

Compaq StorageWorks

SAN Access Module

User Guide

Second Edition (August 2001)
Part Number 222840-002
Compaq Computer Corporation



222840-002

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Contents

About This Guide

Text Conventions.....	vi
Symbols in Text.....	vi
Symbols on Equipment.....	vii
Where to Go for Additional Help	viii
Telephone Numbers.....	viii

Chapter 1

Features

Overview of Features.....	1-2
SAN Access Module Options	1-2

Chapter 2

Installation and Connection Guidelines

Running System ROMPaq.....	2-2
Recording Reference Numbers	2-2
Tools Needed for Installing the SAN Access Module or Smart Array 5302/FC Controller.....	2-2
Preparing the Server	2-3
Installing the SAN Access Module.....	2-4
Installing the Smart Array 5302/FC Controller in a Compaq ProLiant Server.....	2-6
Fibre Channel Cabling for the SAN Access Module and Smart Array 5302/FC Controller.....	2-7
Multi-Mode Fibre Channel Cables	2-7
Installing the Fibre Channel Cable	2-8
Configuring the SAN Access Module through SSP	2-9
Setting up Connection Names through ACU.....	2-11
Connection Names Screen.....	2-11
Logical Drive Host Access Screen	2-12
Typical EBS/SAN Configurations.....	2-13

Chapter 3

Installing the Operating System Drivers

Windows 2000	3-2
Installing the Drivers During Windows 2000 Installation	3-2
Installing the Drivers After Windows 2000 Installation	3-3
Windows NT 4.0	3-3
Installing the Drivers During Windows NT Installation	3-3
Installing the Drivers After Windows NT Installation	3-4
Novell NetWare 4.2 and 5.x	3-5
Installing the Drivers During NetWare 4.2 Installation	3-5
Installing the Drivers After NetWare 4.2 Installation	3-6
Installing the Drivers During NetWare 5.x Installation	3-7
Installing the Drivers After NetWare 5.x Installation	3-8
Software Drive Mirroring With NetWare	3-9
Handling Disk Drive Failures	3-9

Appendix A

Regulatory Compliances

Regulatory Compliance Identification Numbers	A-1
Federal Communications Commission Notice	A-1
Class A Equipment	A-2
Class B Equipment	A-2
Declaration of Conformity for Products Marked with the FCC Logo, United States Only	A-3
Modifications	A-3
Cables	A-3
Canadian Notice (Avis Canadien)	A-4
Class A Equipment	A-4
Class B Equipment	A-4
Mouse Compliance Statement	A-4
European Union Notice	A-4
Japanese Notice	A-5
Taiwanese Notice	A-5

Appendix B

Electrostatic Discharge

Grounding Methods	B-2
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Index

About This Guide

This installation guide is designed to be used for reference when installing the Compaq StorageWorks SAN Access Module.



WARNING: To reduce the risk of personal injury from electrical shock and hazardous energy levels, only authorized service technicians should attempt to install this equipment. Consult the Safety Information and user documentation provided with your computer before attempting this installation.

Many PCs are capable of producing energy levels that are considered hazardous and are only intended to be serviced by qualified personnel trained in dealing with these hazards. Do **not** remove enclosures or attempt to bypass any interlocks that may be provided for the purpose of removing these hazardous conditions.

IMPORTANT: The installation of options and the servicing of this product shall be performed by individuals who are knowledgeable of the procedures, precautions, and hazards associated with equipment containing hazardous energy circuits.

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.
<i>FILENAMES</i>	File names appear in uppercase italics.
COMMANDS, DIRECTORY NAMES, and DRIVE NAMES	These elements appear in uppercase.
Type	When you are instructed to <i>type</i> information, type the information without pressing the Enter key.
Enter	When you are instructed to <i>enter</i> 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 symbols may be located on equipment in areas where hazardous conditions may exist.



This symbol in conjunction with any of the following symbols indicates the presence of a potential hazard. The potential for injury exists if warnings are not observed. Consult your documentation for specific details.



This symbol indicates the presence of hazardous energy circuits or electric shock hazards. Refer all servicing to qualified personnel.

WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure. Refer all maintenance, upgrades, and servicing to qualified personnel.



This symbol indicates the presence of electric shock hazards. The area contains no user or field serviceable parts. Do not open for any reason.

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



This symbol on an RJ-45 receptacle 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.



This symbol 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.



These symbols on power supplies or systems 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.



This symbol indicates that the component exceeds the recommended weight for one individual to handle safely.

Weight kg

Weight lb

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.

Where to Go for Additional Help

In addition to this guide, the following information sources are available:

- User documentation
- *Compaq Service Quick Reference Guide*
- Service training guides
- Compaq service advisories and bulletins
- Compaq QuickFind
- Compaq Insight Manager
- Compaq Download Facility; call 1-281-518-1418

Telephone Numbers

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.

For Compaq technical support:

- In the United States and Canada, call 1-800-386-2172.
- For Compaq technical support phone numbers outside the United States and Canada, visit the Compaq website at www.compaq.com.

Chapter 1

Features

The Compaq *StorageWorks*[™] SAN Access Module is a Fibre Channel host adapter option installed on a Compaq Smart Array 5302 Controller, a two-channel Wide Ultra3 SCSI controller with a 32-, 64-, or 128-MB Array Accelerator cache. The SAN Access Module provides an interface between Direct Attach Storage driven by the Smart Array 5302 and external, Fibre Channel-connected tape and disk storage systems.

The Smart Array 5302/FC Controller option is a Smart Array 5302 Controller with 32 MB cache and the SAN Access Module preinstalled. This option can also be upgraded to 64 MB or 128 MB of cache.

NOTE: A Smart Array 5304 Controller is a 4-channel Ultra3 SCSI device, including 2 channels on a plug-on adapter board. A server with a Smart Array 5304 Controller installed can use the SAN Access Module after the 2-channel SCSI adapter board on the Smart Array 5304 is removed. The SAN Access Module then replaces the adapter board on the controller.

The Smart Array 5302/FC Controller features 64-bit/66-MHz PCI connectivity, which provides a high-speed (up to 528 MB/s) path between the system board and the SAN Access Module. The Smart Array 5302 is also compatible with 32-bit/33-MHz PCI slots.

The SAN Access Module is qualified on Compaq *ProLiant*[™] servers running the Microsoft Windows NT, Microsoft Windows 2000, or Novell NetWare operating system.

Overview of Features

Key features of the SAN Access Module/Smart Array 5302 Controller include:

- Smart Array RAID on Direct Attach Storage (Wide Ultra3 SCSI) and Fibre Channel in a single PCI slot, reducing PCI slot consumption
- 1-Gigabit Fibre Channel SAN connectivity for robust 100-MB-per-second peak data transfer performance
- Reduced host CPU usage by offloading data transfer management from the host CPU to the Smart Array 5302 Controller
- Full qualification with Compaq StorageWorks EBS ARCPaq and *BackPaq*™ Enterprise Backup Solutions
- SAN-based backup consolidation for simpler deployment and manageability of backup operations
- Qualified for use with the following Compaq StorageWorks products:
 - Fibre Channel Tape Controller II (FCTC-II)
 - Modular Data Router (MDR)
 - TL895 DLT Library
 - TL891 DLT Library and TL891DLX DLT Library
 - SSL2020 AIT Library
 - Fibre Channel Storage Hub 7 and Fibre Channel Storage Hub 12
 - FC-AL Switch

SAN Access Module Options

The SAN Access Module can be ordered as an add-on option (Part Number 216687-B21) or preinstalled on a Smart Array 5302 Controller (Smart Array 5302/FC Controller, Part Number 216688-B21). These options are shown in the following figures.

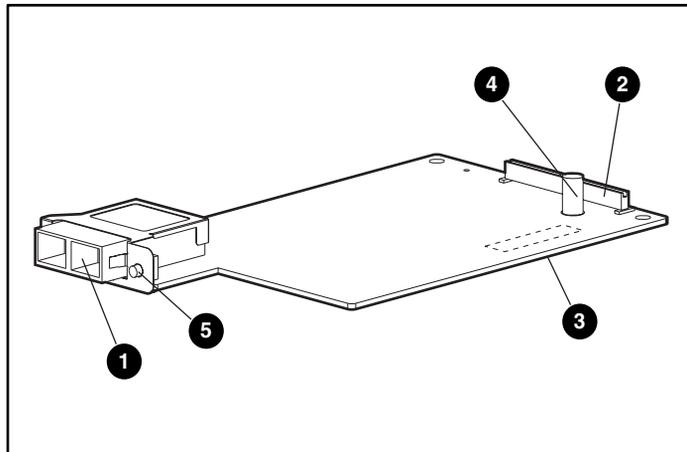


Figure 1-1. SAN Access Module

Fibre Channel port (fixed optical transceiver)

Connector (for installing the module onto the Smart Array 5302)

WorldWide Name (WWN) label (on back of board)

Standoff

LED

**Table 1-1
LED Status Indicators**

Indicators	Description
Solid green	Normal operation
Flashing yellow	Fault detected
Off (no color)	Controller lockup

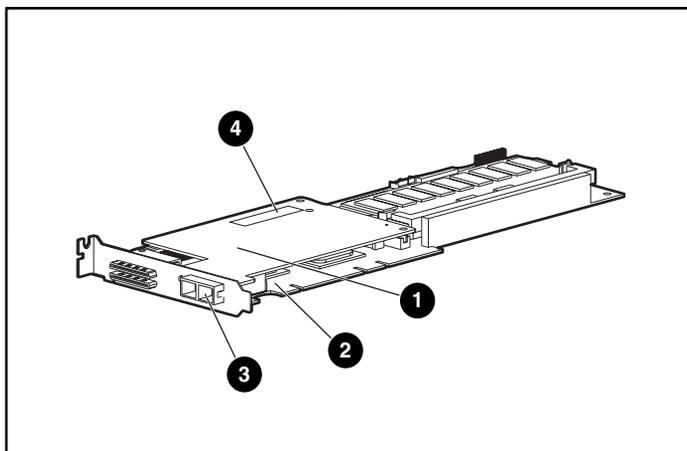


Figure 1-2. Smart Array 5302/FC Controller

SAN Access Module

Smart Array 5302 Controller

Fibre Channel port (transceiver)

WWN label (on top of board)

Chapter 2

Installation and Connection Guidelines

Complete the following steps to install the Compaq SAN Access Module or Smart Array 5302/FC Controller in a Fibre Channel storage and/or tape backup system.

1. Run System *ROMPaq*[™].
2. Record the serial number and WorldWide Name (WWN) label for the device.
3. Install the SAN Access Module onto the Smart Array 5302 Controller and/or plug the Smart Array 5302/FC Controller into the server.
4. Connect the multi-mode Fibre Channel cable from the SAN Access Module to the Fibre Channel interconnect device.
5. Run the Compaq Smart Array 5300 Controller Support Software CD to load/update the support drivers.
6. Configure the device.

These steps are documented in the following sections of this chapter.

Running System ROMPaq

Prior to installing the SAN Access Module on the Smart Array 5302 or installing the Smart Array 5302 FC Controller into the server, run System ROMPaq. This utility replaces the existing contents of the ROM. Boot the server from the Support Software CD and select “Run Options ROMPaq Utility” from the menu displayed. The utility will launch, then detect and update the existing firmware.

NOTE: The Compaq SmartStart Software and Support CD is updated periodically to include updates to the Compaq *SmartStart*[™] utility. Users should obtain the latest version of the SmartStart Software and Support CD for updates to the Compaq Smart Array 5300 Controller Support Software CD.

Recording Reference Numbers

Each SAN Access Module ships with a unique address identifier stored in flash memory. Fibre Channel industry standards issue two unique identifiers: WorldWide Port Name (WWPN) and Node Name (NN), each of which is derived from the SAN Access Module’s IEEE address. Combined, the WWPN and NN create the WorldWide Name (WWN), an 8-byte field that uniquely identifies a SAN Access Module on a Fibre Channel circuit.

The WWN address and serial number are clearly marked on the SAN Access Module. Record the addresses on the lines below for future reference.

WWN address: _____

Serial number: _____

Tools Needed for Installing the SAN Access Module or Smart Array 5302/FC Controller

- Torx T-8 and T-15 screwdriver
- 3/16-inch, flat-bladed screwdriver

Preparing the Server



WARNING: To reduce the risk of personal injury or damage to the equipment, consult the safety information and user documentation provided with your computer before attempting the installation.

Many computers are capable of producing energy levels that are considered hazardous. These computers are intended to be serviced by qualified personnel trained to deal with those hazards. Do not remove enclosures or attempt to bypass any interlocks that may be provided for the purpose of removing these hazardous conditions.

To prepare the server for the SAN Access Module installation:

1. Perform a normal system shutdown.



CAUTION: If you will be moving non-arrayed SCSI drives to the Smart Array 5302, you must first back up all of your data. Data is not preserved when drives are moved between array controllers and non-array controllers.



CAUTION: In systems using external data storage, be sure the server is the first unit powered down and the last to be powered back up. This will ensure that the system will not erroneously mark the drives as “failed.”

2. Turn off the server.
3. Turn off any peripheral devices attached to the server.
4. Unplug the AC power cord from the outlet, then from the server.

IMPORTANT: If you are upgrading the existing Smart Array 5300 Controller with a SAN Access Module, see “Installing the Fibre Channel Cable to determine the external cabling requirements.”

5. Disconnect any peripheral devices from the server.



WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components and hot-plug hard drives to cool before touching.

6. Remove or open the access panel.

Installing the SAN Access Module

1. Record the serial number and WWN.
2. Remove the protective covers from the transceiver on the edge of the SAN Access Module.

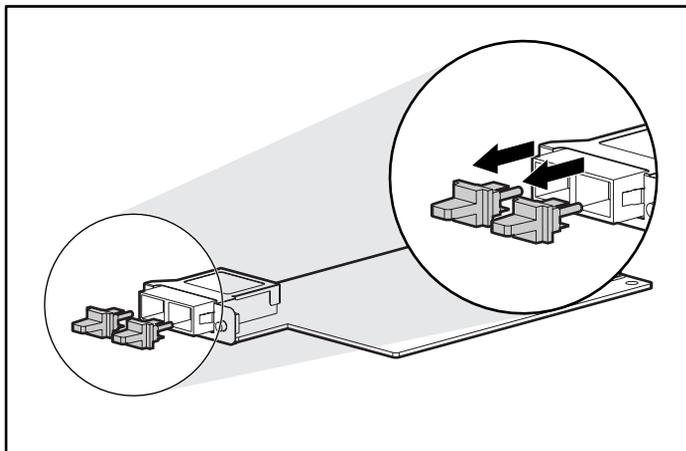


Figure 2-1. Removing the transceiver covers

3. Remove the faceplate from the metal bracket on the edge of the Smart Array 5302.

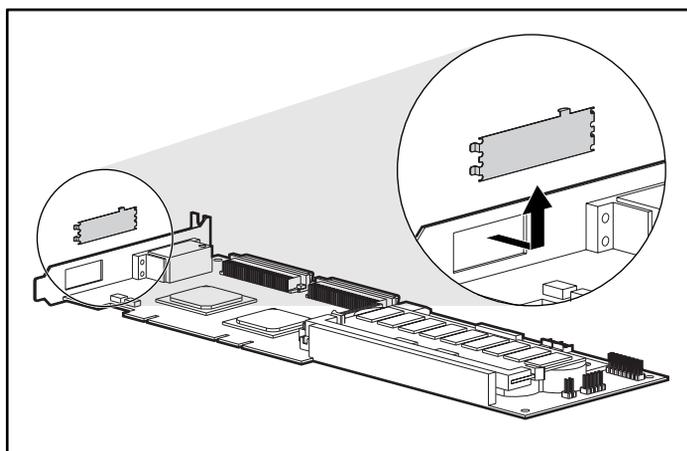


Figure 2-2. Removing the faceplate

Angle the SAN Access Module so that the fixed optical transceiver on the end of the module passes through the bracket on the Smart Array 5302.

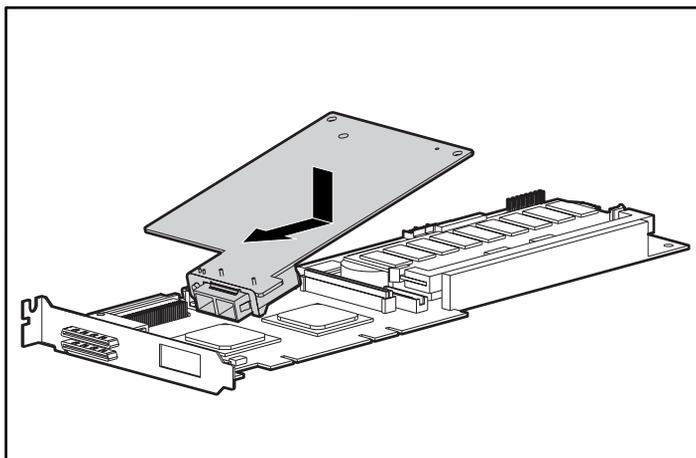


Figure 2-3. Angling the SAN Access Module

4. Align the SAN Access Module over the connector on the Smart Array 5302 Controller.

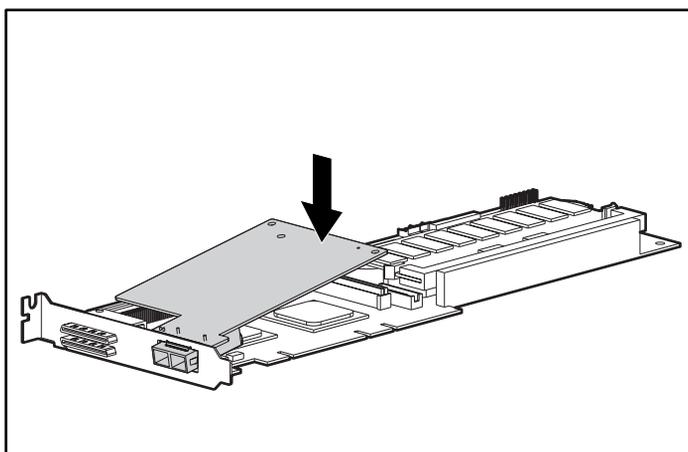


Figure 2-4. Aligning the SAN Access Module

5. Replace the covers over the transceiver.
6. Press the SAN Access Module onto the Smart Array 5302 connector.

7. Install the Torx T-8 screw provided in the option kit through the bottom of the Smart Array 5302 and into the standoff on the SAN Access Module.

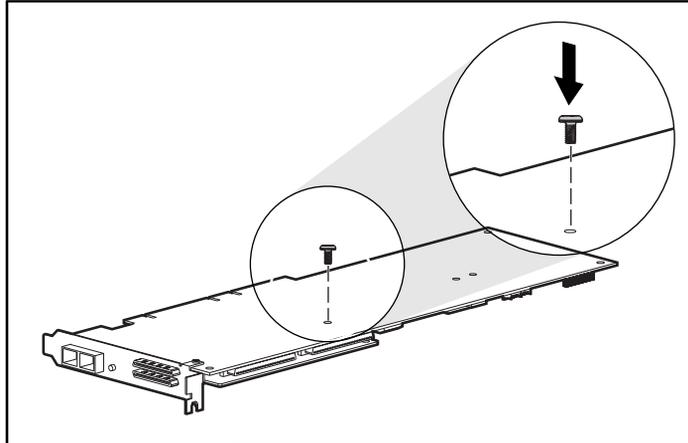


Figure 2-5. Installing the screw into the SAN Access Module standoff

Installing the Smart Array 5302/FC Controller in a Compaq ProLiant Server

To install a Smart Array 5302/FC Controller in a new Compaq server:

1. Record the serial number and WWN.
2. Select an available 64-bit PCI slot (if available).
3. Remove the slot cover or open the hot-plug latch. Save the retaining screw, if present.



CAUTION: Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning this procedure. See Appendix B, "Electrostatic Discharge" for more information.

4. Remove and retain the protective covers in the two transceivers on the SAN Access Module.
5. Press the Smart Array 5302 firmly into the slot so the contacts on the board edge seat fully in the system board connector.
6. Secure the board in place with the hot-plug latch or retaining screw.

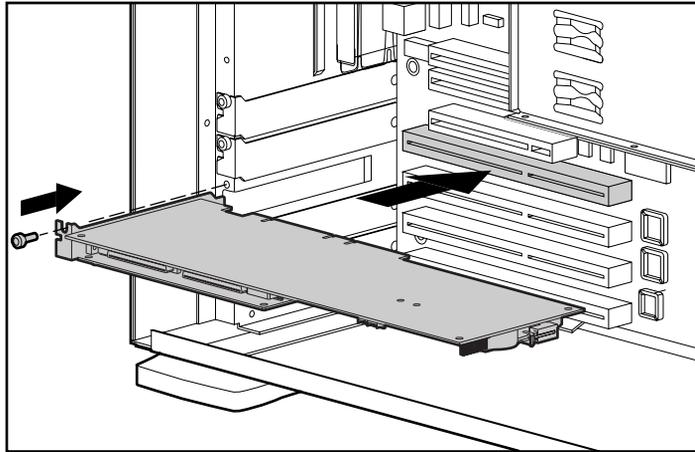


Figure 2-6. Installing a Smart Array 5302/FC Controller

NOTE: Your server may look slightly different from the one shown above.

7. Reinstall the protective covers into the transceivers on the SAN Access Module if the Fibre Channel cable is not to be immediately connected, or connect the cable to the SAN Access Module and the Fibre Channel interconnect device.

Fibre Channel Cabling for the SAN Access Module and Smart Array 5302/FC Controller

Multi-Mode Fibre Channel Cables

Multi-Mode Fibre Channel cables can span distances up to 500 meters. A 5-meter Multi-Mode Fibre Channel Cable is included in the SAN Access Module Option Kit and the 5302 Smart Array/FC Controller Option Kit.

IMPORTANT: To ensure product integrity, Compaq recommends a 50/125 μm multi-mode optical fiber cable that complies with Bellcore GR409. The cable assembly should be terminated with SC Duplex Connectors (super polished ferrule) at each end. These connectors must be NNT-SC-, Bellcore 326-, and IEC-874-19 SC-compliant.

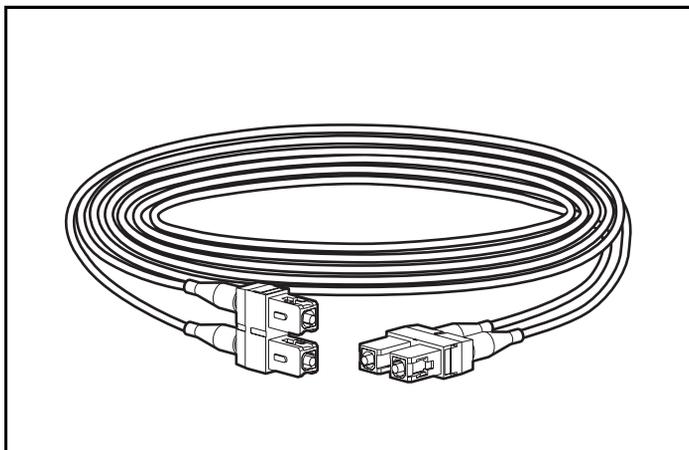


Figure 2-7. Fibre Channel cable with connectors

Installing the Fibre Channel Cable

To install the Fibre Channel cable:

1. Insert one end of the Fibre Channel cable connector into the SAN Access Module transceiver and the other end into the Fibre Channel interconnect device.



CAUTION: The fixed optical transceiver on the SAN Access Module and the Fibre Channel cable connector are keyed to prevent improper installation.

2. Support the installed Fibre Channel cable to prevent a bend radius of less than 3 inches (76 millimeters). Otherwise, the cable could be damaged.
3. Support and route the Fibre Channel cable to prevent damage from sharp edges or from being crushed by nearby equipment.

IMPORTANT: Ensure that a multi-mode Gigabit Interface Connector (GBIC) is installed on the interconnect device. If there is no GBIC, order Part Number 380561-B21 from a Compaq Authorized Reseller or online at www.compaq.com.

NOTE: For information on Fibre Channel interconnect devices, refer to the appropriate switch or hub documentation.

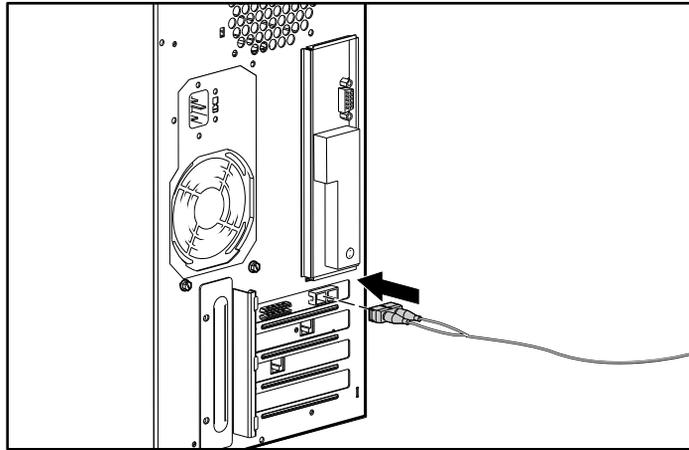


Figure 2-8. Connecting the Fibre Channel cable to the SAN Access Module

Table 2-1
Multi-Mode Fibre Channel Cables and GBIC

Part Description	Option Kit Number
2-meter multi-mode Fibre Channel cable	234457-B21
5-meter multi-mode Fibre Channel cable	234457-B22
15-meter multi-mode Fibre Channel cable	234457-B23
30-meter multi-mode Fibre Channel cable	234457-B24
50-meter multi-mode Fibre Channel cable	234457-B25
Multi-mode shortwave GBIC	380561-B21

Configuring the SAN Access Module through SSP

The Option ROM Configuration Array (ORCA) cannot be used to configure logical drives through the SAN Access Module. Configuration of logical drives through the SAN Access Module requires access to a 64-Bit/66-MHz Fibre Channel Host Adapter with the Array Configuration Utility (ACU), Version 2.50A or higher.

Selective Storage Presentation (SSP) allows logical disk drives on an array controller to be shared by multiple servers. At POST, ORCA identifies SCSI-attached logical drives available to the host bus adapter in the server. For more information on ORCA, refer to “Configuring Your Array” in the *Compaq StorageWorks SA5300 Controller User Guide*.

To configure the logical drives with online ACU, the server with the 64-Bit/66-MHz Fibre Channel Host Adapter must be running Windows 2000 or NetWare 4.0 or higher.

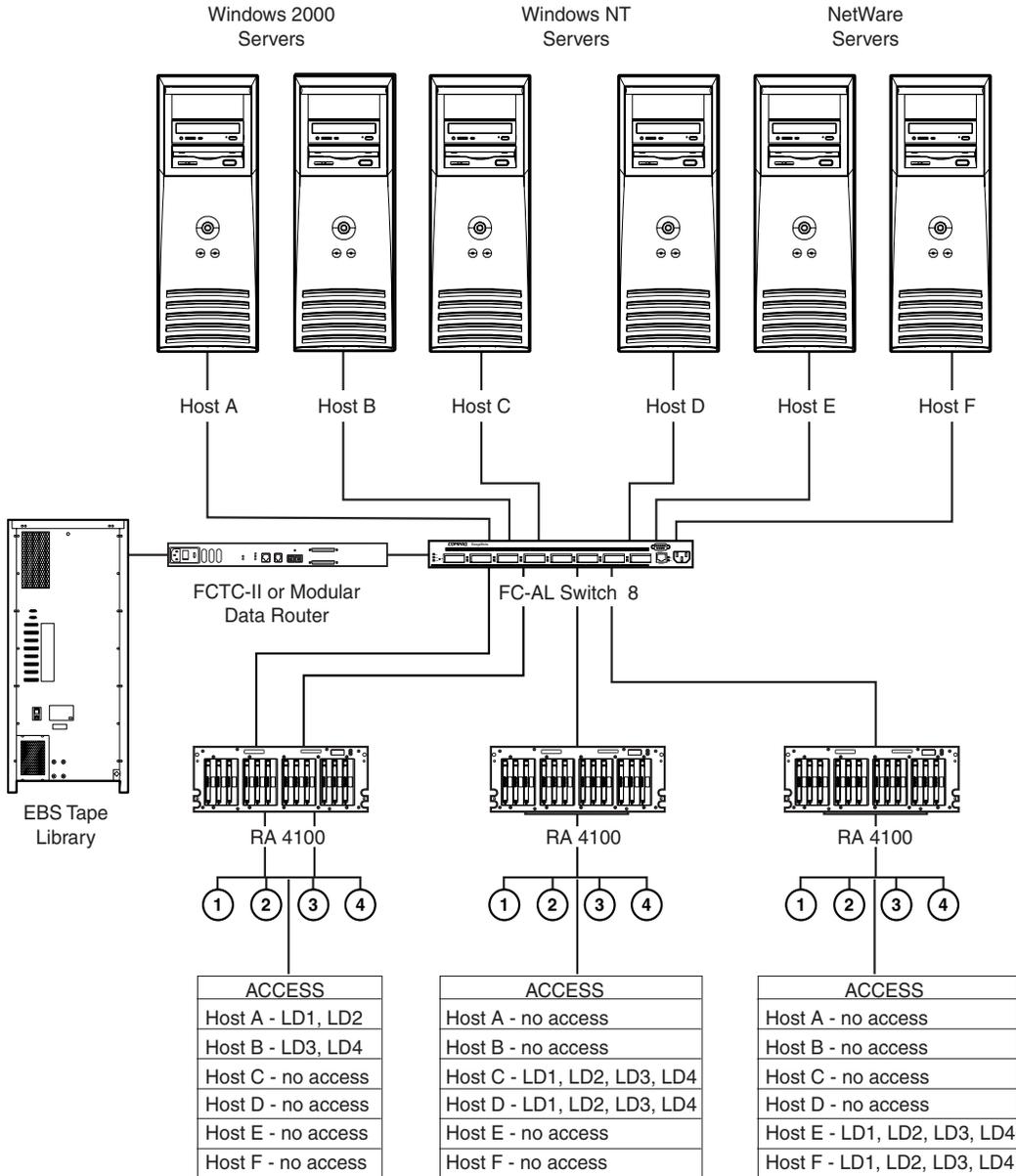


Figure 2-9. Logical disk drive access through host servers

Setting up Connection Names through ACU

To set up connection names for the controller using the Array Configuration Utility (ACU):

1. Click on Programs, then Compaq System Tools.
2. Click on ACU, then click on the controller displayed among the choices available in the menu.
3. Click on the controller on the ACU main screen.
4. Click on Settings to run the Controller Settings screen.
5. On the Controller Settings screen, press the Connection Names button in the Access Control group box to run the Connection Names screen.

Connection Names Screen

The Connection Names screen displays the connections that the ACU detects from all servers to the array controller. This screen allows the user to set up connection names for all connections. SSP provides a means of mapping the worldwide identification (WWID) of the server host bus adapters to connection names.

The user should record the WWN before configuring the server(s). The connection name is a convenient way to identify a connection for a controller instead of relying entirely on the WWN of the SAN Access Module. The following Figure shows the Connection Names screen.

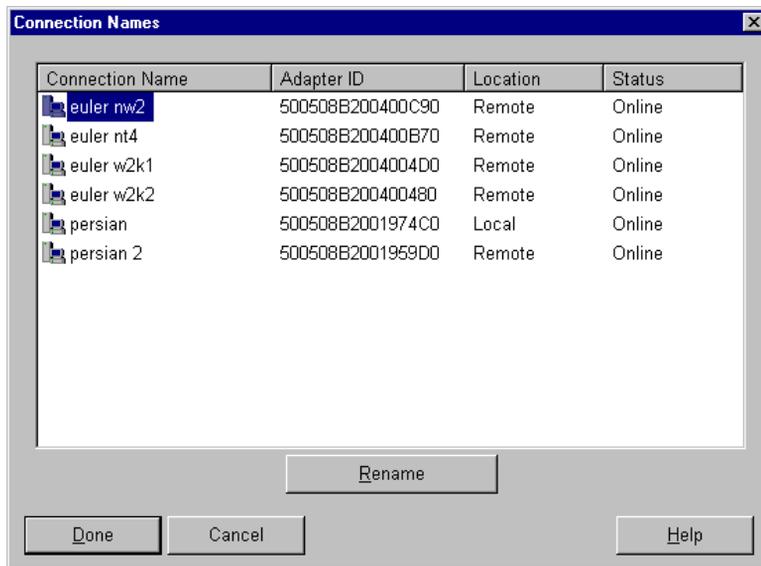


Figure 2-10. ACU Connection Names screen

The Location column shows the location of the host bus adapter with respect to the server the ACU is currently running on. The Status column shows if a host bus adapter resides on the same FC-AL Switch as the controller. The ACU can detect a local host bus adapter that is invisible to a controller for one of two reasons: the adapter is not plugged in or it may reside on another Fibre Channel loop or switch.

Logical Drive Host Access Screen

SSP functionality in the ACU allows users to grant and deny access to all connections and to grant and deny access to selected connections for each logical drive. The following Figure shows the Logical Drive Host Access screen.

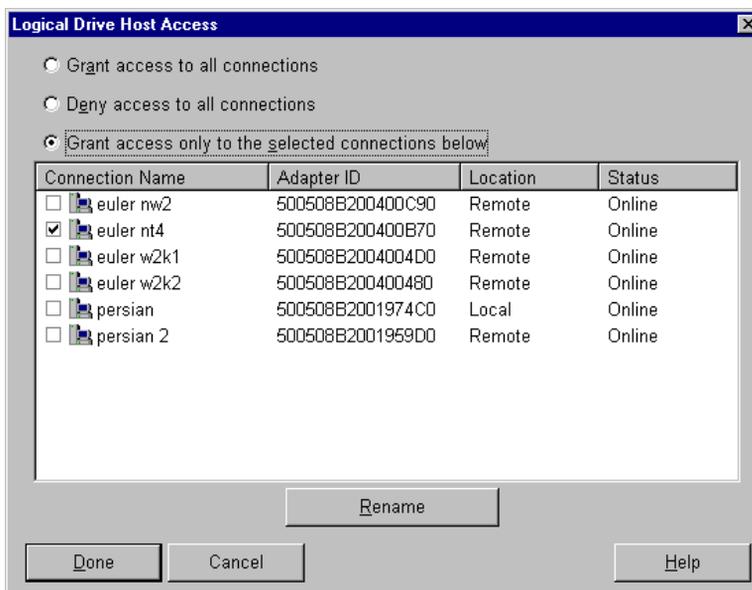


Figure 2-11. Granting access only to selected connections

When configuring the SAN Access Module, select this option to allow the connection to have access to the logical drive. Check the connections in the window in which you want to give access to the logical drive. A checkmark in the box means that the connection will have access to the logical drive. An empty box means that the connection will not have access to the logical drive.

Each logical drive on the controller has an access control list that contains the worldwide names of the server host bus adapters with access to the drive. If a server tries to send read or write commands (and other commands) to a logical drive that it does not have access to, the firmware rejects these commands.

Typical EBS/SAN Configurations

The SAN Access Module and the Smart Array 5302/FC Controller can be configured for backup operations with ARCPaq or BackPaq and/or provide access to primary storage (RAID Array 4100) on the SAN. The following diagrams illustrate two basic scenarios for an Enhanced Backup Solution (EBS) and an Entry Level SAN.

IMPORTANT: These configurations should be used only in a single interconnect environment.

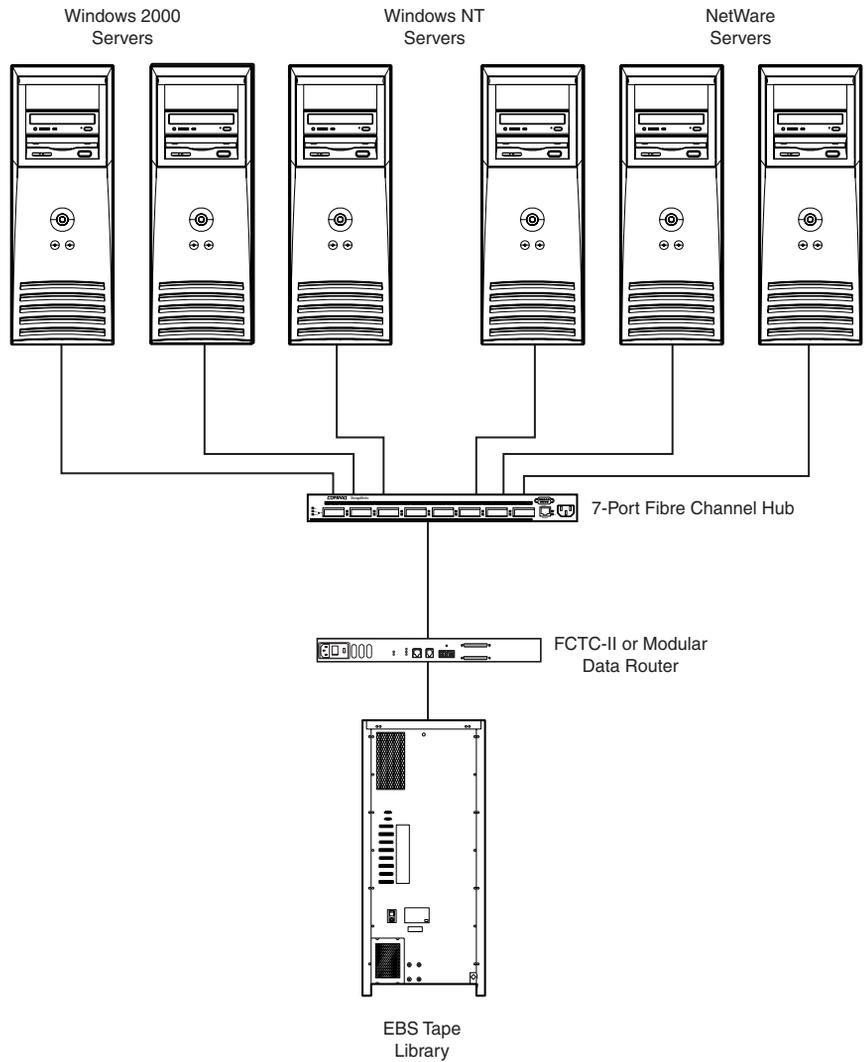


Figure 2-12. Basic EBS configuration

IMPORTANT: Any single server should not have both a SAN Access Module and a Fibre Channel Host Adapter installed.

NOTE: This configuration may include either a SAN Access Module or Compaq 64-Bit/66-MHz Fibre Channel Host Adapter in any or all of the servers.

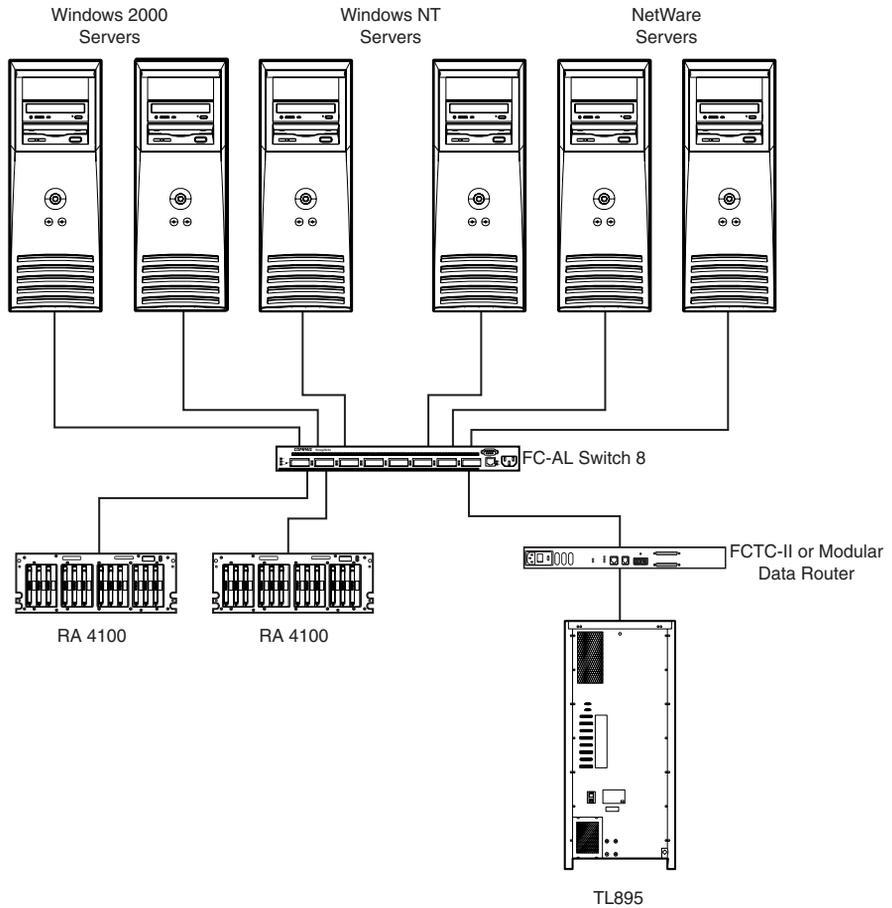


Figure 2-13. Basic Entry Level SAN configuration

NOTE: This configuration must include at least one server with a 64-Bit/66-MHz Fibre Channel Host Adapter, but that server should not have a SAN Access Module also installed.

Chapter 3

Installing the Operating System Drivers

This chapter outlines driver installation steps to set up the SAN Access Module in a server running any of the following operating systems:

- Windows 2000
- Windows NT 4.0
- Novell NetWare 4.2 and 5.x

This chapter also contains related information for using the SAN Access Module or Smart Array 5302/FC Controller with these operating systems. Use the Smart Array 5300 Support Software CD to install the device drivers for the SAN Access Module.

Before installing operating system drivers, you should have:

- Updated your system firmware by running System ROMPaq. See the “Running System ROMPaq” section in Chapter 2.
- Installed the device.
- Configured the hardware.
- Configured your drive array (or arrays).

Windows 2000

Install the drivers either during or after installation of the operating system.

Installing the Drivers During Windows 2000 Installation

NOTE: In order to take advantage of the logical drive extension feature under Windows 2000, Compaq recommends upgrading a disk to DYNAMIC before creating a partition on that disk. Windows 2000 may not allow extension of a logical volume if the disk is upgraded to DYNAMIC when a partition already exists on the disk. Refer to the Windows 2000 documentation for details about DYNAMIC and BASIC disks.

1. Start the Windows 2000 installation as directed by the operating system instructions.
2. Press **F6** when instructed by a message at the bottom of the screen. If you do not press **F6** during the brief interval that the prompt displays, you must restart the installation.
3. A blue screen will display with the message:

S = Specify Additional Device ENTER = Continue F3 = Exit

at the bottom of the screen. Press the **S** key.
4. If a menu is displayed, use the arrow keys to scroll to the menu item Other and press **Enter**.
5. When prompted, insert the Support Software CD and press **Enter**.
6. Select the menu item "Compaq Smart Array 5302 Controller for Windows 2000" and press **Enter**.
7. The screen for specifying additional drivers will be displayed again. If you do not have any additional drivers to install, press **Enter**.
8. Follow the instructions to complete the installation. Leave the CD in the drive until instructed to remove it. When finished, reboot the system.
9. Install the CISS (CPQCISSE.SYS) Array Notification driver.
 - a. Insert the Support Software CD into the CD-ROM drive.
 - b. Click Start and choose Run from the menu, if autorun does not execute.
 - c. Enter <CD-ROM drive letter>:\Win2K\cpqsetup.exe in the Open field.
 - d. Click **OK**.

NOTE: A Screen will appear stating that the software is installed and up to date. At this point, click the Install button to continue installing the CISS Array Notification driver.

e. Follow the on-screen instructions.

Results of the installation are logged to the
<BOOT DRIVE LETTER>:\CPQSYSTEM\LOG\CPQSETUP.LOG file.

Installing the Drivers After Windows 2000 Installation

NOTE: If installing the driver for the first time, the PNP Device Manager displays a Found New Hardware wizard dialog box. Click the **Cancel** button.

To install the device drivers after Windows 2000 has already been installed on the system:

1. Insert the Support Software CD into the CD-ROM drive.
2. Click **Start**, and choose Run from the menu, if autorun does not execute.
3. Enter <CD-ROM drive letter>:\Win2K\cpqsetup.exe in the Open field.
4. Click **OK**.
5. Follow the on-screen instructions.

Results of the installation are logged to the
<BOOT DRIVE LETTER>:\CPQSYSTEM\LOG\CPQSETUP.LOG file.

Windows NT 4.0

This section includes instructions for installing the initial driver for a new or for upgrading the driver in an existing Windows NT server/Smart Array 5300 system.

Installing the Drivers During Windows NT Installation

This section describes how to install the device drivers during the initial installation of Windows NT 4.0.

1. Start the Windows NT installation directly from the operating system CD. Do not use boot diskettes built from the CD.

2. Follow the operating system instructions. When the Windows NT Setup screen displays, press the **F6** key within five seconds to begin driver installation. If dialog displays in the bottom left corner of the screen before you press **F6**, you must restart the installation.

NOTE: There will not be any screen prompt to press the **F6** key.

NOTE: There may be a delay of up to 60 seconds before the next screen displays.

3. When prompted to Specify Additional Device (at the bottom of the screen), press the **S** key.
4. Use the arrow keys to scroll to the menu item Other and press **Enter**.
5. A screen will display prompting you to insert your manufacturer-supplied diskette. Insert the Support Software Diskette #1 and press **Enter**.
6. Scroll to Compaq Smart Array 53xx Controller for Windows NT 4.0, then press **Enter**.
7. The screen for specifying additional drivers will be displayed again. If you do not have any additional drivers to install, press **Enter**.
8. Continue the installation by following the on-screen instructions. Leave the diskette in the diskette drive until you are instructed to remove it.
9. Reboot the system.
10. Install the CISS (*CPQCISSE.SYS*) ARRAY NOTIFICATION driver.
 - a. Insert the Support Software CD into the CD-ROM drive.
 - b. Click Start and choose Run from the menu, if autorun does not execute.
 - c. Enter <CD-ROM drive letter>:\Winnt4\cpqsetup.exe in the Open field.
 - d. Click **OK**.
 - e. Follow the on-screen instructions.

Results of the installation are logged to the
<BOOT DRIVE LETTER>:\CPQSYSTEMLOG\CPQSETUP.LOG file.

Installing the Drivers After Windows NT Installation

To install the device drivers after Windows NT has already been installed on the system:

1. Insert the Support Software CD into the CD-ROM drive.

2. Click Start and choose Run from the menu, if autorun does not execute.
3. Enter <CD-ROM drive letter>:\Winnt4\cpqsetup.exe into the Open field.
4. Click **OK**, and follow the on-screen instructions.

Results of the installation are logged to the
<BOOT DRIVE LETTER>:\CPQSYSTEMLOG\CPQSETUP.LOG file.

Updating the Compaq Insight Manager Agents

If using *Compaq Insight Manager*[™], update the Insight Agents to support the new device.

- The latest versions of the Compaq Insight Manager and Management Agents for the SAN Access Module or Smart Array 5302/FC Controller can be downloaded from www.compaq.com/manage.
- The agents may be updated manually. Contact your local Compaq Reseller or Authorized Compaq Service Provider to obtain the agents, and refer to the documentation included with Compaq Insight Manager for the correct procedure to update the agents.

Installation of the device is complete. Reboot the server to begin using the array controller.

Novell NetWare 4.2 and 5.x

Use the instructions in this section to install the driver for a new SAN Access Module or Smart Array 5302/FC Controller or to upgrade the driver in a server running NetWare and using the Smart Array 5300 Controller.

Installing the Drivers During NetWare 4.2 Installation

This section describes how to install the SAN Access Module or Smart Array 5302/FC Controller drivers during the initial installation of NetWare 4.2.

1. Within the DOS partition where NetWare 4.2 will be installed, create a directory called NWUPDATE under <BOOT DRIVE LETTER>.
2. Insert Support Software CD into the CD-ROM drive.
3. Enter copy a:\NetWare\CPQSHD.* <boot drive letter>:\nwupdate.
4. Start NetWare installation as directed by the operating system instructions.

5. When a prompt displays to confirm that a new PCI device has been detected, press **Enter**.
6. From the Driver Actions menu, choose Select Additional or Modify Selected Disk/LAN Drivers and press **Enter**. Press **Enter** again.
7. When prompted to choose the server drivers, choose Select Additional Driver and press **Enter**. Of the choices that display, select Use Only Previously Installed Drivers, then press the **Insert** key to add unlisted drivers.
8. Press **F3** to continue.
9. In the popup box, type a:\NetWare and press **Enter**. Select the *CPQRAID.HAM* driver.
10. On the Driver CPQRAID Parameter Actions menu, use the arrow keys to choose Save Parameters and Load Driver, and press **Enter**.
11. A popup window displays with the message:

Do you wish to select an additional Disk Driver [Y/N]

Choose the option that matches your requirement and continue the operating system installation as directed.

Updating the Compaq Insight Manager Agents

If using Compaq Insight Manager, update the Insight Agents to support the new device.

- The latest versions of the Compaq Insight Manager and Management Agents for the SAN Access Module or Smart Array 5302/FC Controller can be downloaded from www.compaq.com/manage.
- The agents may be updated manually. Contact your local Compaq Reseller or Authorized Compaq Service Provider to obtain the agents, and refer to the documentation included with Compaq Insight Manager for the correct procedure to update the agents.

Installation of the device is complete. Reboot the server to begin using the array controller.

Installing the Drivers After NetWare 4.2 Installation

This section describes how to install the SAN Access Module or Smart Array 5302/FC Controller drivers after the initial installation of NetWare 4.2.

1. Insert the Support Software CD into the CD-ROM drive.

2. At the System Console, type load CDRom, then press **Enter**.
3. At the System Console, type CD mount all, then press **Enter**.
4. At the System Console, type load <CD-volume name>:\NW4x\cpqsetup.nlm and press **Enter**.
5. Follow the on-screen instructions to complete the driver installation. Results are logged in the *SYS:\SYSTEMCPOSETUP.LOG* file.
6. For instructions for copying online Array Configuration Utility (ACU) support, view

<CD-VOLUME NAME>:\README.TXT.
7. After running Cpqsetup, enter down at the NetWare console, and enter restart server.

Installing the Drivers During NetWare 5.x Installation

This section describes how to install the SAN Access Module or Smart Array 5302/FC Controller drivers during the initial installation of NetWare 5.x.

1. Start NetWare installation as directed by the operating system instructions.
2. The following message displays:

The following drivers were detected for this server
Add change or delete device drivers as needed

On the Options menu, use the arrow keys to choose Modify and press **Enter**.
3. From the Device Type menu, choose Storage Adapters and press **Enter**.
4. When the next screen displays, press the **Insert** key to add drivers. Press the **Insert** key again to add unlisted drivers.
5. When prompted to select a driver for each storage adapter, insert the Support Software CD into the CD-ROM drive. Press **F3** to continue.
6. In the pop-up box, type a:\NetWare and press **Enter**.
7. Verify that CPQRAID.HAM (Compaq Smart Array 5302/FC Controller) is added to the list of storage drivers. Press **Escape**, and press **Enter** to return to Driver Summary.
8. On the Options menu, use the arrow keys to choose Continue, and press **Enter**.

9. At the next screen, on the Options menu, choose Modify and press **Enter**.
10. On the Device Type menu, choose Storage Devices and press **Enter**.
11. If CPQSHD.CDM (Compaq SCSI Hard Disk Driver) is displayed, select it and press **Delete**.
12. Press **Insert** to add drivers. Press **Insert** again to add unlisted drivers.
13. When prompted to select a driver, insert the Smart Array 5300 Controller Support Software CD into the CD-ROM drive. Press **F3** to continue.
14. In the popup box, type a:\NetWare and press **Enter**.
15. Verify that *CPQSHD.CDM* (Compaq SCSI Hard Disk Driver) is added to the list of storage devices. Press **Escape** and press **Enter** to return to Driver Summary.
16. On the Options menu, choose Continue and press **Enter**.
17. Follow the on-screen instructions to complete the operating system installation.

Installing the Drivers After NetWare 5.x Installation

This section describes how to install the SAN Access Module or Smart Array 5302/FC Controller drivers after the initial installation of NetWare 5.x.

1. Insert the Support Software CD into the CD-ROM drive.
2. At the System Console, type load CDRom and press **Enter**.
3. At the System Console, type load <CD-volume name>\NW5x\cpqsetup.nlm and press **Enter**.
4. Follow the on-screen instructions to complete the driver installation. Results are logged in the *SYS:\SYSTEM\CPQSETUP.LOG* file.
5. If installing online ACU support at this time, view <CD-volume name>\Readme.txt for instructions.
6. After running cpqsetup, enter restart server.

Software Drive Mirroring With NetWare

NetWare recognizes each logical drive in an array as a separate physical drive. If you mirror logical drives on the same array and a physical drive fails, both logical drives in the mirrored pair will fail and the data will be lost.

To avoid this, the logical drives must be mirrored on separate arrays. Use the Compaq Array Configuration Utility for NetWare (*CPQONLIN.NLM*) on the Support Software CD to view the logical configuration for the SAN Access Module or Smart Array 5302/FC Controller. Record the logical drives and the arrays on which they reside. When configuring NetWare for drive mirroring, select equally sized logical drives on different arrays.

IMPORTANT: Do not use NetWare drive mirroring if you do not have at least two arrays.

Handling Disk Drive Failures

Although drive failures are not common, it is important to protect your critical data. The best way to recover from a failed drive is to configure your drive system with some form of fault tolerance.

To ensure a quick and transparent recovery, Compaq recommends that the SAN Access Module or Smart Array 5302/FC Controller be configured with hardware fault tolerance. Another advantage of hardware fault tolerance is that the controller is able to perform a background surface analysis on the hard drives to monitor for bad sectors and to remap data to a new location on the media. This feature enhances the reliability and availability of your data. Compaq also recommends that you use good backup procedures, in case of catastrophic failure.

If a failed drive is discovered:

- Identify and document which physical drive has failed. Note the drive type and capacity.
- Note which partition and volume, if any has failed. This information is provided in the error message on the server console. It is also recorded in the server error log file, which can be viewed using the NWADMIN utility.
- Make sure that you have a recent backup. If the drive is part of a fault-tolerant mirrored volume, or a hardware fault-tolerant volume, you will be able to back up the data again in case of a second drive failure.

- Locate a replacement drive of the same type and capacity.
- Follow the instructions in the following sections for replacing a drive for the server configuration.

DOS Partitions and NetWare Fault Tolerance

NetWare does not mirror information on DOS partitions. Only hardware fault tolerance supports mirrored DOS partitions. If there is a mirrored drive containing a DOS partition, restore the DOS partition information from another backup source.

If the failed drive contains a DOS partition, NetWare cannot access information on that partition. For example, files on the DOS partition include *STARTUP.NCF* and Novell disk drivers. To prevent NetWare from attempting to read from or write to the failed device, execute the following command from the console:

```
REMOVE DOS
```

Recovering a DOS Partition Without Hardware Fault Tolerance

If the server is not configured for hardware fault tolerance, and if the failed drive contains the DOS partition used to boot the server, it cannot be restarted once it has been powered off. Schedule maintenance time as soon as possible. Next do the following:

1. Power off the server.
2. Replace the failed drive.
3. Reboot the system and run the Compaq System Configuration Utility.
4. Select the option to Install a System Partition on the DOS boot device. This partition should contain the Compaq System Configuration Utility and the Compaq Diagnostic Utility. Exit the System Configuration Utility.
5. Locate a DOS bootable diskette that contains the DOS FDISK and FORMAT programs.
6. Use the FDISK program to create a primary DOS partition on the replaced drive. Compaq recommends the DOS partition be at least 100 MB.
7. Set the active partition to the DOS partition just created.

8. Use the `FORMAT` command to format the DOS partition to include the necessary files to make the partition bootable. For example:


```
FORMAT C: /s
```
9. Copy `SERVER.EXE`, the required disk drivers, LAN drivers, and utility NLMs that should reside on the DOS partition from the Novell SSD.
10. Copy any other necessary information to the DOS partition, then reboot the system. Then start the NetWare server. The `STARTUP.NCF` file may need to be created.

Recovering Drives Configured for NetWare Fault Tolerance

If no fault tolerance for the drives connected to the device is chosen and NetWare mirroring or NetWare controller duplexing is configured, perform the following steps to recover the data after a drive failure:

1. Identify the failed physical drive that caused the NetWare device to be deactivated. Record the device number and device name of the failed logical drive. For example:

```
NWPA:          [V503-A2-D1:0] Compaq SMART-2 Slot 8 Disk 2 NFT
```

The failure messages are recorded on the server console and in the server error log file, which may be viewed using the `NWADMIN` utility (4.x). Use this information later to create a valid partition.

2. Load `INSTALL.NLM` and `NWCONFIG` for NetWare 5.x and select the Disk Options Mirroring menu. Select the mirrored logical partition that was affected by the drive failure (See step 1). Record the device number and partition number of the operational logical drive in this mirrored group. This information will be used later to remirror the repaired logical drive. For example:

```
NWPA:          [V503-A2-D1:0] Compaq SMART-2 Slot 8 Disk 2 NFT
```

3. Delete the unavailable (possibly out of sync) device from the Mirror Partition group. This device is unavailable due to the drive failure.
4. Record the drive bay location of the failed physical drive. The new physical drive must be inserted in this drive bay.
5. If the failed drive is hot-pluggable, go to step 6. Otherwise, schedule server down time, take the server offline, and power off the unit.
6. Insert the replacement physical drive in the drive bay where the failed drive was located. The physical drive must be of the same capacity as the failed drive. Be sure that all cable connections are secure.

For replacements in a ProLiant server or storage system, after you secure the drive in the bay, the LEDs on the drive each light once in an alternating pattern to indicate that the connection was successful. The online LED turns green, indicating that the controller has recognized and successfully initialized the replacement drive. If the online LED does not light after a few minutes, verify that the new drive is in the same slot that the failed drive was in and that the drive capacity is the same as the failed drive.

7. Activate the replaced device. Use the *MONITOR.NLM* Disk Information option to select the device. Some versions of NetWare will cause a “device activate” to occur automatically when this option is chosen. Other versions of NetWare require manual activation of the device by changing the operating status to active. If reactivation of the failed logical drive is successful, the driver sends a console alert.
8. Use the *INSTALL.NLM* and *NWCONFIG* for NetWare 5.x option Change Hot Fix (look at the information provided about the mirrored drive, not the failed drive) to determine the number of Hot Fix Redirection blocks set up for this partition.
9. Use the *INSTALL.NLM* and *NWCONFIG* for NetWare 5.x to delete and create the partition on the repaired logical drive.

NOTE: Although the logical drive may have a valid partition table, the data on this logical drive is no longer valid. Some data may appear valid because the failed physical drive was only a portion of the arrayed logical drive. However, there is a hole in the logical drive data at this point. Delete any old, invalid data and create a new partition on the logical drive.

10. From the *INSTALL.NLM* Disk Options menu, select the Modify Disk Partitions and Hot Fix Option. On the *INSTALL.NLM* Available Disk Drives menu, select the previously failed logical drive, which has now been repaired. The device information was recorded in step 1. For example:

NWPA: [V503-A2-D1:0] Compaq SMART-2 Slot 8 Disk 2 NFT

Select the Delete Partition. *INSTALL* may display several error messages. Since you will delete this partition, do not update any Volume Definition Table information. Continue until the partition has been deleted.

If *INSTALL* reports that it cannot delete the partition because another process has it locked, load *MONITOR* and look at the System Resources option to determine which NLM has locked the device. It may be *MONITOR.NLM*, so you will need to unload *MONITOR* and any other NLMs that have the partition locked. After you create the partition and volume information, reload those NLMs.

11. Create the partition on the same logical drive.
12. Return to the Disk Options Mirroring menu. Select the previously mirrored NetWare 386 Partition number (recorded in step 2).

NWPA: [V503-A2-D1:0] Compaq SMART-2 Slot 8 Disk 2 NFT

13. Press **Insert** for a list of partitions available to remirror. Select the partition associated with the repaired device (step 1). This causes NetWare to resynchronize the mirrored partitions.

A console message indicates successful completion of the resynchronization step.

Recovering Drives Configured for No Fault Tolerance

If no fault tolerance is configured, recover the data from a backup media. Perform the following steps:

1. Identify the failed physical drive that caused the logical drive to be deactivated. Record the device number and device name of the failed logical drive. For example:

NWPA: [V503-A2-D1:0] Compaq SMART-2 Slot 8 Disk 2 NFT

Failure messages are recorded on the server console. They are also recorded in the server error log file, which can be viewed using the NWADMIN utility. This information will be used later to create a valid partition.

NOTE: For hot-pluggable drives in a ProLiant server or storage system, record the location drive bay of the failed physical drive. The failed physical device can be identified by the illumination of the amber LED on the drive tray. This is where the new physical drive must be inserted.

2. Remove the failed drive.
3. Insert the replacement physical drive in the same drive bay where the failed drive was located. The physical drive must be of the same capacity as the failed drive.

NOTE: After a hot-pluggable drive is secured in the bay, the LEDs on the drive each light once in an alternating pattern to indicate that the connection was successful. The online LED turns green, indicating that the controller recognized and successfully initialized the replacement drive. If the online LED does not light after a few minutes, verify that the added drive is in the same slot as the failed drive, and that the drive capacity is the same as the failed drive capacity.

4. Activate the replaced device. Use the *MONITOR.NLM* Disk Information option to select the device. Some versions of NetWare will cause a “device activate” to occur automatically when this option is chosen. Other versions of NetWare require manual activation of the device by changing the operating status to active. If reactivation of the failed logical drive is successful, the driver sends a console alert.
5. Use the *INSTALL.NLM* and *NWCONFIG* for NetWare 5.x option Change Hot Fix (look at the information provided about the mirrored drive, not the failed drive) to determine the number of Hot Fix Redirection blocks set up for this partition.

NOTE: Although the logical drive may have a valid partition table, the data on this logical drive is no longer valid. Some data may appear valid because the failed physical drive was only a portion of the arrayed logical drive. However, there is a hole in the logical drive data. Delete any old, invalid data and create a new partition on the logical drive.

6. Use the *INSTALL.NLM* and *NWCONFIG* for NetWare 5.x to delete and create the partition on the repaired logical drive.
7. Return to the *INSTALL.NLM* Disk Options menu. Select the Modify Disk Partitions and Hot Fix Option. The driver should reactivate the failed logical drive. The driver sends a console alert if reactivation of the failed logical drive is successful. On the *INSTALL.NLM* Available Disk Drives menu, select the previously failed logical drive, which has now been repaired. The device information was recorded in step 1. For example:

NWPA: [V503-A2-D1:0] Compaq SMART-2 Slot 8 Disk 2 NFT

Select the Delete Partition option. *INSTALL* may display several error messages. Delete the volume associated with this partition. Since you will delete this partition, do not update any Volume Definition Table information. Continue until the partition has been deleted.

If *INSTALL* reports that it cannot delete the partition because another process has it locked, load *MONITOR* and look at the System Resources option to determine which NLM has locked the device. It may be *MONITOR.NLM*, so unload *MONITOR* and any other NLMs that have the partition locked. After creating the partition and volume information, reload the NLMs.

8. Create the partition on the same logical drive (refer to the operating system documentation).
9. Create and mount the volume (refer to the operating system documentation).
10. Locate the recent backup media and restore the data to this server volume.

Regulatory Compliances

Regulatory Compliance Identification Numbers

For the purpose of regulatory compliance certifications and identification, your product has been assigned a unique Compaq series number. The series number can be found on the product nameplate label, along with all required approval markings and information. When requesting compliance information for this product, always refer to this series number. The series number should not be confused with the marketing name or model number of the product.

Federal Communications Commission Notice

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

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

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 that is 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 us by mail or telephone:

- Compaq Computer Corporation
P.O. Box 692000, Mail Stop 530113
Houston, Texas 77269-2000
- 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 us by mail or telephone:

- Compaq Computer Corporation
P.O. Box 692000, Mail Stop 510101
Houston, Texas 77269-2000
- (1) 281-514-3333.

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

Modifications

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

Cables

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

Canadian Notice (Avis Canadien)

Class A Equipment

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

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

Class B Equipment

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

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

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 (the equivalent international standards are in parenthesis):

- EN55022 (CISPR 22)—Electromagnetic Interference
- EN55024 (IEC61000-4-2, 3, 4, 5, 6, 8, 11)—Electromagnetic Immunity
- EN61000-3-2 (IEC61000-3-2)—Power Line Harmonics
- EN61000-3-3 (IEC61000-3-3)—Power Line Flicker
- EN60950 (IEC950)—Product Safety

Japanese Notice

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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。

Appendix **B**

Electrostatic Discharge

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

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until 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 \pm 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 an Authorized Compaq Reseller install the part.

NOTE: For more information on static electricity, or assistance with product installation, contact your Authorized Compaq Reseller.

Index

A

ARCPaq 1-2, 2-13
Array Configuration Utility
(ACU) 2-9
array controller
 driver installation 3-1

B

BackPaq 1-2, 2-13
board components
 location 1-2
boot straps, using B-2

C

cables *See* Fibre Channel cables
 FCC compliance
 statement A-3
cabling
 option kit numbers 2-9
 replacement 2-9
Canadian Regulatory Compliance
 Notice (Avis Canadien) A-4
Class A equipment, Canadian
 compliance statement A-4
Class B equipment, Canadian
 compliance statement A-4
Compaq Download Facility
 telephone number viii

Compaq Insight Manager Agents
 updating 3-5, 3-6
Compaq Series Number A-1
components
 location on board 1-2
connection names 2-11
controller
 replacing 2-3
controller installation
 warning 2-3

D

data recovery
 NetWare 3-11
 NetWare, with no fault
 tolerance 3-13
DOS partition
 in NetWare 3-10
drive
 mirrored, in NetWare 3-10
 recovering, NetWare 3-11
 with no fault tolerance 3-13
drive failure
 NetWare 3-9
 recovering from 3-11, 3-13
drive mirroring
 software-based, in
 NetWare 3-9

- driver installation
 - NetWare 3-5
 - Windows 2000 3-2
 - Windows NT 3-3
- drivers
 - installation 3-1

E

- electric shock icon vii
- electrostatic discharge *See* ESD
- ESD (electrostatic discharge)
 - obtaining additional information B-2
 - precautions B-1
 - preventing B-1
 - storing products B-1
 - transporting products B-1
 - types of damage from B-1
- exclamation point icon vii

F

- fault tolerance
 - in NetWare 3-9
- FCC (Federal Communications Commission)
 - Class A Equipment,
 - compliance notice A-2
 - Class B Equipment,
 - compliance notice A-2
 - Declaration of Conformity A-3
 - modifications A-3
 - notice A-1
- Federal Communications Commission *See* FCC
- Federal Communications Commission (FCC) notice A-1
- Fibre Channel cables
 - installing 2-8
 - multi-mode 2-7
- fixed optical transceiver 1-3

G

- GBIC modules
 - installing 2-8
 - shortwave 2-7
- grounding methods B-2
- grounding straps
 - specifications B-2
 - wearing B-2
- grounding, suggested equipment for B-2

H

- hazard symbol vii
- hazardous conditions
 - symbols on equipment vii
- hazardous energy circuits
 - symbol vii
- heel straps, using B-2
- help
 - additional sources viii
 - Compaq Authorized Resellers,
 - telephone numbers viii
 - technical support telephone numbers viii

I

- icons on equipment vii
- important
 - ensuring product integrity 2-7
- installing
 - cables 2-8
 - drivers
 - NetWare 3-5
 - prerequisites 3-1
 - Windows 2000 3-2
 - Windows NT 3-3
 - GBIC modules 2-8

L

- labels
 - symbols on equipment vii
- LED table 1-3
- locked partitions (NetWare) 3-12

M

- mirrored drive (NetWare) 3-10
- mirroring
 - software-based
 - in NetWare 3-9
- mouse compliance statement A-4
- multi-mode Fibre Channel
 - cables 2-7

N

- NetWare
 - data recovery 3-11
 - with no fault tolerance 3-13
 - DOS partition 3-10
 - fault tolerance in 3-9
 - installing drivers 3-5
 - mirrored drive 3-10
 - recovering data 3-11
 - recovering DOS partition 3-10
 - software-based mirroring 3-9
 - updating Compaq Insight
 - Manager Agents 3-6

O

- operating system
 - driver installation
 - prerequisites 3-1
- Option ROM Configuration Array (ORCA) 2-9

P

- part numbers 1-2
- partitions
 - locked, in NetWare 3-12
 - NetWare 3-10

- parts
 - proper handling B-1
 - storing B-1
 - transporting B-1
- PCI 1-1
 - bus 1-1
- precautions
 - controller installation 2-3
- prerequisites
 - installing drivers 3-1

R

- recommendation
 - DOS partition size,
 - NetWare 3-10
- recovering data
 - NetWare 3-11
- recovering DOS partition
 - NetWare 3-10
- regulatory compliance
 - identification number A-1
- regulatory compliance notices
 - cables A-3
 - Canada A-4
 - Class A A-2
 - Class B A-2
 - Compaq series number A-1
 - European Union A-4
 - modifications A-3
 - mouse compliance
 - statement A-4
- replacing
 - controller 2-3
- RJ-45 receptacle symbol vii
- ROMPaq
 - utilities 2-2

S

- screwdriver icon vii
- serial number *See* WorldWide Name
- series number, regulatory
 - compliance A-1
- shortwave GBIC modules 2-7

- Smart Array 5304 Controller 1-1
 - driver installation
 - prerequisites 3-1
- Smart Array drivers
 - NetWare 3-5
 - prerequisites for
 - installation 3-1
 - Windows 2000 3-2
 - Windows NT 3-3
- software-based mirroring
 - in NetWare 3-9
- SSP
 - WorldWide Name 2-11
- static-safe containers
 - storing products in B-1
 - transporting products in B-1
- symbols in text vi
- symbols on equipment vii
- System ROMPaq *See* ROMPaq
- system, preventing electrostatic damage to B-1

T

- table
 - cabling kits 2-9
- technical support
 - telephone numbers viii
- telephone numbers
 - Compaq Authorized Resellers viii
 - Compaq Download Facility viii
 - technical support viii

- telephone symbol vii
- text conventions vi
- tools
 - conductive field service type B-2
- transceiver *See* fixed optical transceiver

U

- updating
 - Compaq Insight Manager Agents 3-5, 3-6
 - system ROM 2-2

W

- warnings
 - controller installation 2-3
 - electric shock vii
 - hot surfaces vii
 - multiple sources of power viii
- Windows 2000
 - driver installation 3-2
- Windows NT
 - driver installation 3-3
 - updating Compaq Insight Manager Agents 3-5
- WorldWide Name 2-2
 - mapping in SSP 2-11
- wrist straps
 - specifications B-2
 - using B-2