

An integral on/off switch, input filter, and power indicator are provided in the power supply.

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