

**RA8000/ESA12000 and
MA8000/EMA12000 Solution
Software V8.5b for IBM AIX**

Installation Reference Guide

Third Edition (April 2000)
Part Number AA-RJ25C-TE
Compaq Computer Corporation

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RA8000/ESA12000 and MA8000/EMA12000 Solution Software V8.5b for IBM AIX
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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.
<i>FILENAMES</i>	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 <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 icons may be located on equipment in areas where hazardous conditions may exist.



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

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



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

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



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

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



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

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

Rack Stability



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

- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- The stabilizing feet are attached to the rack if it is a single rack installations.
- The racks are coupled together in multiple rack installations.
- A rack may become unstable if more than one component is extended for any reason. Extend only one component at a time.

Getting Help

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

Compaq Technical Support

You are entitled to free hardware technical telephone support for your product for as long you own the product. A technical support specialist will help you diagnose the problem or guide you to the next step in the warranty process.

In North America, call the Compaq Technical Phone Support Center at 1-800-OK-COMPAQ¹. This service is available 24 hours a day, 7 days a week.

Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for world wide Technical Support Centers are

¹ For continuous quality improvement, calls may be recorded or monitored.

listed on the Compaq website. Access the Compaq website by logging on to the Internet at <http://www.compaq.com>.

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

- Technical support registration number (if applicable)
- Product serial number (s)
- Product model name(s) and numbers(s)
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level
- Detailed, specific questions

Compaq Website

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

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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**

Preparing your IBM Host for Use with the RA8000/ESA12000 or MA8000/EMA12000

1.1 Introduction

This chapter describes the steps required to prepare an IBM host server for a StorageWorks RA8000/ESA12000 or MA8000/EMA12000 storage subsystem environment. The steps include configuring the RAID controllers, installing the Fibre Channel host bus adapter, uninstalling previous versions of StorageWorks Solutions Software, and loading and installing the StorageWorks Solutions Software onto your hard disk.

The following steps are required to prepare your IBM AIX host server for a StorageWorks RA8000/ESA12000 or MA8000/EMA12000 storage subsystem environment:

- Setup the HSG80 array controllers
- Install the Fibre Channel Host Bus Adapter
- Enable the HSG80 Command Console LUN
- Uninstall Previous Versions of StorageWorks Solutions Software
- Load and Install StorageWorks Solutions Software V8.5 onto the Hard Disk.
- Upgrade or reinstall StorageWorks Solutions Software V8.5.

NOTE: Prior to installing StorageWorks Solutions Software, ensure the RAID Controller Writeback Cache Battery is fully charged. This is accomplished by supplying power to the RAID Controller for a minimum of 6 hours.

The IBM AIX V8.5 Solutions kit supports the following Host Bus Adapters (HBA) and applications:

- Fibre Quick Host Bus Adapter, Compaq Part Number: DS-SWIA1-PC
 - Fibre Channel Arbitrated Loop
- IBM Host Bus Adapter (IBM PN: 6227) – The IBM HBA automatically configures itself for Arbitrated Loop or FC switch on connection.
 - Fibre Channel Arbitrated Loop
 - Fibre Channel Switch

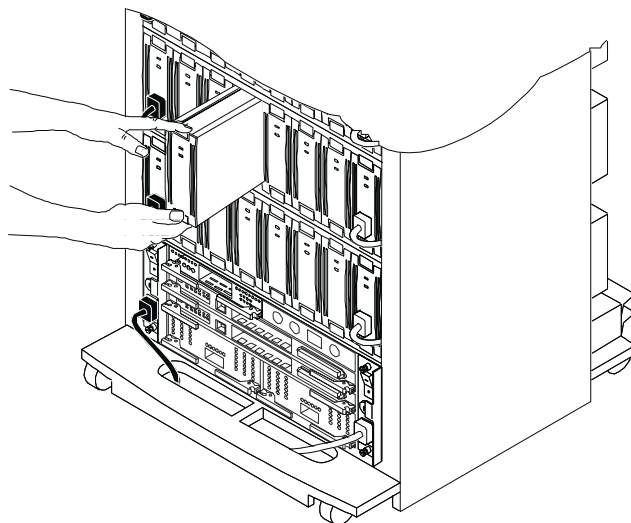
1.2 Install the SBBs in the RA8000/ESA12000 Storage System Cabinet

NOTE: In the following procedures disks may be referred to as Storage Building Blocks, SBBs.

Perform the following steps to install the SBBs into the storage cabinet and refer to Figure 1–1:

1. Insert an SBB into the shelf guide slots and slide the SBB into the shelf until the mounting tabs snap into place.
2. For optimum SCSI bus distribution, install the SBBs from left-to- right and from bottom-to-top.

Figure 1-1. Installing SBBs into Storage System Cabinet



SHR-1542

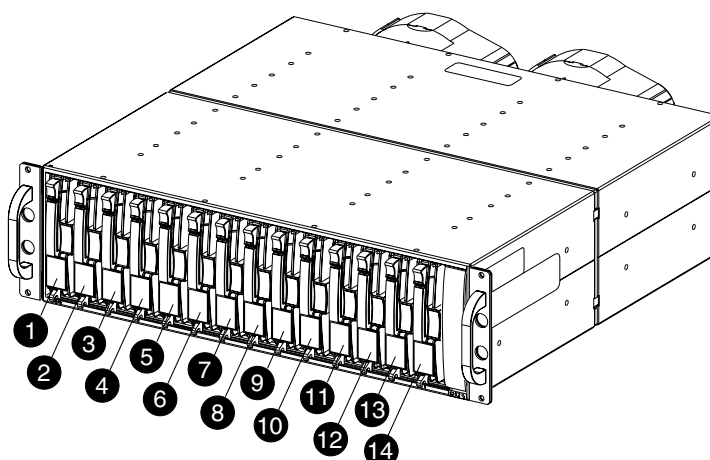
1.3 Install Disks in the Model 4200 Family Disk Enclosure for the MA8000/EMA12000 Storage System

Perform the following steps to install disks into Model 4214 and model 4254 disk enclosures and refer to Figure 1-2:

1. Insert a disk into the enclosure guide slots and slide the disk into the shelf until it snaps into place.

NOTE: Only 12 disks are supported in the single-bus Model 4214 disk enclosure. In order to keep a balanced number of drives on each bus, avoid populating disk bays 7 and 14.

Figure 1-2. Model 4200 family disk enclosure



CXO7219A

Model 4214 Disk Enclosure (Single-Bus)														
Bay	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SCSI ID	00	01	02	03	04	05	08	09	10	11	12	13	14	15

Model 4254 Disk Enclosure (Dual-Bus)														
Bay	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SCSI ID	SCSI Bus A							SCSI Bus B						
	00	01	02	03	04	05	08	00	01	02	03	04	05	08

1.4 Install the PCMCIA Card into the HSG80 Controller

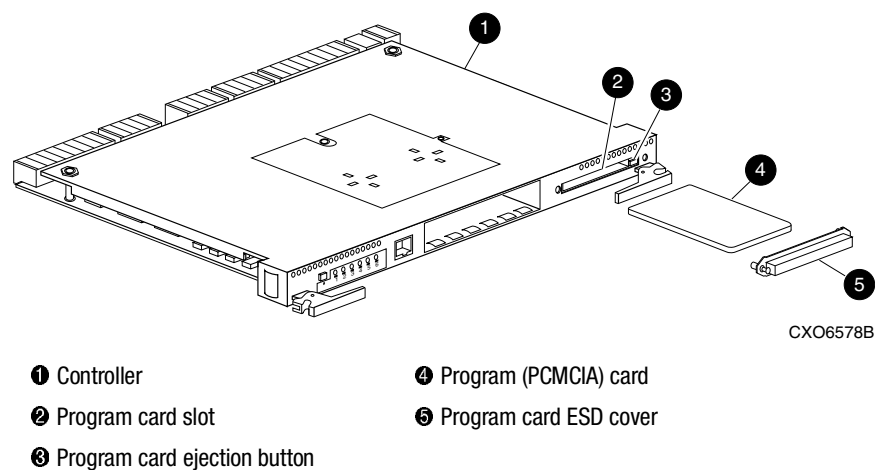
Install the PCMCIA card into the HSG80 controller as follows and refer to Figure 1-3.

2. Remove the ESD cover from the controller PCMCIA slot.
3. Insert the PCMCIA card in the controller slot.
4. Replace the ESD cover over the controller slot.
5. Repeat the procedure for a second controller.



CAUTION: If you bump against the SCSI ID selector switch above the top controller, you can change the switch setting by mistake. Check the setting before you go on and reset the switch if necessary; the switch should be set on 0 for the first cabinet, 2 for the second cabinet, and 3 for the third cabinet.

Figure 1-3. Install PCMCIA Card into HSG80 Controller



1.5 HSG80 Array Controller Setup

Before the StorageWorks RAID subsystem can be used by the IBM host server, its HSG80 controllers must be properly configured. To configure the controllers, proceed as follows:

1. Establish a serial data connection to the RAID system top controller from your host (reference *Appendix A, Creating Your Storage Configuration with the CLI*). Section “Accessing the CLI.”

2. From the CLI prompt, type:

```
SHOW THIS_CONTROLLER FULL
```

The current configuration of your HSG80 controllers will appear.

3. For connection to an arbitrated loop, check the configuration (parameter settings) of your controller against those listed in Table 1-1, which are the correct HSG80 controller parameter settings for an IBM AIX environment. For connection to Fibre Channel switch, proceed to Section 1.5.1

Table 1-1
Correct Controller Parameter Settings for Arbitrated Loop

HSG80 Controller Parameter	Correct Parameter Setting
Prompt	HSG80>
Node (WWN)	nnnn-nnnn-nnnn-nnnn
Command Console LUN	Enabled
Port 1 Profile	PLDA
Port 2 Profile	PLDA
Port 1 Topology	LOOP HARD
Port 2 Topology	LOOP HARD
Port 1 ALPA	nn (D5 is default)
Port 2 ALPA	nn (D6 is default)
SCSI Version	SCSI-2
New Connection Operating System Type	WINNT

4. Change any controller parameter settings inconsistent with those in Table 1-1 by typing the appropriate command for that parameter, as described in the next section.

1.5.1 Controller Parameter Configuration

Commands:

The controller environment settings can be established using the commands defined in this section.

NOTE: Although an IBM operating system entry is present in the CLI and SWCC for Fibre Channel connection, use the default setting "WINNT" for operation with your IBM host. The IBM setting may cause problems when LUNs are not available to AIX or during a controller failover.

NOTE: After completing all of the required parameter changes, you must *restart the controller* for the new settings to take effect.

Ignore the *Restart Controller* messages until you have finished making all the required configuration parameter changes.

Prompt

To set the prompt to the HSG80 controller, type:

```
SET THIS_CONTROLLER PROMPT="HSG80>"
```

Clear Error Messages

Clear the persistent error messages using:

```
HSG80> CLEAR CLI
```

Node (WWN)

Set the Node by acquiring the World Wide Name (WWN) node number and checksum from the enclosed label (located on the top surface of the controller enclosure), and using:

```
HSG80> SET THIS_CONTROLLER NODE=nnnn-nnnn-nnnn-nnnn checksum
```

Command Console LUN

Enable the Command Console LUN using:

```
HSG80> SET THIS_CONTROLLER COMMAND_CONSOLE_LUN
```

Port Profile

Set the Port Profile using:

```
HSG80> SET THIS_CONTROLLER PORT_1_PROFILE=PLDA  
HSG80> SET THIS_CONTROLLER PORT_2_PROFILE=PLDA
```

Port Topology

Set the Port Topology using:

```
HSG80> SET THIS_CONTROLLER PORT_1_TOPOLOGY=LOOP_HARD  
HSG80> SET THIS_CONTROLLER PORT_2_TOPOLOGY=LOOP_HARD
```

Port ALPA

Set the Port ALPA of each controller by referencing *Appendix D, Valid ALPA Settings*, and using:

```
HSG80> SET THIS_CONTROLLER PORT_1_AL_PA=D5  
HSG80> SET THIS_CONTROLLER PORT_2_AL_PA=D6
```

SCSI Version

Set the SCSI version using:

```
HSG80> SET THIS_CONTROLLER SCSI VERSION=SCSI-2
```

New Connection Operating System

Determine if the operating system set for the on-line controller connection is WINNT, using:

```
HSG80> SHOW CONNECTIONS
```

Although an IBM operating system entry exists in the CLI and SWCC, for the Fibre Channel connection, use the default setting WINNT for operation with your IBM host. The IBM setting may cause problems when LUNs are not available to AIX or during controller failover, use:

```
HSG80> SET !NEWCONNxx OPERATING_SYSTEM=WINNT
```

where: *xx* is the online connection id produced in the SHOW CONNECTIONS command above.

NOTE: Further information on command syntax can be found in the *Compaq StorageWorks HSG80 Array Controller ACS V8.5 CLI Reference Guide*.

Controller Restart

Restart the controllers for the new settings to take effect, using:

```
HSG80> RESTART OTHER_CONTROLLER  
HSG80> RESTART THIS_CONTROLLER
```

1.6 Connecting the IBM Host Server, Fibre Channel Hub and RAID System

To connect the Fibre Channel (FC) hub to the host server and RAID subsystem, perform the following steps:

Install the *Fibre Quick Fibre Channel Host Bus Adapter* (HBA) or IBM 6227 HBA into your IBM host server as described in the user guide supplied with the host adapter. The host adapter *driver* that is referenced in the user guide is located on the CD-ROM in your StorageWorks Solutions Software Kit.

Connect a Fibre Channel cable between the Fibre Channel HBA in back of the server and a port on the Fibre Channel hub.

Connect a Fibre Channel cable from each controller port of the RAID system, to the Fibre Channel hub.

Turn the power ON to the Fibre Channel hub.

NOTE: If you are not installing an IBM Host Bus Adapter and Fibre Channel switch, proceed to Section 1.7.

1.6.1 Connecting the IBM Host Server Fibre Channel Switch and RAID System

1. For Fibre Channel Switch, check the configuration (parameter settings) of your controller against those listed in the Table 1-2, which are the correct HSG80 controller parameter settings for an IBM AIX FC switch environment.

NOTE: Fibre Channel switch is supported only with the IBM Fibre Channel adapter, PN: 6227.

Table 1-2
Correct Controller Parameter Settings for Fibre Channel Switch

HSG80 Controller Parameter	Correct Parameter Setting
Prompt	HSG80>
Node (WWN)	nnnn-nnnn-nnnn-nnnn
Command Console LUN	Enabled
Port 1 Topology	FABRIC
Port 2 Topology	FABRIC
SCSI Version	SCSI 2
New Connection Operating System Type	WINNT

2. Change any controller parameter settings inconsistent with those in Table 1-2 by typing the appropriate command for that parameter, as described in the next section.

1.6.2 Controller Parameter Configuration Commands

The controller environment settings can be established using the commands defined in this section.

NOTE: After completing all of the required parameter changes, you must *restart the controller* for the new settings to take effect.

Ignore the *Restart Controller* messages until you have finished making all of the required configuration parameter changes.

Prompt

To set the prompt to the HSG80 controller, type:

```
SET THIS_CONTROLLER PROMPT="HSG80>"
```

Clear Error Messages

```
HSG80> CLEAR CLI
```

Node

Set the Node by acquiring the World Wide Name (WWN) node number and checksum from the enclosed label (located on the top of surface of the controller enclosure), and the following command:

```
HSG80> SET THIS_CONTROLLER NODE=nnnn-nnnn-nnnn-nnnn checksum
```

Command Console LUN

Enable the Command Console LUN by typing:

```
HSG80> SET THIS_CONTROLLER COMMAND_CONSOLE_LUN
```

Port Topology

Set the Port Topology by using:

```
HSG80> SET THIS_CONTROLLER PORT_1_TOPOLOGY=OFFLINE  
HSG80> SET THIS_CONTROLLER PORT_2_TOPOLOGY=OFFLINE  
HSG80> SET THIS_CONTROLLER PORT_1_TOPOLOGY=FABRIC  
HSG80> SET THIS_CONTROLLER PORT_2_TOPOLOGY=FABRIC
```

SCSI Version

Set the SCSI version by using:

```
HSG80> SET THIS_CONTROLLER SCSI VERSION=SCSI-2
```

New Connection Operating System

Determine if the operating system set for the on-line controller connection is IBM, by typing:

```
HSG80> SHOW CONNECTIONS
```

Although an IBM operating system entry exists in the CLI and SWCC, for the Fibre Channel connection, use the default setting WINNT for operation with your IBM host. The IBM setting may cause problems when LUNs are not available to AIX or during controller failover; use the following command:

```
HSG80> SET ! NEWCONNxx OPERATING SYSTEM=WINNT
```

Where: *xx* is the online connection “ID” produced in the SHOW CONNECTIONS command above.

NOTE: Further information on command syntax can be found in the *Compaq StorageWorks HSG80 Array Controller ACS V8.5 CLI Reference Guide*.

Controller Restart

Restart the controllers for the new settings to take effect, using:

```
HSG80> RESTART OTHER_CONTROLLER
```

```
HSG80> RESTART THIS_CONTROLLER
```

1.6.3 Connecting the IBM Host Adapter, Fibre Channel Hub/Switch and RAID System

To connect the Fibre Channel (FC) hub/switch to the host server and RAID system, perform the following steps:

1. Install the IBM Fibre Channel Host Bus Adapter (HBA) into your IBM host server as described in your user guide supplied with your host adapter. The adapter is supported on AIX version 4.3 only. The IBM system will boot with proper drivers attached to the host bus adapter.
2. Connect a Fibre Channel cable between the Fibre Channel HBA and a port on the Fibre Channel hub/switch.
3. Connect a Fibre Channel cable from each controller port of the RAID system, to each Fibre Channel hub/switch in the cluster.
4. Turn ON the power to the Fibre Channel hub/switch.

1.7 Loading StorageWorks Solutions Software V8.5 onto the Hard Disk

The StorageWorks Solutions Software consists of the RAID Array software installation script, the AIX support files, and the Command Console (CC) Agent. Installation and operation of the software will require temporary and permanent space on your hard disk. You will need approximately 4 Mbytes of permanent space on your hard disk to use the StorageWorks Solutions Software and an additional 2 Mbytes of temporary space on your hard disk for installation purposes.

The StorageWorks Solutions Software consists of:

- An installation and configuration script
- ODM database files
- ODM catalog files

Loading the StorageWorks Solutions Software requires the following steps:

- Mounting the CD-ROM that contains the software.
- Copying the files from the file archive to a temporary storage area.
- Executing the installation and configuration script.

1.7.1 Copying the File Archive from CD-ROM to Temporary Storage

Before the installation script or upgrade script can be run, the file archive that contains the StorageWorks Solutions Software will need to be copied from the CD-ROM to a temporary directory. The scripts can then be executed. You will need approximately 2 Mbytes of temporary space to load the file archive from CD-ROM.

1. Insert the StorageWorks Solutions Software distribution CD-ROM into the drive.
2. Login as root (superuser).
3. Change the directory to a temporary storage area (/tmp). For example, type:

```
# cd /tmp
```

4. Create a directory into which the file archive can be loaded:

```
# mkdir HSG80
```

5. Change to that directory:

```
# cd HSG80
```

6. Mount the CD-ROM:

```
# mount -vcdvfs -r /dev/cd0 /mnt
```

NOTE: the name of /dev/cd0 may be different on your system

7. Extract the file archive from the CD-ROM by entering the following command:

```
# tar xvf /mnt/swcc/agent/stm_aix.tar
```

8. All of the files necessary to complete the StorageWorks software installation have now been copied to this directory.
9. If you are upgrading or reinstalling, proceed to Section 1.8.1 “Upgrading or Reinstalling StorageWorks Solutions Software.”

1.7.2 Executing the Installation and Configuration Script

Perform the following procedure to install the StorageWorks Solutions Software version 8.5 onto your system from path /tmp/HSG80:

1. Enter the following command and press the **Return** key.

```
# ./stgws_aix.sh
```

The installation options menu appears.

```
StorageWorks and Command Console Agent
Installation and Configuration Menu
```

```
StorageWorks Options:
```

- ```

1) Install StorageWorks software
2) StorageWorks Maintenance
```

```
Agent Options:
```

- ```
-----
3) Install Agent
4) Agent Maintenance
```

```
Q) Quit
```

```
Enter Selection: q
```

2. Type 1 to install the StorageWorks Software. The Copyright Notice and the following information will be displayed:

Q) QuitEnter Selection: 1

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[should the copyright date be updated]
Restricted Rights: Use, duplication by the U.S. Government is subject to restriction as set forth in subparagraph (c) (1) (ii) of DFARS252.227-7013, or in FAR 52.227-19, or in FAR 52.227-14 Alt. III, as applicable
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Checking User...OK
Checking AIX Revision Level...OK
Checking that Cambex FC Adapter is installed and correctly configured...OK
Checking that IBM FC adapter is installed and correctly configured...OK
Checking for previous HSG80 software installations...OK
Checking for ODM add files...OK
Checking for ODM catalog files...OK
Adding HSG80 to ODM Database...OK
Moving ODM Catalog into place...OK
Saving base configuration...OK
Issuing bosboot command, please standby...OK
Copying installation files to /usr/stgws2 directory...OK

RAID Array Configuration Information

```
-----
name status location description
hdisk3 Available 20-70-00-10,0 DEC HSG80 Command Console LUN
hdisk5 Available 30-60-01 DEC HSG80 Command Console LUN
hdisk2 Available 20-70-00-9,0 DEC HSG80 RAID Array
hdisk4 Available 20-70-00-10,1 DEC HSG80 RAID Array
hdisk6 Available 30-60-01 DEC HSG80 RAID Array
hdisk7 Available 30-60-01 DEC HSG80 RAID Array
```

Disks for Adapter fcs0:No disks on this adapter.

Disks for Adapter fcs1:

Disk	Availability	Disk Type	Address	LUN i.d.
hdisk5	Available	HSG80CCL	0x624400	0
hdisk6	Available	HSG80	0x624400	1
hdisk7	Available	HSG80	0x624600	1

Installation of StorageWorks Software Complete

-- Hit RETURN to continue --

StorageWorks and Command Console Agent
Installation and Configuration Menu

StorageWorks Options:

1) Install StorageWorks software
2) StorageWorks Maintenance

Agent Options:

3) Install Agent
4) Agent Maintenance

Q) Quit

Enter Selection: q

1.8 Using the StorageWorks Installation Utility Maintenance Options

The StorageWorks Solutions Software Installation utility offers the following maintenance options:

- Upgrading or Re-Installing StorageWorks Solutions Software
- Uninstalling StorageWorks Solutions Software

1.8.1 Upgrading or Reinstalling the StorageWorks Solutions Software

The StorageWorks RAID Array Solutions Software Kit contains a script that allows the StorageWorks software to be reinstalled after an AIX upgrade or new and complete installation.

AIX upgrades do not preserve the RAID Controller ODM attributes. After you complete an AIX installation or upgrade, the RAID Array subsystem devices will be listed as “*Other SCSI Disk*.” The logical volume groups, logical volumes and filesystems are still intact, only the device names have been changed. The StorageWorks upgrade script will change the names of the devices and add the RAID Array system entries to the ODM database. Once the upgrade script has been completed, reboot the RS/6000 to complete the upgrade.

To upgrade the StorageWorks software, follow these steps:

1. Type the following command:

```
# cd /tmp/HSG80 (or to the directory created in Section “Copying the File Archive from  
CD-ROM to Temporary Storage”)  
# ./stgwns_aix.sh
```

The script executes and displays the following:

```
StorageWorks and Command Console Agent  
Installation and Configuration Menu
```

```
StorageWorks Options:
```

- ```

1) Install StorageWorks software
2) StorageWorks Maintenance
```

```
Agent Options:
```

- ```
-----  
3) Install Agent  
4) Agent Maintenance
```

```
Q) Quit
```

```
Enter Selection: 2
```

2. Type 2 and the StorageWorks Maintenance Menu displays.

```
StorageWorks Maintenance Menu
-----

1) Upgrade StorageWorks software
2) Uninstall StorageWorks software

Q) Quit

Enter Selection: 1
```

3. Type 1 to upgrade the software. The copyright notice and the following information will be displayed:

```
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FAR 52.227-14 Alt. III, as
applicable

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Compaq Computer Corporation. Possession, use, or copying of this software and media
is authorized only pursuant to a valid written license from Compaq or an authorized
sublicensor.

The purpose of this script is to upgrade existing
HSG80 Storage Works software to the current version.

Checking User Privileges...OK
Checking AIX Revision Level...OK
Checking that Cambex FC Adapter is installed and correctly configured...OK
Checking that IBM FC Adapter is installed and correctly configured...OK
Checking for ODM add files...OK
Checking for ODM catalog files...OK
Adding HSG80 to ODM Database...OK
Moving New ODM Catalogs into place...OK
Copying the new installation files to /usr/stgwns2 directory...OK
Configuring system...OK
Saving base configuration...OK
Issuing bosboot command, please standby...OK

Please reboot the system at this time to
```

allow configuration changes to take effect.
RAID Array Upgrade Complete

-- Hit RETURN to continue --

StorageWorks Maintenance Menu

- 1) Upgrade StorageWorks software
- 2) Uninstall StorageWorks software

Q) Quit

Enter Selection: q

Type Q to return to the main menu.

StorageWorks and Command Console Agent
Installation and Configuration Menu

StorageWorks Options:

- 1) Install StorageWorks software
- 2) StorageWorks Maintenance

Agent Options:

- 3) Install Agent
- 4) Agent Maintenance

Q) Quit

Enter Selection: q

4. Reboot your RS/6000 System.

Host Device Initialization

Once the StorageWorks Solutions Software has been installed, logical units may be created on the RAID Array and configured into the system. These logical units can be created using the StorageWorks Command Console (SWCC) Client or the HSG80 Command Line Interpreter (CLI). In order to utilize SWCC Client to create logical units, the SWCC Agent and Client must first be installed on the AIX and Windows Systems respectively.

New logical units created on the RAID Array must be recognized by the operating system before they can be utilized. The following steps outline the process:

1. Using the CLI or the StorageWorks Command Console Client, create the logical units on the RAID Array.
2. As the superuser (*root*), run the command:

```
# cfgmgr
```

This command will identify and configure all of the new RAID Array devices in the operating system.

3. Verify that the host has located and configured the new RAID Array devices in the operating system using the command:

```
# lsdev -Cc disk
```

The output of the command looks like:

hdisk0	Available	10-58-00-3, 0	Other SCSI Disk Drive
hdisk1	Available	10-58-00-4, 0	Other SCSI Disk Drive
hdisk2	Available	20-70-00-9, 0	DEC HSG80 RAID Array
hdisk3	Available	20-70-00-10, 0	DEC HSG80 Command Console LUN
hdisk4	Available	20-70-00-10, 1	DEC HSG80 RAID Array
hdisk5	Available	30-60-01	DEC HSG80 Command Console LUN
hdisk6	Available	30-60-01	DEC HSG80 RAID Array
hdisk7	Available	30-60-01	DEC HSG80 RAID Array

4. You should have an entry of type:

```
hdisknn Available X0-06-01-2,4 DEC HSG80 RAID Array
```

for each logical unit that you have created on the RAID Array.

5. If the devices were not recognized, recheck the status of the RAID Controller, logical units, and cable connections.
6. You can now use the *System Management Interface Tool (SMIT)* to make volume groups, logical volumes and file systems using these logical units.

1.9 Uninstalling StorageWorks Solutions Software V8.5

If at some point you want to uninstall the StorageWorks Solutions Software V8.5 from your system, the following command will invoke an uninstall script and all traces will be removed.

Use the Uninstall script with extreme caution: it will delete all logical volume groups, logical volumes and filesystems on the RAID Array system with the naming convention described below, *except for* the volume group and associated *ODM* entries for *rootvg* if it resides on the RAID Array system. If the uninstall script deletes these entries, system behavior will be unpredictable and further operation of AIX on the RAID Array system might not be possible.

The uninstall script utilizes the following naming conventions:

- Volume Groups: HSG80lv
- Logical Volumes: lvxx
- File Systems: lvxx

The uninstall utility deletes only the volume groups, logical volumes and filesystems associated with the RAID Array System and that follow this naming convention.

To uninstall all of the StorageWorks RAID Array software, follow these steps:

1. Type the following commands:

```
# cd /usr/stgwks2
# ./stgwks_aix.sh
```

The script executes and displays the following:

StorageWorks and Command Console Agent
Installation and Configuration Menu

StorageWorks Options:

-
- 1) Install StorageWorks software
 - 2) StorageWorks Maintenance

Agent Options:

-
- 3) Install Agent
 - 4) Agent Maintenance

Q) Quit

Enter Selection: 2

2. Select 2) StorageWorks Maintenance.

StorageWorks Maintenance Menu

- 1) Upgrade StorageWorks software
- 2) Uninstall StorageWorks software

Q) Quit

Enter Selection: 2

3. Select 2) Uninstall StorageWorks software.

This uninstall program will remove all traces of the HSG80 RAID Array from the system. All RAID Array filesystems will be deleted from the system ! Are you sure you want to remove all traces of the RAID Array from the system ? Please answer Y or N: y

If you respond (Y) YES, the system starts the deletion process. The uninstall script will not remove the ODM entries for the RAID Array subsystem if the root volume group is installed on the device.

```
Unmounting RAID Filesystems and removing mount points...done
Removing RAID Logical Volume Group information...done
Removing RAID device from configuration database...done
Removing RAID device entry from ODM database...done
Deleting directory /usr/stgwks2...done

Uninstall completed...
-- Hit RETURN to continue --
```

```
StorageWorks Maintenance Menu
-----

1) Upgrade StorageWorks software
2) Uninstall StorageWorks software

Q) Quit

Enter Selection: q
```

4. Type Q to return to main menu.

```
StorageWorks and Command Console Agent
Installation and Configuration Menu
-----

StorageWorks Options:
-----
1) Install StorageWorks software
2) StorageWorks Maintenance

Agent Options:
-----
3) Install Agent
4) Agent Maintenance

Q) Quit

Enter Selection: q
```

cd /

Chapter **2**

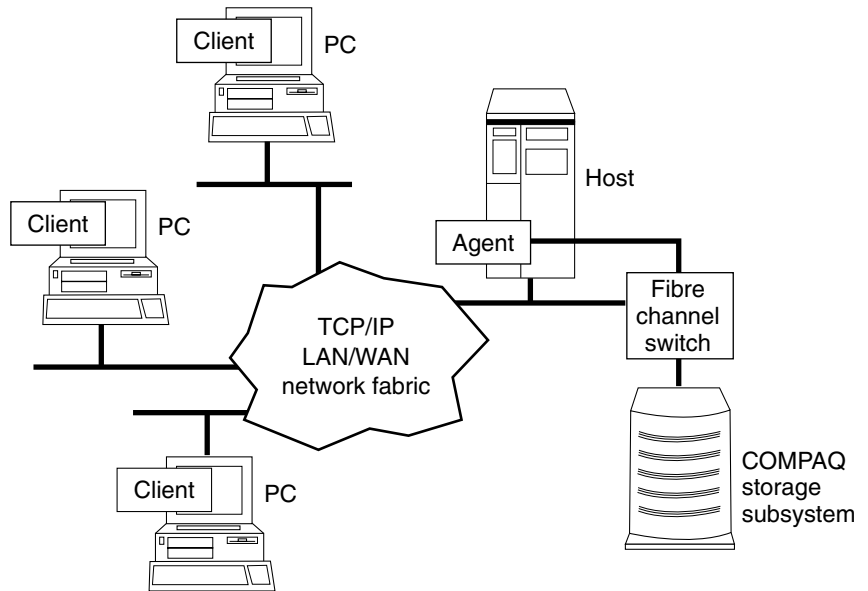
Installing and Configuring the Command Console Agent on Your Host System

This chapter describes how to install a copy of the Command Console (CC) Agent on each of your host servers connected to StorageWorks RA8000/ESA12000 or MA8000/EMA12000 storage system using the installation and configuration script.

2.1 Introduction to StorageWorks CC Agent Software

Command Console (CC) Agent is a companion application to the Command Console (CC) Client graphical user interface (GUI) program. CC Agent serves as Client's assistant in configuring, operating, and monitoring your host's RAID storage systems. CC Agent runs on your host system as a server application. It connects to CC Client sessions via the TCP/IP network protocol, as shown in Figure 2-1.

CC Agent can also be used as a standalone application without the CC Client. In this mode of operation, referred to as Agent Only, the CC Agent monitors the status of the RAID subsystem and provides local and remote notification in the event of a failure. Local notification can be via email and/or the Syslog Facility. Remote notification can be made via SNMP messages to an SNMP Monitor. The CC Client is not required for these types of notification. In order to configure the RAID subsystem, use of the CC Client or the CLI would be required.



CXO7220

Figure 2-1. Command console client/agent connection

CC Agent also provides asynchronous fault notification. The program monitors your host's RAID storage system(s) and sends notification messages to all Client sessions connected to them the moment a fault occurs. You can configure CC Agent to use TCP/IP notification to Client and SNMP notification to an SNMP-compatible monitoring application.

2.1.1 Minimum Requirements

CC Agent is designed to operate with Command Console Client Version 2.3 for Windows 2000 and Windows NT.

Before you can install a CC Agent:

- Your server resources must meet the minimum requirements specified in Table 2–1
- You must have created the communications logical unit on each StorageWorks RAID subsystem to which you want to connect, or have the CCL enabled. If your StorageWorks systems do not each contain at least one logical unit, see *Appendix A* to use the Controller’s Command Line Interpreter (CLI) software to create one. RAID subsystems without at least one volume are invisible to CC Agent and the host operating system.

Table 2-1
Minimum System Requirements

Host Feature	Requirement
Architecture	IBM RS/6000 2 MB free space in /tmp directory, 4 MB free space for CC Agent installation directory
Operating System	IBM AIX Version 4.2 or 4.3 for Fibre Quick Host Bus Adapter; Version 4.3.2 or 4.3.3 for IBM Host Bus Adapter.
Controller Compatibility	Controller running operating firmware Version 8.5.

2.1.2 Selecting a CC Agent Installation and Configuration Method

You must install and run CC Agent for IBM AIX on each RS/6000 server you wish to connect to the CC Client over the network.

To install the CC Agent for the first time, go to Section 2.1.4 “Upgrading the CC Agent Software.” If you are installing an upgrade, go to Section “Upgrading the CC Agent Software.”

2.1.3 Installing and Configuring for the First Time

The install program performs the installation using software retrieved from the CD-ROM in Section “Uninstalling Previous Versions of StorageWorks Solutions Software.” You must have access to the superuser (root) account to perform this installation.

You need to gather some information prior to starting the installation. See Table 2–2. Entries in Table 2–2 appearing with a * specify the information you need prior to starting the installation.

The CC Agent, once installed and configured properly will automatically start when you install it and will restart automatically if it stops for any reason.

To install and configure CC Agent automatically, follow these steps:

1. Log on to the host server as root (superuser).
2. Type: `cd /tmp/HSG80` to change your working directory to the `/tmp` directory containing the CC Agent software loaded from CD-ROM.
3. Type: `./stgwks_aix.sh` to start the StorageWorks Installation and Configuration script. The StorageWorks Installation and Configuration script menu appears.

```
StorageWorks and Command Console Agent
Installation and Configuration Menu
```

```
StorageWorks Options:
```

- ```

1) Install StorageWorks software
2) StorageWorks Maintenance
```

```
Agent Options:
```

- ```
-----
3) Install Agent
4) Agent Maintenance
```

```
Q) Quit
Enter Selection: 3
```

4. Type: 3 to install the CC Agent.
5. Follow the text-based prompts and enter the appropriate information. Table 2–2 guides you in responding to many of the prompts.

Table 2-2
Information Required for Install Program Prompts

Information Required to Complete Installation	How to Respond
Target directory for installation	/usr/stgws2 is the Compaq recommended directory for StorageWorks. It contains the software you installed in Chapter 1. You need a directory with a minimum of 4 MB of space available. Type the name of a directory and the install program automatically creates it if it doesn't already exist.
*Port that the Command Console Client GUI uses to communicate with the Command Console Agent for RAID subsystem configuration and maintenance.	*Default is 4998. If the default port is already used, press N and specify a new port.

continued

Table 2-2
Information Required for Install Program Prompts *continued*

Information Required to Complete Installation	How to Respond
*Port number that the Command Console Agent uses to send notifications to the Command Console Client GUI.	*Default is 4999. If the default port is already used, press N and specify a new port.
The directory which contains the device special files.	AIX device special files are located in the /dev directory.
A password to gain access to the agent to configure the RAID subsystem with the GUI.	Enter a 4–16 character password. The install program does not echo what you type.
*The name of CC Agent manufacturer and the Enterprise object identifier for use with its MIB, so that it can operate with other SNMP applications.	*Enter Compaq Computer Corporation as the CC Agent manufacturer.
*The Enterprise Object Identifier (OID) is a vendor specific value used to identify SNMP messages.	*Enter: 36.2.15.21
*Names of the Host Systems on which you will run the Client.	*Enter the Network names for the hosts from which you will run the GUI.

continued

Table 2-2
Information Required for Install Program Prompts *continued*

Information Required to Complete Installation	How to Respond
<p>Level of access a client has for communicating with the storage systems.</p> <p>The possible options are:</p> <p>0 = Navigation Tree monitoring only</p> <p>1 = Navigation Tree and Storage Window monitoring only</p> <p>2 = Navigation Tree monitoring, Storage Window monitoring and configuration</p>	<p>You can give a client configuration level access only if you specified an access password.</p>
<p>How do you want a CC Agent server to notify a client when an error condition occurs?</p> <p>Notification schemes available are:</p> <p>0 = No Error Notification</p> <p>1 = Notification via a TCP/IP Socket</p> <p>2 = Notification via the SNMP protocol</p> <p>3 = Notification via both TCP/IP and SNMP</p>	<p>Selecting this option results in:</p> <p>0 = No notification over network, but local notification through e-mail and an entry in the CC Agent error log file.</p> <p>1 = Notification messages sent to the GUI and local notification sent through e-mail and an entry in the CC Agent error log file.</p> <p>2 = Notification messages sent to the SNMP monitor and local notification sent through e-mail and an entry in the CC Agent error log file.</p> <p>3 = Notification messages sent to the GUI, the SNMP monitor, and local notification sent through e-mail and an entry in the CC Agent error log file.</p>
Names of your subsystems.	Specify unique names for each subsystem in your configuration.

continued

Table 2-2
Information Required for Install Program Prompts *continued*

Information Required to Complete Installation	How to Respond
*The character special file name for accessing the storage system (for example, hdisk4).	Enter the device name that your operating system assigned to the communications logical unit that you enabled in <i>Appendix B</i> . To determine the device name type: lsdev -Cc disk Then locate the hdisk that corresponds to the communications LUN ("HSG80CCL").
Do you want email notification of errors or failures on the RAID subsystem? *If yes to email notification, specify email address and notification level. 1 = Fatal error only 2 = Warning and fatal errors 3 = Info, warning and fatal errors	Type Y to receive email and syslog notification. Type N for syslog notification only. *Enter email address and notification level for each user. 1 = Notification for serious errors, which require immediate attention. 2 = Notification for serious errors and warning messages. 3 = Notification for serious errors, warnings and informational messages.

Your CC Agent program is installed. It was automatically started if you typed **Y** to start the CC Agent during the installation. It will restart automatically after a system reboot or if it stops for any reason.

NOTE: If you plan to install the Command Console Client at this point, refer to the *Command Console V2.2 (HSG80) User's Guide*.

2.1.4 Upgrading the CC Agent Software

The RAID subsystem, client, and notification information is preserved when you upgrade the agent. To upgrade the CC Agent from earlier versions, perform the following steps:

1. Log on to the host server as root (superuser).
2. Type: `cd /tmp/HSG80` to change your working directory to the */tmp* directory containing the CC Agent software loaded from CD-ROM.

3. Type: `./stgwks_aix.sh` to start the StorageWorks Installation and Configuration script. The StorageWorks Installation and Configuration script menu appears.

```
StorageWorks and Command Console Agent
Installation and Configuration Menu
```

```
-----
StorageWorks Options:
```

- ```

1) Install StorageWorks software
2) StorageWorks Maintenance
```

```
Agent Options:
```

- ```
-----
3) Install Agent
4) Agent Maintenance
```

```
Q) Quit
Enter Selection: 3
```

4. Type: 3 to install the CC Agent.

```
*****
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*****

*****
Enterprise Storage Management (steam)

Agent Installation Script
*****

This script will make changes to several system level files and install all application
files.  You MUST reboot to effect these changes!

Current user is root.

Do you wish to continue? [Y,n] : Y

A previous Command Console Agent installation has been found.

Would you like to upgrade it? [Y,n] : Y
```

5. Type Y to upgrade the CC Agent.

This phase of the installation creates the 'storage.ini' file: a list of the RAID subsystems and attached disk devices accessible by the SWCC Agent application.

There are several methods available for doing this--

- 1) Use the access device found in the existing 'storage.ini' file to determine the additional controller parameters. This method will only require interaction if the specified access device is inaccessible. (recommended)
- 2) Skip this phase of the installation and add all the RAID subsystems attached to your host by using the "Add a Subsystem" option from the "Agent Maintenance" menu.

Select a 'storage.ini' file set-up method:
Choice? [1,2] : 1

6. The recommended choice is 1. Choose 2 if you want to modify the storage.ini file later.

NOTE: The CC Agent will not be started until the *storage.ini* file has been updated. If you selected 2, you will need to add all RAID subsystems attached to the host by using the "Add a Subsystem" option in the "Agent Maintenance" menu.

The Agents' configuration file has been successfully updated!
Would you like to add subsystems now? [Y,n] Y

7. Type Y if you want to add new subsystems, such as your new RAID Array 8000.

```
hdisk2 Available 20-70-00-9,0 DEC HSG80 RAID Array
hdisk3 Available 20-70-00-10,0 DEC HSG80 Command Console LUN
hdisk4 Available 20-70-00-10,1 DEC HSG80 RAID Array
hdisk5 Available 30-60-01 DEC HSG80 Command Console LUN
hdisk6 Available 30-60-01 DEC HSG80 RAID Array
hdisk7 Available 30-60-01 DEC HSG80 RAID Array
Disks for Adapter fcs0:
No disks on this adapter.
```

Disks for Adapter fcs1:

Disk	Availability	Disk Type	Address	LUN i.d.
-----	-----	-----	-----	-----
hdisk5	Available	HSG80CCL	0x624400	0
hdisk6	Available	HSG80	0x624400	1
hdisk7	Available	HSG80	0x624600	1

8. Specify the unique names for each new subsystem in your configuration. Enter the device name that the operating system assigned to the communications logical unit that you enabled in *Appendix B*.

```
The SWCC Agent has been upgraded to version 2.3
would you like to run the new Agent now? [Y,n] : Y
```

9. Type Y to start the new CC Agent.

Your CC Agent program is now installed. It will restart automatically after a system reboot or if it stops for any reason.

2.2 System Clean Up

Having successfully completed the installation of the StorageWorks software and the CC Agent, it is now possible to delete the temporary directory. For example, type:

```
# rm -r /tmp/HSG80
```

2.3 Running CC Agent

Your Agent program was automatically started when you installed it, and it was installed to restart automatically if the system is rebooted or it stops for any reason.

The installation script places an entry in the “/etc/inittab” file to implement automatic execution of the Agent. The tag field in the file is “steam”.

2.4 Reconfiguring CC Agent

You can reconfigure previously-installed Agents using the configuration and installation program. To reconfigure an Agent, execute the `./stgws_aix.sh`, script in `/usr/stgws2`, the StorageWorks Installation and Configuration, directory (`/usr/stgws2`) and follow the prompts to CC Agent maintenance.

The configuration program menu enables you to perform numerous modifications to the Agent and the way it performs. You can also use this script to manually start and stop the daemon.

```
Agent Maintenance Menu
-----
1) Change Agent password
2) Change SNMP Enterprise OID
3) Start/Stop the Agent
4) Toggle Agent startup on system boot
5) Uninstall Agent

Client Options:          Storage Subsystem Options:
-----
6) Add a Client          10) Add a subsystem
7) Remove a Client       11) Remove a subsystem
8) Modify a Client       12) Modify a subsystem
9) View Clients          13) View subsystems

Agent Notification Options:
-----
14) Enable/Disable system notification
15) Add user to mail notification list
16) Delete user from mail notification list
17) Modify mail notification list
18) View mail notification list
19) Enable/Disable mail notification

Q) Quit
Enter Selection
```

2.5 Uninstalling CC Agent

You can remove the CC Agent program using the Agent Maintenance option from the *stgwks_aix.sh* Bourne-shell script.

To remove the Agent follow these steps:

1. Run the *./stgwks_aix.sh* script from the */usr/stgwks2* directory.
2. From the Installation and Configuration menu, select option 4, Agent Maintenance.
3. Select option 5, Uninstall Agent, from the Agent Maintenance Menu.

Uninstalling CC Agent stops the agent and removes all of its files.

Installing the Command Console Client

This Chapter covers how to install, launch, and use Command Console Client.

3.1 What is Command Console?

The Command Console (CC) Client is a Graphical User Interface (GUI) for StorageWorks Controllers. Command Console consists of two programs:

- Command Console Client is the GUI program designed for use on systems running the Microsoft Windows NT or Windows 2000 Operating Systems. It provides a user-friendly method of configuring, operating, monitoring, and troubleshooting your storage subsystem.
- Command Console Agent is a companion program that enables the CC Client to communicate with your storage subsystems over a network. Agent is available for operation on a variety of popular Host Operating Systems.

The CC Client connects to your storage subsystem via a TCP/IP-compatible network. It sends (via the Agent) CLI commands to your subsystem's Controllers as you perform subsystem configuration, operation, monitoring, and troubleshooting tasks using its graphical interface. It displays subsystem status by interpreting CLI information returned by the subsystem.

Use the procedures within this chapter to:

- Set up Command Console and establish communication with your storage subsystems.
- Configure your storage devices to create host-accessible volumes by:
 - ❑ Configuring the Client by adding systems to the Navigation Window.
 - ❑ Adding physical devices
 - ❑ Creating virtual disks

3.2 Installing Command Console Client

Command Console Client installs from a CD-ROM disk using a standard Windows installation routine on a Windows 2000 or Windows NT platform. The program is self-extracting and stores Command Console Client into the directory `C:\Program Files\SWCC` by default. During setup, you have the option to change the disk or directory location.

To install Command Console:

NOTE: SNMP must be installed on the client system before installing SWCC.

1. Place the software CD in the CD-ROM Drive.
2. Run File Manager or Windows Explorer.
3. Navigate to the folder: *drive_letter:\swcc\client\intel*
4. Double-click on Setup.
5. Follow the instructions in the setup program to complete the installation.

Command Console Client installs the Program Group *Command Console*. Client also inserts several selections on the Start menu (Figure 2-1). To start Command Console from the Start Menu, double-click on the HSG80ACS85 Storage Window name.

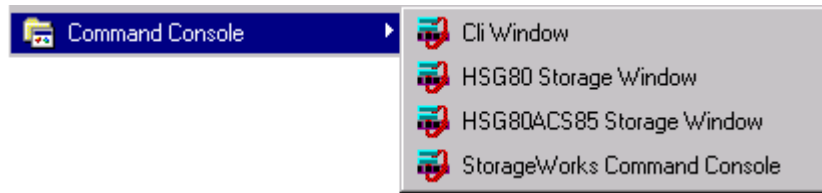


Figure 3-1. Command console program group

3.3 Launching the Command Console Client

Some of the choices Client provides you with at startup are:

- **CLI Window:** HS-series controllers provide a feature called the Command Line Interpreter (CLI) for configuring and monitoring your storage controllers using text-based commands. With the CLI, you can connect a maintenance terminal directly to your controller and manage it using the complete set of CLI commands. You can also use a host-based, virtual terminal, such as Command Console's CLI Window, to make the connection. Refer to *Chapter 3, Creating Your Storage Configuration with the CLI*, for details.
- **HSG80 or HSG80ACS85 Storage Window:** Displays the Storage Window. This choice lets you monitor and configure one storage subsystem using Client's graphical user interface. All connection choices are provided: serial line, SCSI bus and network (TCP/IP).

NOTE: HSG80ACS85 Storage Window is used with RA8000/ESA12000 and MA8000/EMA12000 storage systems using ACS V8.5 software. Older ACS version (8.3) require the HSG80 Storage Window.

- **StorageWorks Command Console:** Displays the Navigation Window. The Navigation Window is a network navigation tool used to manage and monitor storage subsystems over a TCP/IP network. This choice lets you monitor and configure one or many storage subsystems over a network using Client's graphical tools.

3.3.1 Establishing an Initial Host Connection and Verifying Subsystem Setup

NOTE: Prior to making a network connection between the Intel-based System on which you installed the CC Client GUI and your subsystem, you must have completed the steps in this guide to install the CC Agent in your Host System, the CC Client GUI in your Intel-based Client System, and to create a volume on your subsystem. Since the Agent uses a LUN for communication, you cannot make a connection to any subsystem unless the Command Console LUN is enabled or at least one volume has been created on the subsystem.

To establish a network connection proceed as follows:

1. Click on the *Start* button on the taskbar.
2. Click on *Programs*.
3. Click on *Command Console*.
4. Click on *HSG80 Storage Window*.
5. At the Connection Selection dialog box, select the *Network (TCP/IP)* option (Figure 3-2), then click *OK* to display the *Connect Network* dialog box (Figure 3-3).

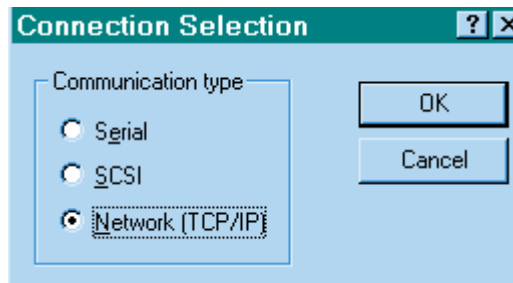


Figure 3-2. Connection selection dialog box

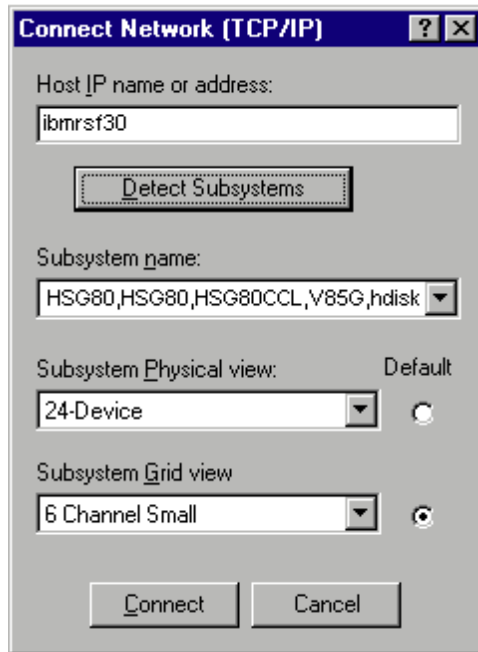


Figure 3-3. Connect network dialog box for storage window

6. On the *Connect Network* dialog box, enter the HOST name or IP address where your HSG80 controller is connected. Then click the *Detect Subsystems* button to display the storage subsystem name. Then click *Connect* to connect to your storage subsystem. The Storage Window appears as shown in Figure 3-4. The next step is to configure the properties of the controller.

NOTE: The top window of the Storage Window (Figure 3-4) displays the virtual disks that have been created. The bottom windowpane shows the devices you have installed in the RAID Fibre Channel Subsystem. On startup, Command Console finds installed drives and displays them in a grid by channel and SCSI ID number.

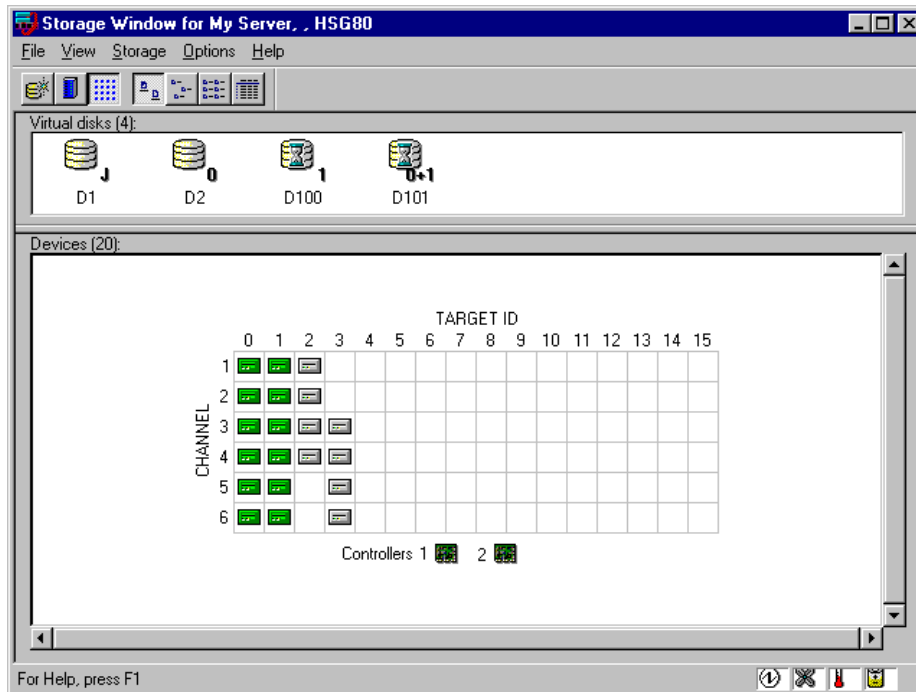


Figure 3-4. Storage Window

3.4 Configuring Controller Properties

Your controller's operating parameters are stored in property sheets.

Controller property sheets are accessed by double-clicking on a controller icon in the Storage Window or right clicking on the icon and selecting *Properties*. Property sheets are tabbed. To access a sheet, click on its tab.

For changes in any field to take effect, a controller restart is required. The program prompts you for confirmation before it restarts your controller. A restart of the controller will be detected by the host system. Do not make changes to the controller settings when either file systems are mounted on the RAID Array or applications are using the RAID Array. After you initialize a controller restart, there is approximately a 90-second delay while the controller reinitializes.

1. Access the controller's property sheets by double-clicking the controllers icon in the Storage Window. When you double-click on a controller's icon the *General* controller properties sheet displays (Figure 3-5). The controller has five other property sheets. Each sheet is accessed by clicking on its tab.

Confirm the following:

- Allocation class is 0
- SCSI Version is SCSI-2

(You may also set the time and date.)

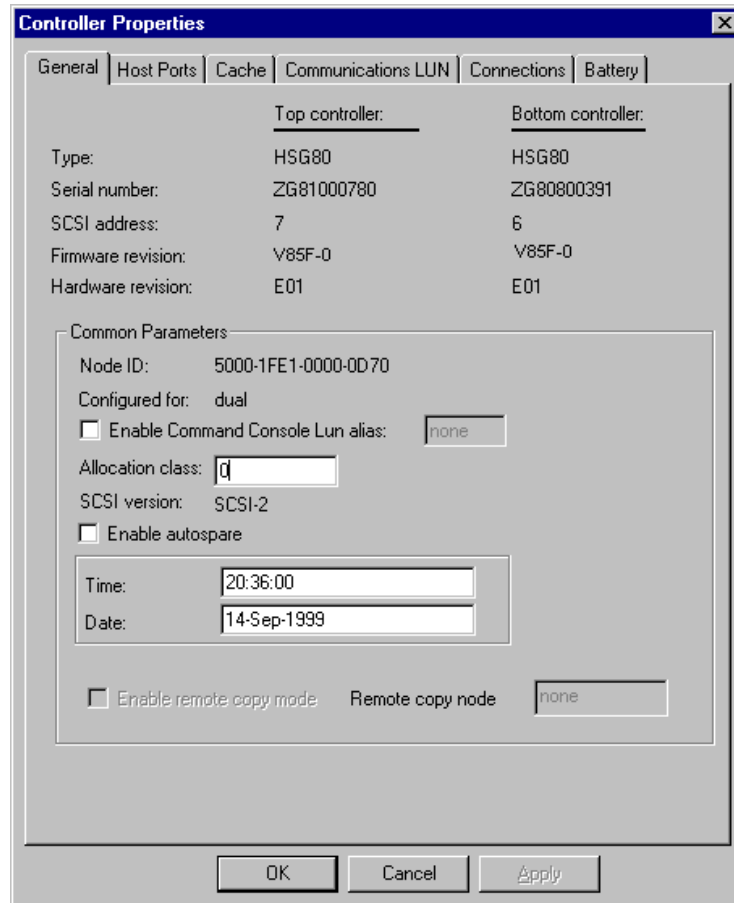


Figure 3-5. General controller properties tab

2. Click the *Host Ports* tab to display the host port operating parameters and verify the host port operating parameters shown in Figure 3-6.

The settings displayed for:

- Port ID
- Actual Topology
- Requested Port Address

■ Actual Port Address

will vary depending upon your cabling, loop configuration, ALPA settings and number of host ports in use.

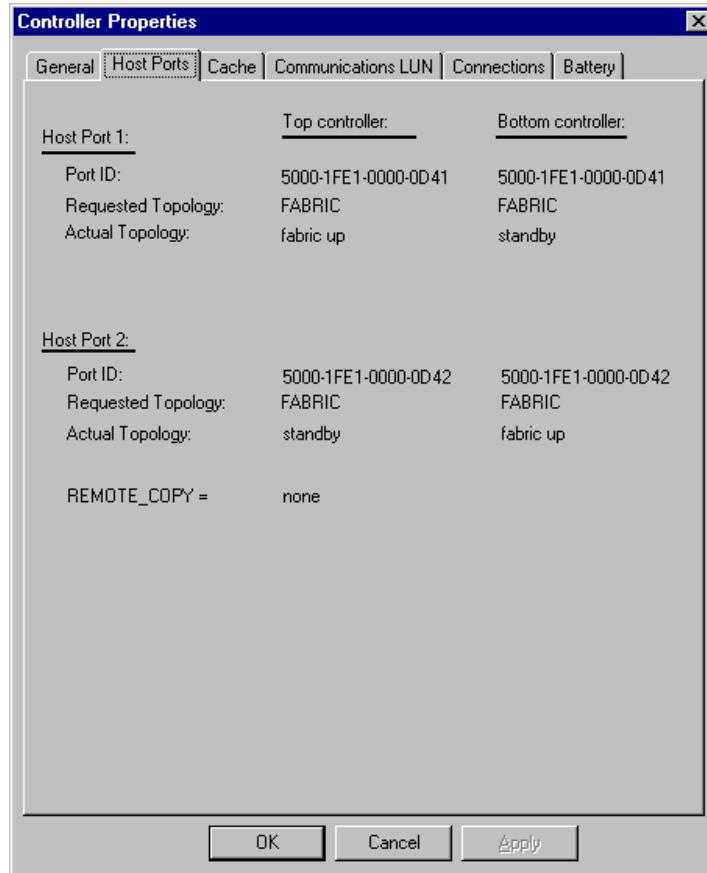


Figure 3-6. Host ports controller properties tab

3. Click the *Cache* tab to check cache size (Figure 3-7).

Confirm the following:

- Cache flush timer is 10 (seconds)
- Respond to internal cache battery condition is selected

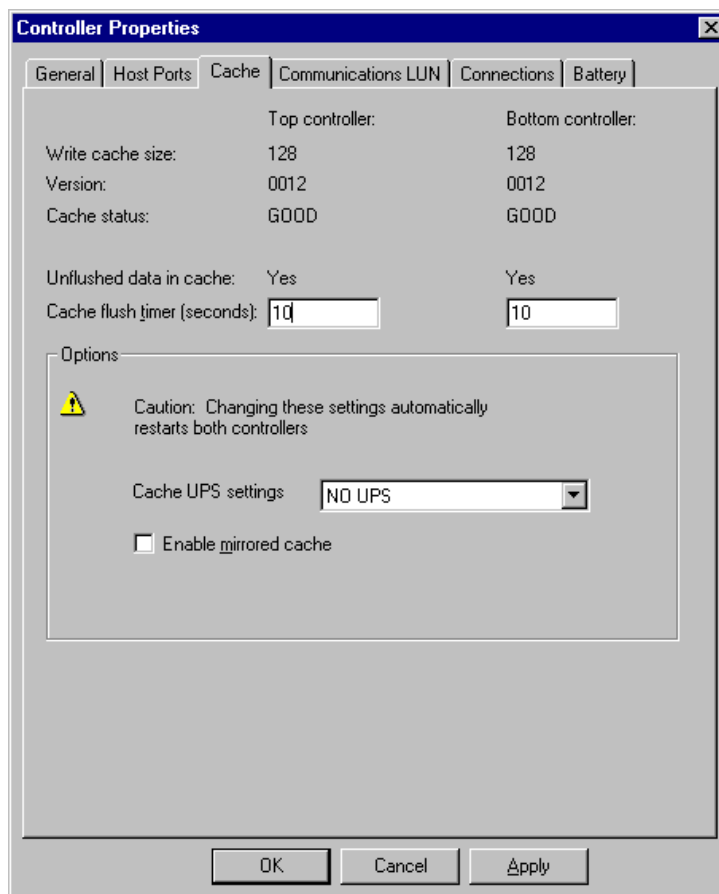


Figure 3-7. Cache controller properties tab

4. Click the *Communications LUN* tab (Figure 3-8).

NOTE: Ensure that *Fixed* is set if you are using the virtual LUN (CCL). Refer to *Appendix C* for more information on the CCL.

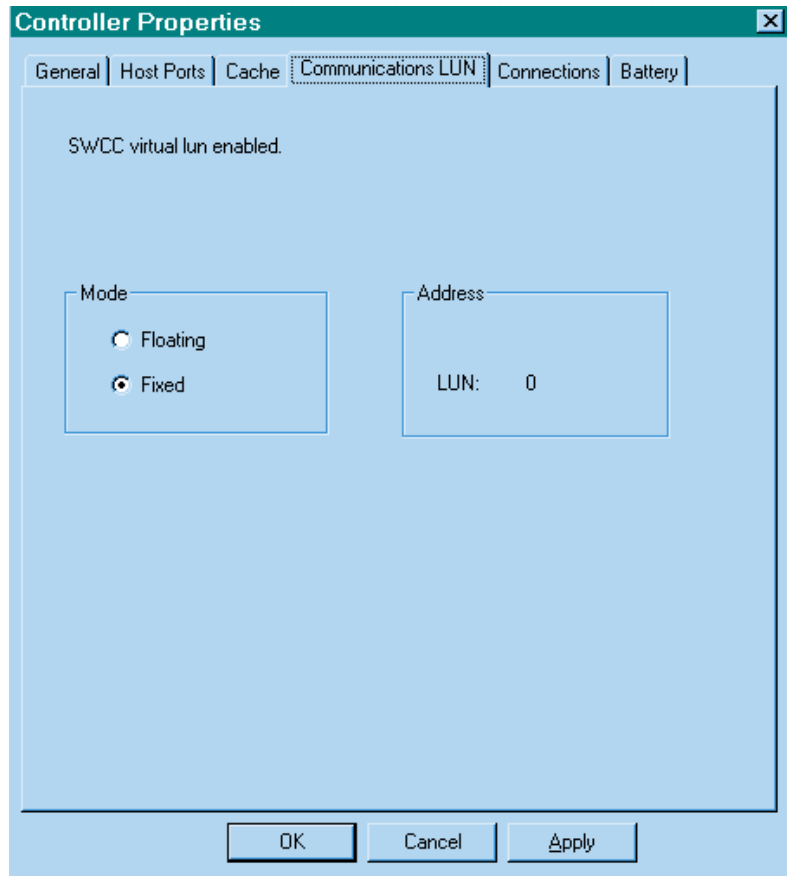


Figure 3-8. Communications LUN controller properties tab

5. Click the *Connections* tab (Figure 3-9).

Confirm the following:

- Verify the connection type is WINNT. Use the pull-down menu to change the operating system to WINNT.
- Unit Offset should be 0 for Port 1
- Unit Offset should be 100 for Port 2

Connection Name	Operating System	Port	Address	Status	Unit Offset
INEWCON09	WINNT	2	000001	Online	100
Host ID: 0020-0000-1AD1-A969 Adapter ID: 5005-02E0-1000-0070					
INEWCON10	WINNT	1	000001	Online	0
Host ID: 0020-0000-1AD1-5B69 Adapter ID: 2000-0000-0520-66A0					

Previous Next

OK Cancel Apply

Figure 3-9. Connections controller properties tab

6. Click the *Battery* tab (Figure 3–10).

NOTE: Confirm that the battery is fully charged. If not, wait until it is fully charged before using the system.

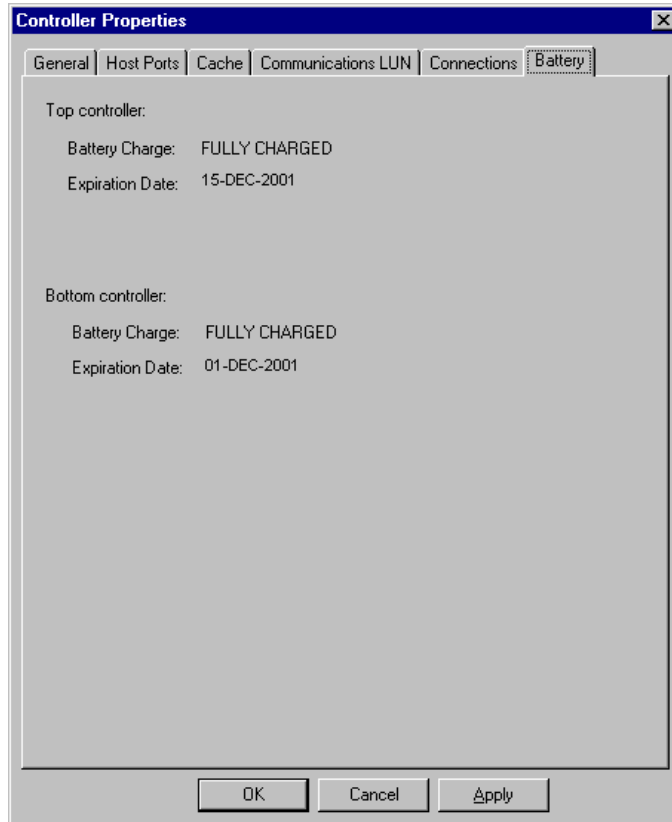


Figure 3-10. Battery controller properties tab

Click on the *Apply* button. Once all of the changes have been made, click the *OK* button to complete controller configuration. The storage window is now displayed. To begin using SWCC to create Virtual Disks, refer to the StorageWorks Command Console User's Guide, to the section entitled *Creating Your First Virtual Disk*.

3.5 Using the Navigation Window

The Navigation Window is a network management tool that you can use to create, monitor and configure a network of storage subsystems. The Navigation Window has its own Menu Bar. It can be moved and minimized. It can be sized by dragging on its corners and borders. You start building a network of RAID Array 8000 storage subsystems by adding Host Systems to the Navigation Window.

Figure 3-11 shows a navigation window that shows a two-host network with systems *sunday* and *aries*. Subsystem *RA8000* is connected to host *aries*. Subsystems *HSG80* and *HSZ40* are connected to host *sunday*. Folders are shown expanded.

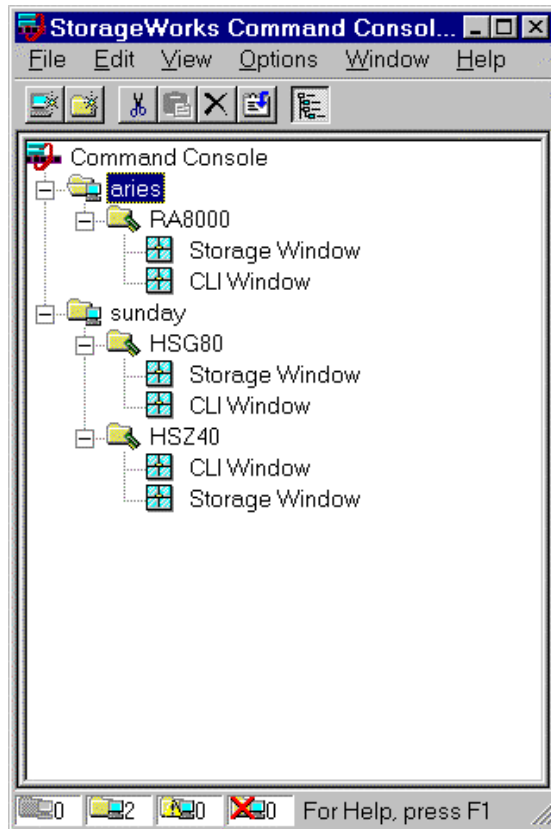


Figure 3-11. Navigation window shows two-host network

3.5.1 Adding a Host System to the Navigation Window

To add a system (reference Figure 3-12):

1. From the File menu select *Add System*.
2. Use the *Add System* dialog box to add host systems to the Command Console Client. A system is any machine running a Command Console Agent. Enter the Domain Name Service (DNS) name or the Internet Protocol (IP) address in the “Host name or TCP/IP address text box” and click *Apply*. Refer to the on-line Help menu *Adding a System* if you need more information about entering a system name.

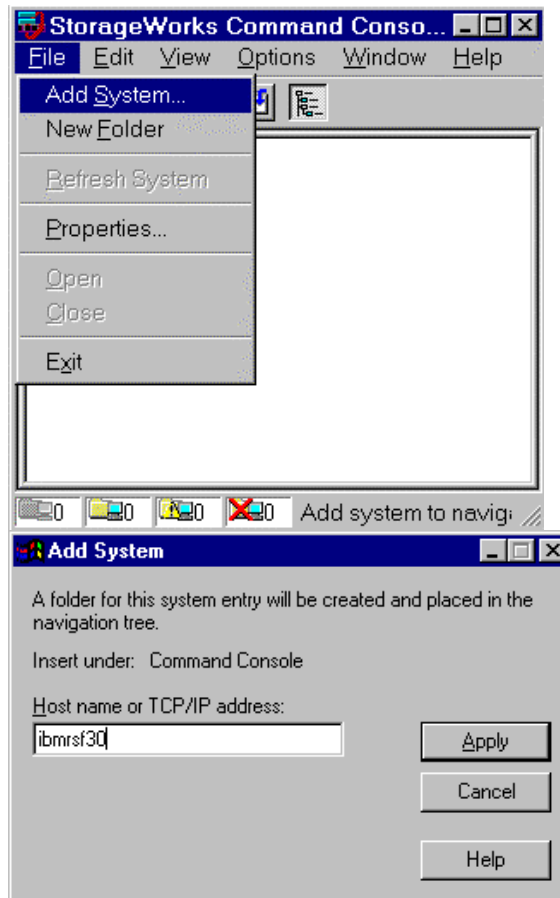


Figure 3-12. Adding a host system

3. After you click the *Apply* button, and the system address is resolved, click *Close* on the Add System dialog box. Client adds an icon for *ibmrfsf30* in the Navigation Window, as shown in Figure 3-13.

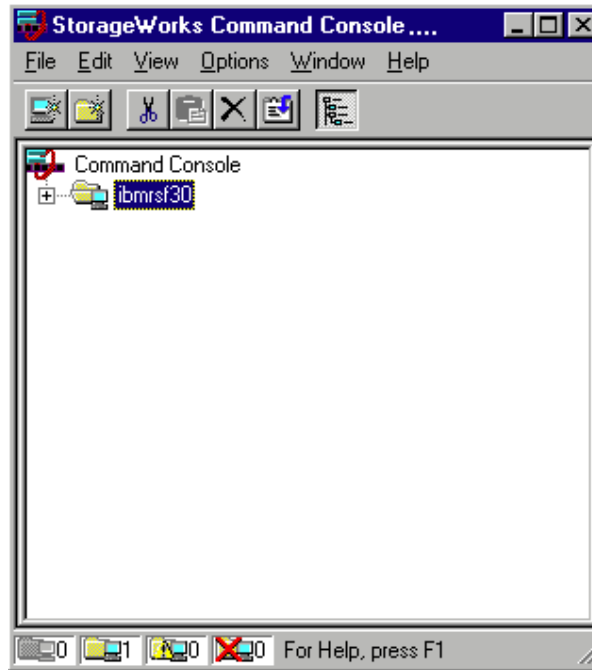


Figure 3-13. "IBMrfsf30" added to the navigation window

3.5.2 Deleting a Host System from the Navigation Window

To delete a system:

1. In the Navigation Window, click on and highlight the system that you want to delete.
2. From the Edit menu, select *Delete*.
3. System icon should disappear from Navigation Window.

3.5.3 Creating and Using New General Folders

Use folders to help organize your storage. The Client will automatically create folders when you add a subsystem. You may also create your own folders to help organize your subsystem. Folders can be dragged and dropped within the Navigation Window. In the following example, we have created the folder *My Server* and then dragged and dropped the host *ibmrstf30*, in the folder (Figure 3–14). To create a new folder:

1. From the File menu, choose *New Folder*.
2. Name the new folder in the Navigation Window by double-clicking its label and entering a new name.



Figure 3-14. Adding a folder

3.5.4 Renaming a Folder

1. Double-click on the folder name in the Navigation Window.
2. Enter the new name. Only general folders that you create can be renamed.

3.5.5 Viewing the Hierarchy in the Navigation Window

1. Click on a folder on the Navigation Window to display its contents.
2. Click the plus signs (+) to display more folders, systems, and controllers. To open a folder, double-click on it.

3.5.6 Viewing and Modifying System Folder Properties

1. Right-click on a system icon in the Navigation Window.
2. Click Properties from the shortcut menu to view the system folder properties (Figure 3-15).

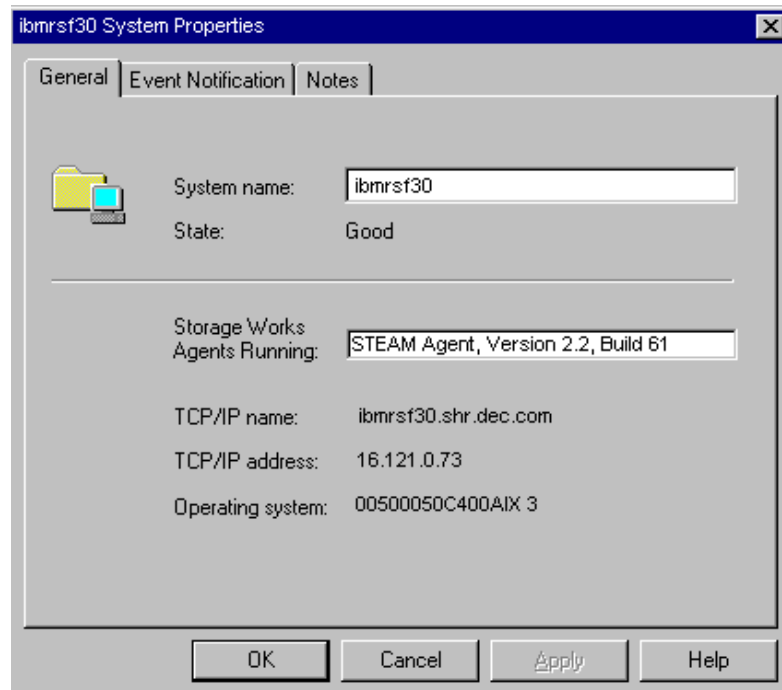


Figure 3-15. System properties

3.5.7 Opening a Storage Window



Storage Window

1. Connect to a storage subsystem.
2. In the Navigation Window, double-click on a system folder.
3. Double-click the Storage Window icon to open a Storage Window.

3.5.8 Opening a CLI Window

Not all controllers support the Command Line Interpreter (CLI) window. If you are familiar with CLI syntax, you can enter commands into the command line area directly underneath the CLI Window Menu Bar. Error messages and system responses are displayed in the message area directly beneath the command line area.



CLI Window

1. Connect to a storage subsystem.
2. In the Navigation Window, double-click on a system folder.
3. Double-click the CLI Window icon to open a CLI Window.

3.6 Choosing a Connection Method

The Client offers three ways to connect to your storage subsystem: over the controller's serial port, the SCSI bus (Windows NT Only) or over a TCP/IP network. The serial port and SCSI bus connections are local connections and allow you to connect to only one storage subsystem at a time.

3.6.1 Establishing a Serial Connection

The simplest connection to a storage subsystem is a direct, cable connection from the Client's host system to one of the storage subsystem's serial ports. To establish a serial connection, connect a serial cable from one of the PC's COM ports to the storage subsystem's serial configuration port and proceed as follows:

1. From the Start menu, select Programs, Command Console V2.3, and then the *HSG80 Storage Window* or *HSG80ACS85* applet.
2. When the Connection Selection dialog box displays, select the *Serial* option, then click OK to display the Connect Serial dialog box (Figure 3-16).
3. On the Serial Connection dialog box, from the drop-down menu, select the PC COM port your controller is connected to, a subsystem physical and grid view, and a baud rate. Next click the Connect button to display the Storage Window. When the Storage Window appears, you are connected to your storage subsystem.

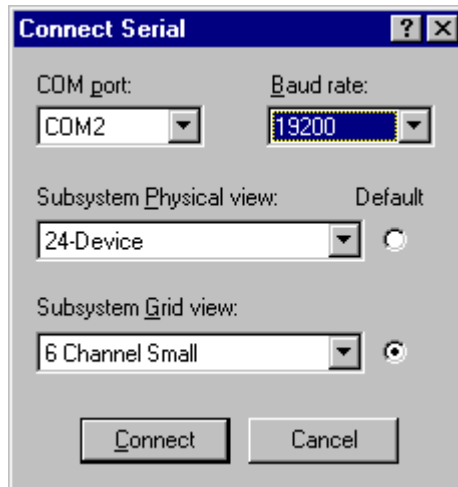


Figure 3-16. Connect serial dialog box

3.7 Creating a Virtual Disk

Before you can create a virtual disk, you must select a host system, open a Storage Window, set the Controller parameters, and make your physical devices known to your Controller.

3.7.1 Add Physical Devices to Your Configuration

You must make the physical devices known to the Controller before you can create virtual disks from them. To add physical devices to the configuration:

1. In the **Storage** menu, select *Device*, then *Add*.
2. Enter your password if required.
3. When Client prompts you to insert the physical devices (Figure 3-17), insert them in the storage subsystem; then click the OK button. Client adds your devices to your configuration and refreshes the Storage Window.



Figure 3-17. Insert devices prompt

Once you have added the physical devices to the storage configuration you can use them to create a number of different types of logical storage units called virtual disks. You can create:

- Single-device virtual disks JBODs (Just a Bunch of Disks)
- Striped virtual disks (RAID 0)
- Mirrored virtual disks (RAID 1)
- Striped mirrored virtual disks (RAID 0+ 1)
- Striped virtual disks with parity (RAID 3/5)

3.7.2 Create a Virtual Disk

1. In the Storage menu, select *Add Virtual Disk*. Virtual Disk Wizard's Step 1 (Figure 3-18) appears. There are five steps in total.
2. Select the RAID level you want to create, then click *Next*.

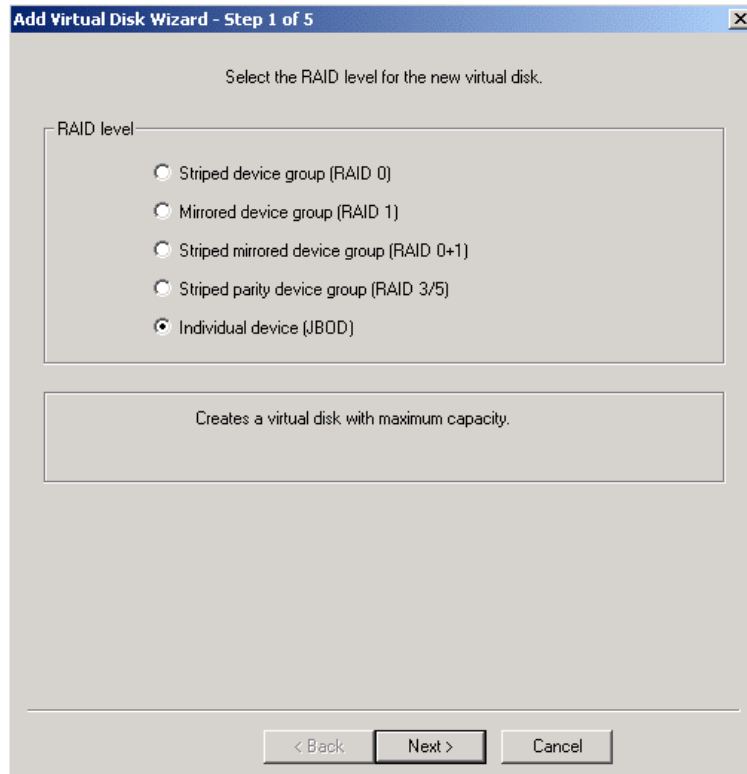


Figure 3-18. Add virtual disk wizard step 1

3. Select the devices you want to include in the virtual disk from a list of available storage devices. You select devices by double-clicking them in the *Available Storage* window in the dialog box. As you click them, they move to the *Selected Devices* window in the dialog box. They are also shown as selected in the Device Window pane of the Storage Window.

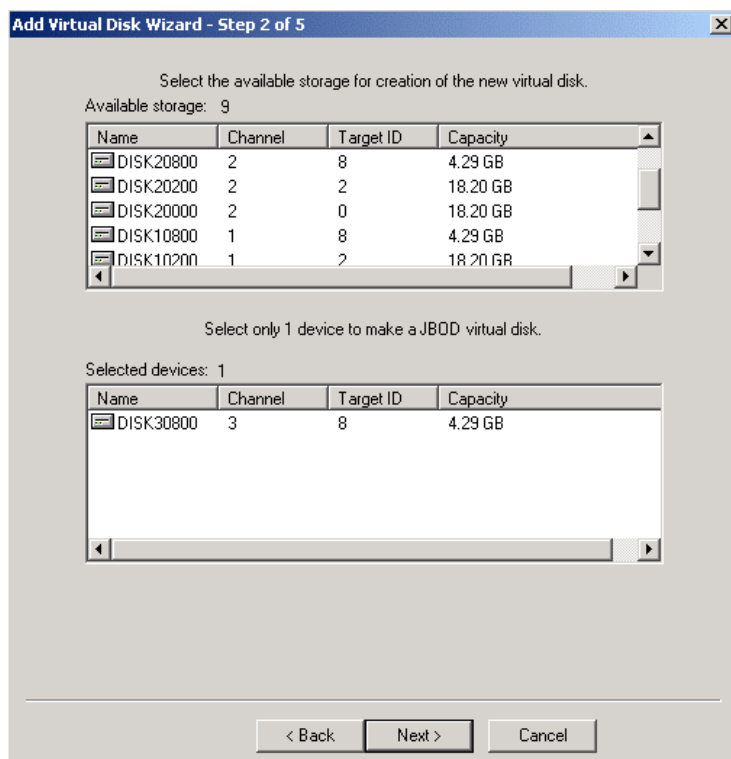
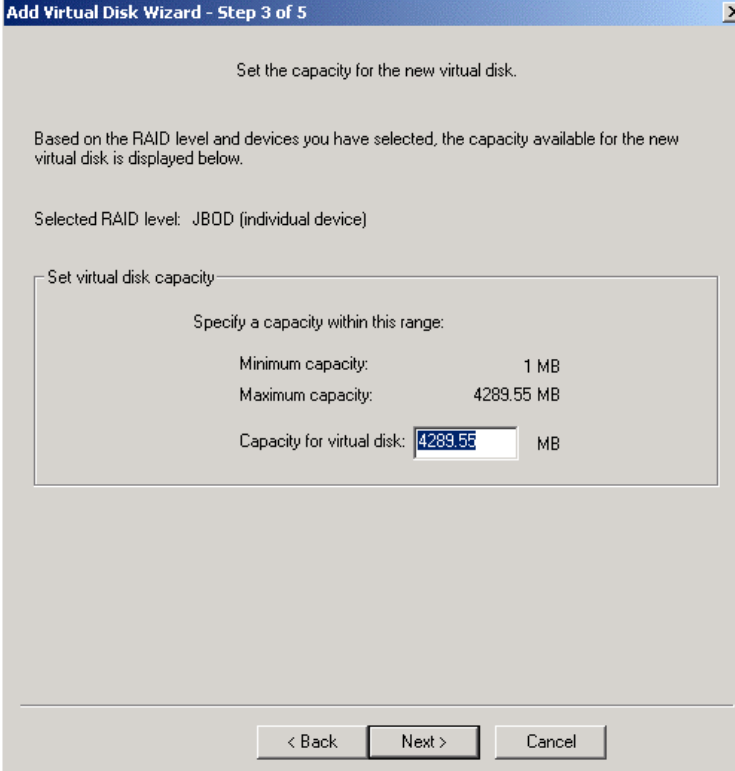


Figure 3-19. Add virtual disk wizard step 2

7. Select the capacity of the virtual disk, then click *Next*. The wizard offers you the option of using only a portion of the capacity of the devices you have selected for your new virtual disk. It displays the total, available capacity of the devices you have selected in the capacity box. Enter the size of the virtual disk you want to create in the box.



The screenshot shows a window titled "Add Virtual Disk Wizard - Step 3 of 5". The main text says "Set the capacity for the new virtual disk." Below this, it states: "Based on the RAID level and devices you have selected, the capacity available for the new virtual disk is displayed below." The selected RAID level is "JBOD (individual device)". A box titled "Set virtual disk capacity" contains the text "Specify a capacity within this range:" followed by "Minimum capacity: 1 MB" and "Maximum capacity: 4289.55 MB". Below this, there is a text input field labeled "Capacity for virtual disk:" with the value "4289.55" entered, followed by "MB". At the bottom of the window are three buttons: "< Back", "Next >", and "Cancel".

Figure 3-20. Add virtual disk wizard step 3

8. Specify the target ID and Logical Unit Number (LUN), operating parameters, and options of your new virtual disk, then click *Next*.

Set the options to be used when creating this new virtual disk.

Virtual Disk Name
Name (i.e., D0 - D199) : d1

☒ Enable writeback cache
☒ Enable read cache
☒ Enable readahead cache
☐ Enable writeprotect

Maximum cached transfer: 32 blocks

Host access
☒ All
☐ None
☐ Selective

INEWCON75
INEWCON76
ATLANTA
ATLANTA-P

☐ Save controller configuration to virtual disk

Replacement policy:
Strip size (in blocks):
Reconstruction rate:

Read source:
Copy speed:

< Back Next > Cancel

Figure 3-21. Add virtual disk wizard step 4

9. The final Virtual Disk Wizard window, Step 5, recaps the choices you have made in Steps 1 through 4. If you are satisfied with your choices, click *Finish*. Otherwise, use the *Back* button to go return to the previous step and make the necessary changes.

A virtual disk with the following characteristics will be created on the subsystem:

Characteristics

RAID level:	JBOD (individual device)	Virtual Disk Name:	d1
Capacity:	4.29 GB	Write-back cache:	ON
Lun ID Alias:	NONE	Readahead cache:	ON
Save configuration:	OFF	Read cache:	ON
Member devices:	1	Write protect:	OFF
Max cached transfer:	32		

Name	Channel	Target ...	Capacity
DISK30800	3	8	4.29 GB

Host access:

ALL

If you are satisfied with these characteristics, select Finish to create the virtual disk.

< Back Finish Cancel

Figure 3-22. Add virtual disk wizard step 5

3.7.3 Delete a Virtual Disk

To delete a virtual disk:

1. Select its *icon* by clicking on it in the Virtual Disk Window.
2. Choose *Storage* from the Menu Bar; then *Virtual Disk*, then *Delete*.

3.7.4 Saving the Configuration

1. From the **Storage** menu, click *Controller Configuration*, then *Save*.
2. The Save dialog box appears, enter the desired location and file name.
Your configuration is saved.

Appendix **A**

Creating Your Storage Configuration with the CLI

This chapter contains instructions for creating an initial storage configuration using the Command Line Interpreter (CLI). It briefly describes the CLI and how to access it. The configuration steps include: adding devices; creating and initializing RAIDsets, stripesets, mirrorsets, and striped mirrorsets; identifying a storageset as a unit to the host; and verifying and recording the final configuration.

NOTE: To create your storage configuration using the StorageWorks Command Console, refer to The Command Console User's Guide.

Once you complete the physical setup of the RAID Array, configure the devices in your subsystem into storagesets.

To configure the devices in your subsystem into storagesets, you need to:

- Plan your configuration (Refer to *Appendix B*.)
- Add disks to the controller
- Create storagesets
- Save the configuration
- Record the configuration

A.1 Configuration Guidelines

Use the following guidelines to configure the HSG80 controller and your host system to optimize system performance.

A.1.1 Controller Device Configuration Guidelines

- The enclosure has six device ports (SCSI buses). Evenly distribute disk devices across the separate six device ports. This permits parallel activities on the controller's available device ports to the attached drives.
- Avoid configuring multiple mirrorsets with the first member being on the same device port. Configure multiple mirrorsets similar to the following example:

```
add mirrorset mirr_1 disk10000 disk20000
```

```
add mirrorset mirr_2 disk20100 disk10100
```

A.1.2 Host System Configuration Guidelines

You need to assign a host logical unit number to each storageset or single disk unit that you want your host to know about in your subsystem. The host uses these numbers to indicate the source or destination for every I/O request it sends to the controller.

Each logical unit number contains the following:

- A letter that indicates the kind of devices in the storage unit. For example, D for disk drives
- A number from 0-99 or 100-199

Each HSG80 controller has two host ports, Port 1 and Port 2, as shown in the following figures. Unit numbers D0-D99 are assigned to Host Port 1, unit numbers D100-D199 are assigned to Host Port 2.

NOTE: Always assign all partitions of a storageset to the same host port (do not split partitioned storagesets across host ports).

Controller A	Port 1 Active	Port 2 Unused	
EMPTY			
Cache A		EMPTY	

Figure A-1. Single controller/single host

- For single HSG80 controller configurations connected to a single host you can configure up to 64 host logical units on Controller A - Host Port 1. Valid unit numbers are D0-D99. Controller A - Host Port 2 is unused.

Controller A	Port 1 Active	Port 2 Active	
EMPTY			
Cache A		EMPTY	

Figure A-2. Single controller/two hosts

- For single HSG80 controller configurations connected to two host systems, for one host you can configure up to 64 host logical units on Controller A - Host Port 1. Valid unit numbers are D0-D99. For the other host, you can configure up to 64 host logical units on Controller A - Host Port 2. Valid unit numbers are D100-D199.

Controller A	Port 1 Active	Port 2 Unused	
Controller B	Port 1 Standby	Port 2 Unused	
Cache A		Cache B	

Figure A-3. Dual controller/single host

- For dual-redundant HSG80 controller configurations connected to a single host you can configure up to 64 host logical units on Controller A - Host Port 1. Valid unit numbers are D0-D99. Controller B - Host Port 1 is automatically configured as a standby port for these same 64 units. Controller A - Host Port 2 and Controller B - Host Port 2 are unused.

Controller A	Port 1 Active	Port 2 Standby	
Controller B	Port 1 Standby	Port 2 Active	
Cache A		Cache B	

Figure A-4. Dual controllers/two hosts

- For dual-redundant HSG80 controller configurations connected to two host systems, for one host you can configure up to 64 host logical units on Controller A - Host Port 1. Valid unit numbers are D0–D99. Controller B - Host Port 1 is automatically configured as a standby port for these same 64 units.

For the other host you can configure up to 64 host logical units on Controller B - Host Port 2. Valid unit numbers are D100–D199. Controller A -Host Port 2 is automatically configured as a standby port for these same 64 units.

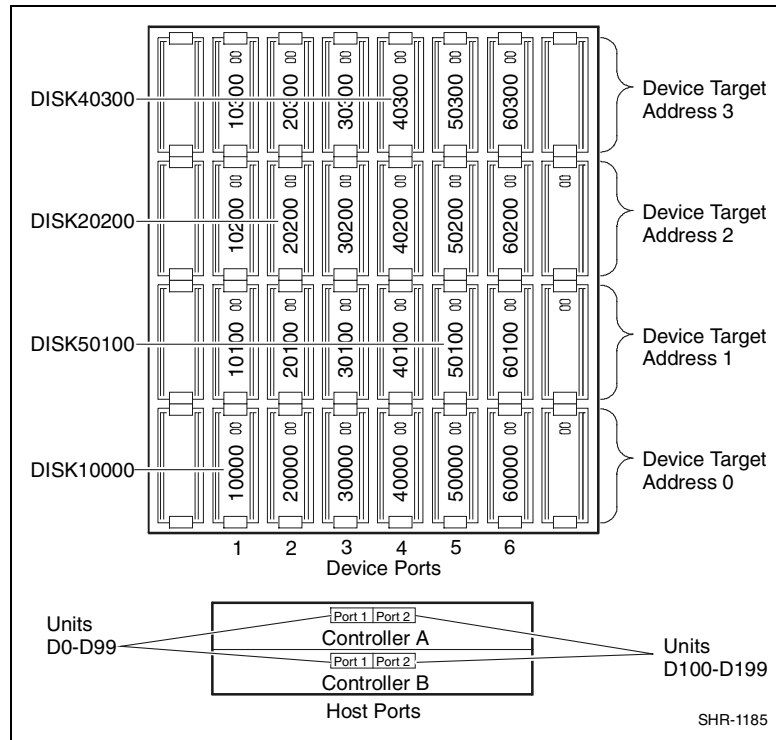


Figure A-5. Mapping of device ports/targets and host ports in a BA370 enclosure (RA8000/ESA12000)

Model 4214 Disk Enclosure Shelf 1 (Single-Bus)							
Bay	1	2	3	4	5	6	7
SCSI ID	00	01	02	03	04	05	08
	DISK10000	DISK10100	DISK10200	DISK10300	DISK10400	DISK10500	DISK10800
Bay	8	9	10	11	12	13	14
SCSI ID	09	10	11	12	13	14	15
	DISK10900	DISK11000	DISK11100	DISK11200	DISK11300	DISK11400	DISK11500

Model 4254 Disk Enclosure Shelf 1 (Dual-Bus)							
Bay	1	2	3	4	5	6	7
SCSI ID	00	01	02	03	04	05	08
	DISK10000	DISK10100	DISK10200	DISK10300	DISK10400	DISK10500	DISK10800
Bay	8	9	10	11	12	13	14
SCSI ID	00	01	02	03	04	05	08
	DISK20000	DISK20100	DISK20200	DISK20300	DISK20400	DISK20500	DISK20800

Figure A-6. Mapping of device ports/targets and host ports in a Model 4214 or Model 4254 disk enclosure (MA8000/EMA12000)

A.2 Accessing the CLI

The Command Line Interpreter (CLI) is a command line user interface to the HSG80 controller. It provides a series of commands for you to create a configuration for the subsystem through the controller's firmware.

This chapter describes only the CLI commands required to create an initial configuration on the controller.

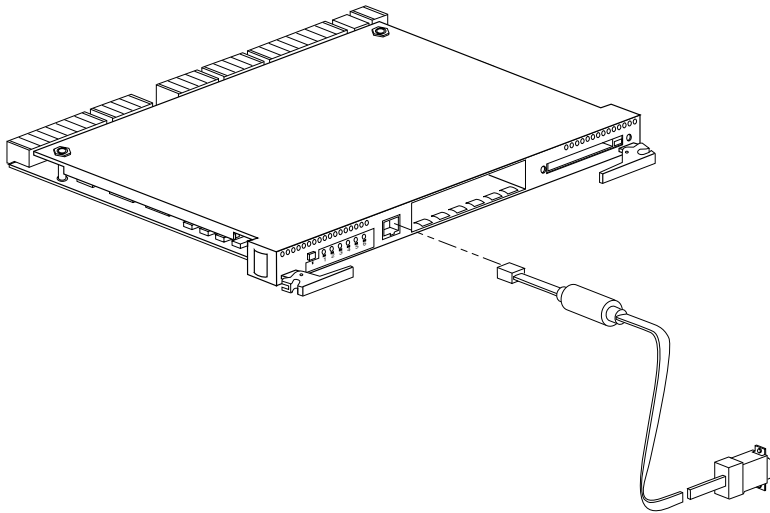
See the *Compaq StorageWorks HSG80 Array Controller ACS Version 8.5 CLI Reference Guide* for detailed descriptions of all CLI commands.

You must make a serial connection to the HSG80 controller to access the CLI.

A.2.1 Connecting the Cable

To connect a maintenance terminal or PC to a HSG80 controller follow these steps:

1. Locate the connecting cable that came with the RA8000 Fibre Channel subsystem. It has an RJ12 connector (similar to standard telephone plug) on one end and a 9-pin serial connector on the other end.
2. Plug the serial connector into the 9-pin serial port/com port 1 of the PC.
3. Plug the RJ12 connector from the PC or maintenance terminal into the maintenance port on the HSG80 controller (see Figure A-7).
4. Note which serial port you use; you will need that information if using a communications program.



CXO6484B

Figure A-7. Making a serial connection to the HSG80 controller

A.2.2 Establishing Connection with a Maintenance Terminal

To establish a connection between a maintenance terminal and the controller, follow these steps:

1. After connecting the maintenance terminal cable to the controller, press the Enter key. The CLI prompt appears in the window similar to the following:

HSG80 >

2. To view the status of the controller, type:

HSG80 > **SHOW THIS_CONTROLLER FULL**

The controller displays information similar to the following example: (dual-redundant configuration shown)

Controller:

HSG80 ZG74100091 Software V85G-0, Hardware E01

NODE_ID = 5000-1FE1-FF00-0170

Allocation_Class=0

SCSI_Version=2

Configured for dual-redundancy with ZG74100121

In dual-redundant configuration

Device Port SCSI address 7

Time: 28-SEP-1998 21:03:32

Host PORT_1:

Reported PORT_ID = 5000-1FE1-FF00-0171

PORT_1_PROFILE = PLDA

PORT_1_TOPOLOGY = LOOP_HARD (loop up)

PORT_1_AL_PA = D5 (D5 negotiated)

Host PORT_2:

Reported PORT_ID = 5000-1FE1-FF00-0172

PORT_2_PROFILE = PLDA

PORT_2_TOPOLOGY = LOOP_HARD (loop up)

PORT_2_AL_PA = D6 (D6 negotiated)

Cache:

128 megabyte write cache, version 0012

Cache is GOOD

Battery is GOOD

No unflushed data in cache

CACHE_FLUSH_TIMER = DEFAULT (10 seconds)

Mirrored Cache:

Not enabled

Battery:

FULLY CHARGED

Expires:

NOCACHE_UPS

Extended information:

Terminal speed 9600 baud, eight bit, no parity, 1 stop bit

Operation control: 00000000 Security state code: 21429

Configuration backup disabled

NOTE: Verify that the output of the “SHOW THIS” command from your subsystem is similar to that shown. If the controller presents a NODE_ID of all zeros (0000-0000-0000-0000), or the appropriate host port does not report a LOOP_UP condition, refer to the *Compaq StorageWorks HSG80 Array Controller ACS V8.5 Configuration Guide* for more information.

A.2.3 Establishing Connection with a Host System

To establish a connection between your PC and controller, you must use a communications program. Follow these steps to make the connection:

1. Start a communications program on your PC.
2. Set the communications program to use the serial port that is connected to the controller.
3. Set the communications parameters to:
 - 8 bits
 - 9600 baud
 - 1 stop bit
 - No parity
4. From your communications program, issue a connect command to establish a connection with the controller, and then press the Enter key. You should see the CLI prompt, which looks similar to:

```
HSG80 >
```

5. To view the status of the controller, type:

```
HSG80 > SHOW THIS_CONTROLLER FULL
```

The controller displays information similar to the following example: (dual-redundant configuration shown)

```
Controller:
HSG80 ZG74100091 Software V85G-0, Hardware E01
NODE_ID      = 5000-1FE1-FF00-0170
Allocation_Class=0
SCSI_Version=2
Configured for dual-redundancy with ZG74100121
In dual-redundant configuration
Device Port SCSI address 7
Time: 28-SEP-1998 21:03:32
Host PORT_1:
Reported PORT_ID = 5000-1FE1-FF00-0171
PORT_1_PROFILE  = PLDA
```

```
PORT_1_TOPOLOGY = LOOP_HARD (loop up)
PORT_1_AL_PA    = D5 (D5 negotiated)
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-FF00-0172
  PORT_2_PROFILE  = PLDA
  PORT_2_TOPOLOGY = LOOP_HARD (loop up)
  PORT_2_AL_PA    = D6 (D6 negotiated)
Cache:
  128 megabyte write cache, version 0012
  Cache is GOOD
  Battery is GOOD
  No unflushed data in cache
  CACHE_FLUSH_TIMER = DEFAULT (10 seconds)
```

```
Mirrored Cache:
Not enabled
Battery:
FULLY CHARGED
Expires:
NOCACHE_UPS
Extended information:
  Terminal speed 9600 baud, eight bit, no parity, 1 stop bit
  Operation control: 00000000 Security state code: 21429
  Configuration backup disabled
```

NOTE: Verify that the output of the “SHOW THIS” command from your subsystem is similar to that shown. If the controller presents a NODE_ID of all zeros (0000-0000-0000-0000), or the appropriate host port does not report a LOOP_UP condition, refer to the *Compaq StorageWorks HSG80 Array Controller ACS V8.5 Configuration Guide* for more information.

A.3 Adding Disks to the Configuration

The CONFIG utility locates and adds disks to the controller. Run the CONFIG utility whenever you add new disks to the controller. Enter the following command to start the configuration utility. The disk numbers will correspond to the disk locations for your subsystem.

```
HSG80 > RUN CONFIG
```

The controller responds with a display similar to that shown below:

```
Config Local Program Invoked
Config is building its tables and determining what devices exist on the subsystem.
Please be patient.
add disk10000 1 0 0
add disk10100 1 1 0
add disk10200 1 2 0
```



```

add disk20000 2 0 0
add disk20100 2 1 0
add disk20200 2 2 0
add disk30000 3 0 0
add disk30100 3 1 0
add disk30200 3 2 0
add disk40000 4 0 0
add disk40100 4 1 0
add disk40200 4 2 0
add disk40300 4 3 0
add disk50000 5 0 0
add disk50100 5 1 0
add disk50200 5 2 0
add disk50300 5 3 0
add disk60000 6 0 0
add disk60100 6 1 0
add disk60200 6 2 0
add disk60300 6 3 0
Config – Normal Termination

```

In this example, the controller has located 21 new disks. The 5 digit number associated with each disk corresponds to Device Port Number, Target Number and Controller Logical Unit Number. The Controller Logical Unit Number will always be 0. DISK40000, in this example, corresponds to the disk located on Device Port 4, on controller Target 0, and Controller Logical Unit 0. DISK50100 corresponds to the disk located on Device Port 5, controller Target 1, and Controller Logical Unit 0. Figure A-5 (shown previously in this appendix) shows the mapping of Device Ports, Targets and Host Ports.

A.4 Creating a RAIDset

RAIDsets stripe user data over multiple drives and calculate parity information for data redundancy. Create RAIDsets to use redundant stripesets in your array. RAIDsets must have at least three members and can have as many as fourteen. This example creates two three member RAIDsets using the ADD RAIDSET command.

```

HSG80 > ADD RAIDSET DVGRPR0 DISK10000 DISK20000 DISK30000
HSG80 > ADD RAIDSET DVGRPR1 DISK40000 DISK50000 DISK60000

```

In this example, “DVGRPR0” and “DVGRPR1” are the names of the RAIDsets, and they are followed by a list of disks to be included in each RAIDset. The names of the RAIDsets are user selectable. Performance of your RAIDsets will be optimized if each RAIDset includes disks from different ports as shown in the example.

A.4.1 Initializing a RAIDset

Prior to putting a RAIDset(s) into service as a logical unit, you must initialize it. The INITIALIZE command copies controller metadata onto a small amount of disk space available on the RAIDset and makes this space inaccessible to the host.

When you initialize a RAIDset, you can specify a chunksize. A chunksize is the number of blocks of data that is transferred at one time. By using the default chunksize, the controller will optimize the chunksize by selecting a number equal to the number of blocks in one track of disk data. We recommend using the default chunksize.

```
HSG80 > INITIALIZE DVGRPRO CHUNKSIZE=DEFAULT  
HSG80 > INITIALIZE DVGRPR1 CHUNKSIZE=DEFAULT
```

A.4.2 Adding a RAIDset as a Logical Unit

To make a RAIDset available to the host computer, you must identify it as a host logical unit. For single or dual controllers on a single host, the unit numbers may range from D0 through D99 with a maximum of 64 units. For dual controllers/two hosts, the unit numbers may range from D0 through D99 for the first host and from D100 through D199 for the second host with a maximum of 64 units per host adapter. Add units by using the ADD UNIT command.

```
HSG80 > ADD UNIT D1 DVGRPRO  
HSG80 > ADD UNIT D2 DVGRPR1
```

This example uses D1 and D2, as the first and second units identified on the controller.

A.4.3 Setting Writeback Cache

This feature is enabled by default; but if it is necessary, a single CLI command enables that feature for the entire RAIDset:

```
HSG80 > SET D1 WRITEBACK_CACHE  
HSG80 > SET D2 WRITEBACK_CACHE
```

Where D1 and D2 represent the host logical units of the RAIDsets described above.

A.4.4 Setting Read Ahead Cache

This feature is enabled by default; but if it is necessary, a single CLI command enables that feature for the entire RAIDset:

```
HSG80 > SET D1 READAHEAD_CACHE
```

Where D1 represent the host logical unit of the RAIDsets described above.

A.5 Creating a Stripeset

Use stripesets to stripe data across multiple disks. Striping data across multiple disks increases I/O performance compared with the performance of a single disk. Stripsets must have at least two members and can have as many as fourteen. All members must be single disks. This example creates a three-member stripeset using the ADD STRIPESET command.

```
HSG80 > ADD STRIPESET DVGRPS0 DISK10100 DISK20100 DISK30100
```

In this example, “DVGRPS0” is the name of the stripeset, and it is followed by a list of the disks to be included in the stripeset. The names of the stripesets are user selectable. Performance of your stripesets will be optimized if each stripeset includes disks from different device ports as shown previously in Figure A-5 of this appendix.

A.5.1 Initializing a Stripeset

Prior to putting a stripeset into service as a logical unit, you must initialize it. The INITIALIZE command copies controller metadata onto a small amount of disk space available on the stripeset and makes this space inaccessible to the host.

When you initialize a stripeset, you can specify a chunksize. A chunksize is the number of blocks of data that is transferred at one time. By using the default chunksize, the controller will optimize the chunksize by selecting a number equal to the number of blocks in one track of disk data. We recommend using the default chunksize.

```
HSG80 > INITIALIZE DVGRPSO CHUNKSIZE=DEFAULT
```

A.5.2 Adding a Stripeset as a Logical Unit

To make a stripeset available to the host computer, you must identify it as a host logical unit. For single or dual controllers on a single host, the unit numbers may range from D0 through D99 with a maximum of 64 units. For dual controllers/two hosts, the unit numbers may range from D0 through D99 for the first host and from D100 through D199 for the second host with a maximum of 64 units per host adapter. Add units by using the ADD UNIT command.

```
HSG80 > ADD UNIT D3 DVGRPSO
```

This example uses D3, since the stripeset is the third unit identified on the controller.

A.5.3 Setting Writeback Cache

This feature is enabled by default; but if it is necessary, a single CLI command enables that feature for the entire stripeset:

```
HSG80 > SET D3 WRITEBACK_CACHE
```

Where D3 represents the host logical unit of the stripeset described above.

A.6 Creating a Mirrorset

Create mirrorsets to increase data availability and achieve data redundancy by maintaining at least two drives that have exactly the same data. Mirrorsets must have at least two members, and can have as many as six. This example creates a two-member mirrorset using the ADD MIRRORSET command.

```
HSG80 > ADD MIRRORSET DVGRPM0 DISK10200 DISK20200
```

In this example, DVGRPM0 is the name of the mirrorset, and it is followed by a list of the disks to be included in the mirrorset. The names of the mirrorsets are user selectable. Performance of your mirror sets will be optimized if each mirrorset includes disks from different ports as shown in the example.

A.6.1 Initializing a Mirrorset

Prior to putting a mirrorset into service as a logical unit, you must initialize it. The INITIALIZE command copies controller metadata onto a small amount of disk space available on the mirrorset and makes this space inaccessible to the host.

When you initialize a mirrorset you can specify a chunksize. A chunksize is the number of blocks of data that is transferred at one time. By using the default chunksize, the controller will optimize the chunksize by selecting a number equal to the number of blocks in one track of disk data. We recommend using the default chunksize.

```
HSG80 > INITIALIZE DVGRPM0
```

A.6.2 Adding a Mirrorset as a Logical Unit

To make a mirrorset available to the host computer, you must identify it as a host logical unit. For single or dual controllers on a single host, the unit numbers may range from D0 through D99 with a maximum of 64 units. For dual controllers/two hosts, the unit numbers may range from D0 through D99 for the first host and from D100 through D199 for the second host with a maximum of 64 units per host adapter. Add units by using the ADD UNIT command.

```
HSG80 > ADD UNIT D4 DVGRPM0
```

A.6.3 Setting Writeback Cache

This feature is enabled by default; but if it is necessary, a single CLI command enables that feature for the entire mirrorset:

```
HSG80 > SET D4 WRITEBACK_CACHE
```

Where D4 represents the host logical unit of the mirrorset described above.

A.7 Creating a Striped Mirrorset

Create a striped mirrorset to achieve high I/O performance and maximum data availability. striped mirrorsets must have at least two mirrorset members, and can have as many as fourteen. All members must be mirrorsets. To create striped mirrorsets, you first create mirrorsets and then you create stripesets with those mirrorsets.

A.7.1 Creating Mirrorsets

These examples create 2, two member mirrorsets for the striped mirrorset.

```
HSG80 > ADD MIRRORSET MIRR_0 DISK30200 DISK40200  
HSG80 > ADD MIRRORSET MIRR_1 DISK50200 DISK60200
```

In these examples, MIRR_0 and MIRR_1 are the names of the mirrorsets. Each is followed by the list of disks to be included in it.

A.7.2 Striping the Mirrorsets

Striped mirrorsets must have at least two members, and can have as many as fourteen. This example uses the ADD STRIPESET command to create a two-member stripeset with the mirrorsets that you just created.

```
HSG80 > ADD STRIPESET DVGRPSM0 MIRR_0 MIRR_1
```

In this example, DVGRPSM0 is the name of the striped mirrorset, and it is followed by a list of mirrorsets to include in it. The name of the stripeset is user selectable. Performance of your striped mirrorset will be optimized if each mirrorset includes disks from different device ports as shown in Figure-A-4.

A.7.3 Initializing the Striped Mirrorset

Prior to putting a striped mirrorset(s) into service as a logical unit, you must initialize it. The INITIALIZE command copies controller metadata onto a small amount of disk space available on the striped mirrorset and makes this space inaccessible to the host.

When you initialize a striped mirrorset you can specify a chunksize. A chunksize is the number of blocks of data that is transferred at one time. By using the default chunksize, the controller will optimize the chunksize by selecting a number equal to the number of blocks in one track of disk data. We recommend using the default chunksize.

```
HSG80 > INITIALIZE DVGRPSM0 CHUNKSIZE=DEFAULT
```

A.7.4 Adding a Striped Mirrorset as a Logical Unit

To make a striped mirrorset available to the host computer, you must identify it as a host logical unit. For single or dual controllers on a single host, the unit numbers may range from D0 through D99 with a maximum of 64 units. For dual controllers/two hosts, the unit numbers may range from D0 through D99 for the first host and from D100 through D199 for the second host with a

maximum of 64 units per host adapter. Add units by using the ADD UNIT command.

```
HSG80 > ADD UNIT D5 DVGRPSMO
```

A.7.5 Setting Writeback Cache

This feature is enabled by default; but if it is necessary, a single CLI command enables that feature for the entire striped mirrorset:

```
HSG80 > SET D5 WRITEBACK_CACHE
```

Where D5 represents the host logical units of the striped mirrorset described above.

A.8 Adding Individual Disks as Logical Units

To use an individual disk in a RA8000 Fibre Channel subsystem, you must initialize it and then add it as a logical unit.

A.8.1 Initializing Individual Disks

Prior to putting an individual disk into service as a logical unit, you must initialize it. The INITIALIZE command copies controller metadata onto a small amount of disk space available on the disk and makes this space inaccessible to the host.

When you initialize a disk, you can specify a chunksize. A chunksize is the number of blocks of data that is transferred at one time. By using the default chunksize, the controller will optimize the chunksize by selecting a number equal to the number of blocks in one track of disk data. We recommend using the default chunksize.

```
HSG80 > INITIALIZE DISK40100 CHUNKSIZE=DEFAULT
HSG80 > INITIALIZE DISK50100 CHUNKSIZE=DEFAULT
```

A.8.2 Adding as Logical Units

To make an individual disk available to the host computer, you must identify it as a host logical unit. For single or dual controllers on a single host, the unit numbers may range from D0 through D99 with a maximum of 64 units. For dual controllers/two hosts, the unit numbers may range from D0 through D99 for the first host and from D100 through D199 for the second host with a

maximum of 64 units per host adapter. Add units by using the ADD UNIT command.

```
HSG80 > ADD UNIT D4 DISK40100  
HSG80 > ADD UNIT D5 DISK50100
```

A.9 Adding Devices to the Spareset

It is advisable to add devices to the spareset to create a pool of devices for the controller to use as replacements for devices in a RAIDset, mirrorset or striped mirrorset that fail. If no spareset exists, these redundant types of storagesets will run “reduced,” and you should replace the disabled disk as soon as possible. To create the spareset, identify the drive(s) using the ADD SPARESET command.

```
HSG80 > ADD SPARESET DISK60100
```

In this example, DISK60100 was identified to the controller as a spareset.

NOTE: Any disk member added to the spareset must have the same storage capacity as the largest existing individual disk member of your logical storagesets or it will not be usable as a spare for those storagesets.

A.10 Saving Copies of the Configuration

Use the following INITIALIZE command to save a copy of the entire controller configuration on a device or storageset in the subsystem. Save a copy of the controller configuration on a device or storageset so that in the event of a controller failure, you will not need to create a new controller configuration.

The controller automatically updates the saved copy of the configuration whenever the configuration changes.

We recommend keeping a copy of the configuration on at least two devices or storagesets for single controller systems.

To save a copy of the configuration on disk, use the INITIALIZE command as follows:

```
HSG80 > INITIALIZE DISK10000 SAVE_CONFIGURATION
```

The controller places a copy of the configuration onto the specified device or storageset and automatically updates this saved copy whenever the configuration changes. To ensure availability of a copy of the configuration, save the configuration on at least two devices.

NOTE: This command applies to single controller configurations. For dual controller configurations use the “SET FAILOVER COPY” command to save the configuration. Refer to the *Compaq StorageWorks HSG80 Array Controller ACS Version 8.5 CLI Reference Guide* for more information.

A.11 Recording your Configuration

You have now completed all the steps required to create an initial configuration for your controller. In the following steps, you should verify and record your configuration for future reference. Additional worksheets are provided in this chapter for recording future new or modified configurations.

First, verify the Logical Units you have configured:

```
HSG80 > SHOW UNITS
```

The controller responds with a display similar to that shown below:

LUN	Uses
D1	DVGRPRO
D2	DVGRPR1
D3	DVGRPS0
D4	DISK40100
D5	DISK50100

Record the information in the following table:

[illegible]

Next, verify the storagesets you have configured:

```
HSG80 > show storagesets
```

The controller responds with a display similar to that shown below:

Name	StorageSet	Uses	Used by
DVGRPS0	stripeset	DISK10100	D3
		DISK20100	
		DISK30100	
DVGRPSM0	stripeset	MIRR_0	D5
		MIRR_1	
DVGRPM0	mirrorset	DISK10200	D4
		DISK20200	
MIRR_0	mirrorset	DISK30200	DVGRPSM0
		DISK40200	
MIRR_1	mirrorset	DISK50200	DVGRPSM0
		DISK60200	
DVGRPR0	raidset	DISK10000	D1
		DISK20000	
		DISK30000	
DVGRPR1	raidset	DISK40000	D2
		DISK50000	
		DISK60000	
SPARESET	spareset	DISK60100	
FAILEDSET	failedset		

Individual devices are not displayed in this report. To display individual devices, enter the following:

```
HSG80 > SHOW DEVICES
```

Record the above information in the following table. In the event of a controller failure, the information that is recorded here will assist you in reconstruction of the storageset on your RA8000/ESA12000 or MA8000/EMA12000 Fibre Channel subsystem.

[illegible]

Planning Your Storage Configuration

This appendix describes the RAID configuration options and RAID concepts which you need to know to create your storage configuration.

B.1 Planning Your Configuration

RAID stands for Redundant Array of Independent Disks. It is a way of configuring multiple physical disk drives to achieve high data availability and/or larger virtual disk devices. RAID is implemented as a set of multiple storage devices (disks, tapes, and solid-state disks), called an array, and a specialized array controller, which manages the distribution of data across the array.

A RAID array, whether it contains two, five, or seven physical drives, can be configured to look like one or more large virtual disk drives. Use a RAID array virtual drive just as you would a physical drive. You can partition it if you want, and you do not need to make any application changes to realize the benefits of RAID. A RAID array provides higher levels of data availability and performance than a single physical disk drive of similar capacity.

Data for a given file is divided into chunks that is then written across multiple drives. A *chunk* is a group of contiguous data blocks that are stored on a single physical disk drive. By using more than one physical drive, the data is transferred in chunks to multiple physical devices simultaneously, achieving transfer rates greater than each physical disk. Depending on the RAID level used, arrays also provide redundancy to protect the data availability. Arrays provide redundancy in two main ways: by mirroring and by generating parity.

The storage configuration options available depend upon your storage needs and the number of disks that you purchased for your RAID array. Table B-1 describes the storage options available and the minimum number of physical disks required to implement each.

You can use a variety of storageset type containers within a single subsystem, providing you have the disk device resources to support them.

Table B-1
Storage Configuration Options

Storage Method	Storageset Type	Number of Devices	Offers
RAID 3/5 A redundant-stripeset combining the optimized data transfers of RAID 3 with the striping of parity of RAID 5.	RAIDset	3 - 14	Good throughput and read bandwidth for a high request rate of small to medium transfers. High Data Availability.
RAID 0	Stripeset	2 - 14	Good performance for both read and write requests. Provides load balancing with each request requiring a single data operation. Data availability equivalent to that of an individual disk device.
RAID 1	Mirrorset	2 - 6 devices per mirrorset, up to 12 mirrorsets per RAID array	Good performance for read requests. High Data Availability
RAID 0 + 1	Striped mirrorsets	2 - 12 mirrorsets	Performance for read requests surpassing that of an unstriped mirrorset since it can achieve load balancing. High Data Availability.

Once you select the type of storagesets that you want to use in your subsystem, you must create them using an appropriate configuration manager.

Command Console LUN

This appendix discusses the Command Console LUN.

C.1 Command Console LUN

The StorageWorks RAID Array is configured by creating various types of storagesets and associating them with specific IDs called Logical Unit Numbers (LUNs). The Host uses these LUNs to access the underlying storageset. The RAID Array is preconfigured with a virtual LUN, located on Controller A, LUN 0. This device, called the Command Console LUN (CCL), allows the RAID Array to be recognized by the Host system as soon as it is attached to the Fibre Channel and configured into the operating system. The CCL also serves as a communications device for the StorageWorks Command Console (SWCC) Agent. The CCL identifies itself to the Host via a unique identification string. This string, HSG80CCL, is returned in response to the SCSI Inquiry command.

When the CCL is enabled, as it is upon delivery, its address can be determined using the CLI command:

```
HSG80 > SHOW THIS_CONTROLLER
```

The CCL can be disabled using the CLI command:

```
HSG80 > SET THIS_CONTROLLER NOCOMMAND_CONSOLE_LUN
```

The CCL is enabled using the CLI command:

```
HSG80 > SET THIS_CONTROLLER COMMAND_CONSOLE_LUN
```

In dual-redundant controller configurations, these commands alter the setting of the CCL on both Controllers. When the CCL is enabled, its ID is the lowest

LUN of the lowest loop ID. When creating storagesets and logical units on the RAID Array using the CLI, the address of the CCL should be reserved and not used. However, if the CCL's LUN is assigned to a storageset, the CCL will "float" to the next lowest LUN that is available. On some Host Systems, the SWCC Agent requires that the CCL remain in a fixed location. If the CCL is moved to a new address, the SWCC Agent will no longer be able to communicate with the RAID Array for configuration and monitoring purposes.

Appendix **D**

Valid ALPA Settings

This appendix provides a table of the valid arbitrated loop physical addresses available for hard addressing the fibre channel arbitrated loop.

D.1 Valid ALPA Settings

Table D-1 lists the ALPA settings and corresponding SCSI target numbers for hard addressing the fibre channel arbitrated loop using the CPQfca driver. Use this table when setting the PORT_1_AL_PA and PORT_2_AL_PA addresses on the HSG80 controller.

NOTES: AL_PA 0x00 through 0x70 are reserved for FC adapters installed in a Host system. When setting AL_PA addresses on the HSG80 controllers, use AL_PA 0x71 through 0xEF.

The values are intentionally from lowest to highest priority. AL_PA = 00 is reserved for the FL_Port; -- it is not available.

The Fibre Quick Adapter driver is operating under the IBM hdisk driver and so is restricted to using valid SCSI IDs (0–15). For this reason ALPA D5, SCSI ID 10 and ALPA D6, SCSI ID 9 were selected.

Table D-1
Arbitrated Loop Physical Address (ALPA) Settings

AL_PA (hex)	Switch (hex)	Setting (dec)	AL_PA (hex)	Switch (hex)	Setting (dec)	AL_PA (hex)	Switch (hex)	Setting (dec)
EF	00	0	A3	2B	43	4D	56	86
E8	01	1	9F	2C	44	4C	57	87
E4	02	2	9E	2D	45	4B	58	88
E2	03	3	9D	2E	46	4A	59	89
E1	04	4	9B	2F	47	49	5A	90
E0	05	5	98	30	48	47	5B	91
DC	06	6	97	31	49	46	5C	92
DA	07	7	90	32	50	45	5D	93
D9	08	8	8F	33	51	43	5E	94
D6	09	9	88	34	52	3C	5F	95
D5	0A	10	84	35	53	3A	60	96
D4	0B	11	82	36	54	39	61	97
D3	0C	12	81	37	55	36	62	98
D2	0D	13	80	38	56	35	63	99
D1	0E	14	7C	39	57	34	64	100
CE	0F	15	7A	3A	58	33	65	101
CD	10	16	79	3B	59	32	66	102
CC	11	17	76	3C	60	31	67	103
CB	12	18	75	3D	61	2E	68	104
CA	13	19	74	3E	62	2D	69	105
C9	14	20	73	3F	63	2C	6A	106
C7	15	21	72	40	64	2B	6B	107
C6	16	22	71	41	65	2A	6C	108
C5	17	23	6E	42	66	29	6D	109

continued

Table D-1
Arbitrated Loop Physical Address (ALPA) Settings *continued*

AL_PA (hex)	Switch (hex)	Setting (dec)	AL_PA (hex)	Switch (hex)	Setting (dec)	AL_PA (hex)	Switch (hex)	Setting (dec)
C3	18	24	6D	43	67	27	6E	110
BC	10	25	6C	44	68	26	6F	111
BA	1A	26	6B	45	69	25	70	112
B9	1B	27	6A	46	70	23	71	113
B6	1C	28	69	47	71	1F	72	114
B5	1D	29	67	48	72	1E	73	115
B4	1E	30	66	49	73	1D	74	116
B3	1F	31	65	4A	74	1B	75	117
B2	20	32	63	4B	75	18	76	118
B1	21	33	5C	4C	76	17	77	119
AE	22	34	5A	4D	77	10	78	120
AD	23	35	59	4E	78	0F	79	121
AC	24	36	56	4F	79	08	7A	122
AB	25	37	55	50	80	04	7B	123
AA	26	38	54	51	81	02	7C	124
A9	27	39	53	52	82	01	7D	125
A7	28	40	52	53	83	00	7E	126
A6	29	41	51	54	84			
A5	2A	42	4E	55	85			

Appendix **E**

Agent Data Files

This appendix provides information about Agent data files and formats for advanced level troubleshooting of agent installation problems.

E.1 Editing the Services File

SWCC Agent uses Windows sockets (sometimes called “network ports”) to communicate with its Clients. The socket numbers at the Client and Agent ends must match for network communication to occur.

In Windows 2000 or Windows NT, the socket numbers are assigned in the *services* file in the `\winnt\system32\drivers\etc` subdirectory. In the unlikely event that you experience a conflict with the socket numbers, you may edit the *services* file manually.

The default socket numbers for Command Console are "4998" and "4999". If you are installing SWCC Agent and these numbers are already taken by another application, the installation program prompts to warn you that you must choose another pair. If you do not choose another pair, the program uses the defaults, regardless of any conflicts with other programs.

To select another pair for Agent, open the *services* file in an ASCII editor. Pick two numbers above 1023 that are not already used in the file, and add the following two lines:

```
spgui number1/tcp # StorageWorks Command Console  
spagent number2/tcp # StorageWorks Command Console
```

Note that the port numbers that you select must match the port numbers used by all of the Clients to which you wish to connect your Agent.

E.2 Editing the Agent Configuration File

The agent configuration file, *steam.cfg*, configures Agent within its operating system.

File Format

The file contains five lines of ASCII text, formatted as follows:

device_special_file_path

In Windows 2000 or Windows NT, this line must be blank.

agent_executable_file_path

The full path to the *steam.exe*, *client.ini*, and *storage.ini* files.

encrypted_password

The encrypted password from the password generation program.

manufacturer_name

Your manufacturer name. The default is "Compaq Computer Corporation"
You can use up to 80 characters.

snmp_enterprise_assignment

Your SNMP enterprise assignment number. The default is "36.2.15.21."
(Note that this parameter is not your numerical TCP/IP address.) If you are unsure about this parameter, use the default or contact your network administrator.

E.2.1 Editing the *steam.cfg* File

Edit the *steam.cfg* file by performing the following actions:

1. Run the password generation program by changing to the directory that the *steam.exe*, *client.ini*, and *storage.ini* files are installed in and entering the following at a command prompt:

sp_passwd "yourpassword"

where "yourpassword" is a 4 to 16-character text string of your choosing.

The program generates a 4 to 16-character, encrypted password string and displays it on the screen.

2. Use an ASCII editor to modify the *steam.cfg* file you copied during the installation process. Use the encrypted password from Step 1 as line 3 in the file.

Sample File

Following is a sample *steam.cfg* file:

```
/dev/rdisk
/opt/steam
-2V1 (z05)
Compaq Computer Corporation
36.2.15.21.
```

E.3 Editing the Client Access File

The client access file, *client.ini*, configures Agent for proper operation with its Clients.

File Format

NOTE: Blank lines are not allowed in the *client.ini* file and the file must end with a carriage return. An embedded blank line or lack of a trailing carriage return may interfere with Agent execution.

The line for each client system must be in the following format:

system_network_addressnotification_methodaccess_allowed <CR>

where:

system_network_address

The network name, including the domain information if appropriate, of the remote system to which you wish to grant access. The address may be an alphanumeric alias or a numeric IP address. The address can be up to 128 characters long, including periods. If you are unsure of this address, consult your network administrator. This parameter is case sensitive.

notification_method

The mechanism you wish Agent to use to notify Client sessions of a fault, where:

- 0 = no notification
- 1 = notify via TCP
- 2 = notify via SNMP
- 3 = notify via both TCP and SNMP

If you are unsure of which mechanism to use, use "1" for this parameter. To avoid significant delays in fault notification, set this parameter to "0" for Clients using RAS connections to the network.

access_allowed

You can configure Agent for three levels of subsystem access:

- Navigation Tree monitoring—Good/Bad indication in the Navigation Tree only. No Storage Window can be opened for the subsystem by this Client.
- Storage Window monitoring—All detailed information about the status of the storage subsystem available in a Storage Window, in addition to Navigation Tree monitoring capabilities.
- Storage Window configuration—Capability of changing the configuration of the storage subsystem in the Storage Window, in addition to monitoring the subsystem in both the Navigation Tree and Storage Window.

The *access_allowed* parameter sets the level of access you are granting to this remote system, where:

- 0 = Navigation Tree monitoring only. A Storage Window cannot be opened. No Storage Window monitoring or configuration changes allowed.
- 1 = Navigation Tree and Storage Window monitoring. No storage subsystem configuration changes allowed in the Storage Window.
- 2 = Navigation Tree monitoring and Storage Window monitoring and configuration access.

<CR>

A carriage return is required at the end of the file.

E.3.1 Editing the File

Use an ASCII editor to modify the *client.ini* file you copied during the installation process. Add a separate line in the file for each system that you wish to grant access to this host system. Use vertical bars (sometimes called the “pipe” character) to delimit the fields. You may add comment lines as long as they start in very first position and begin with the pound character, “#”.

Sample File

Following is a sample *client.ini* file. This file enables full access for the remote Client system at network address *dreamon.your.company.com*, and sends fault notifications to Client using the TCP mechanism. It also disables configuration access by Client running on the system at network address *wanderlust.your.company.com*, but still enables asynchronous fault notification via the TCP mechanism.

```
# Access list for system HOST123:
dreamon.your.company.com|1|2
wanderlust.your.company.com|1|1
```

E.4 Editing the Subsystem Identification File

The subsystem identification file, *storage.ini*, configures Agent to communicate with the storage subsystems on the host on which Agent is running.

File Format

NOTE: Blank lines are not allowed in the *storage.ini* file and the file cannot end with a carriage return. An embedded blank line or a trailing carriage return may interfere with Agent execution.

The line for each system must have the following format:

```
subsystem_name|monitor_interval|Reserved|controller_type|emu_type|this_s
n|other_sn|
```

```
fw_version|access_device|ccl_device|num_virtual_disks|device_ID1|device_I
Dn
```

where:

subsystem_name

The name you wish to refer to the subsystem by when using the Client GUI. The name must be alphanumeric and can consist of up to 32 characters.

monitor_interval

The time interval, in seconds, between Agent's periodic status checks on this subsystem. The range of intervals is from 1 to 99,999 seconds. If you set this parameter to 0, Agent does not perform periodic status checks on the subsystem, and any event notification from the subsystem is disabled..

Reserved

This field is reserved for future use.

controller_type

A numeric identifier for the controller model used in the subsystem, as follows:

NOTE: All controller types may not be supported by your software version. Check the release notes for your, specific software version to determine which controllers are supported.

0=HSZ20 controller
1=HSZ22 controller
2=HSD40 controller
3=HSJ40 controller
4=HSZ40 controller
5=HSD50 controller
6=HSJ50 controller
7=HSZ50 controller
8=HSZ70 controller
9=HSZ80 controller
10=HSG80 controller
99=Unknown controller type

emu_type

A numeric identifier for the type of environmental monitoring unit (EMU) used in the subsystem, as follows:

0=no EMUs installed
1=standard EMUs installed
2=enhanced EMUs installed

this_sn

The serial number of the controller to which the Agent is communicating.

other_sn

The serial number of the companion to the controller to which the Agent is communicating.

fw_version

The version number of ACS software running on the RAID Array.

access_device

The device name that identifies this storage subsystem in the operating system. This subsystem virtual disk is represented by a drive letter in Windows 2000 or Windows NT Disk Administrator. Enter the drive letter for the subsystem you wish to add as its *access_device*.

ccl_device

Note that the communications LUN is not compatible with the Windows 2000 or Windows NT operating system. Do not enable the LUN if your operating system is Windows NT.

If a controller communications LUN is used to connect Agent to the subsystem controller, this field contains information about the LUN.

For controllers offering the communications LUN feature, this field contains either of the following:

- a. The text string “disabled”, indicating that the communications LUN is not enabled in the controller.
- b. The operating system device name representing the communications LUN. The format is the same as the *access_device* field.

For all other controller types, this field contains the text string “none”, indicating that there is no communications LUN available. In this case, Agent uses the device specified in the *access_device* field to connect to the controller. This device is a virtual disk, also listed in the *device_ID1*/*device_IDn* fields, below.

num_devices

A numeric value indicating the total number of virtual disks configured in the storage subsystem and added to the operating system as devices. Each virtual disk represents one or more physical devices attached to the controller.

This field contains the value 0 if no virtual disks are configured on this system, or if the ones that have been configured have not been added to the operating system as accessible devices. In this case, you must use a maintenance terminal and the CLI to create at least one virtual disk for use as a communications virtual disk.

For Windows 2000 or Windows NT systems, this parameter must be greater than zero.

device_ID1device_IDn

A listing of the operating system device names for the virtual disks configured in the storage subsystem. The format is the same as the *access_device* field. Vertical bars (sometimes called the “pipe” character) are used to delimit the virtual disk names. The total number of names listed must equal the value in the *num_devices* field.

The listing must include the communications virtual disk.

E.4.2 Editing the *storage.ini* File

Use an ASCII editor to modify the *storage.ini* file you copied during the installation process. Add a separate line in the file for each system that you wish to grant access to this host system. Use vertical bars (sometimes called the “pipe” character) to delimit the fields in each line. You may add comment lines as long as they start in very first position and begin with the exclamation point character, “#”.

Sample File

Following is a sample *storage.ini* file. This file configures Agent to communicate with and to periodically monitor subsystems RA8000/ESA12000 c8t0d0. Agent will check RA8000/ESA12000 at 20-second intervals. Subsystem RA8000/ESA12000 is an HSG80-based subsystem using a communications LUN for communication.

```
# Storage subsystems for HOST123
ra8000|20|0|4|2|cx3459688|cx3459699|v83g|c8t0d0|c8t0d0|0|
```

E.5 Agent/Controller Communications

Command Console communicates with your controller via a virtual disk that you must specify in the *storage.ini* file. There must be at least one virtual disk on your subsystem, so that Agent can use it to make a connection.

Use care in making changes to your virtual disk configuration with Command Console. If the virtual disk that Agent is using to communicate with your subsystem fails or is deleted, Agent loses its connection with the controller, and Client loses its connection with your subsystem.

Appendix **F**

SNMP MIB Information

This appendix provides information about the SNMP traps that may be generated by the Agent.

When a physical storage device, a logical storage unit, or a physical enclosure component changes state, the Agent sends out an SNMP trap (that is, an asynchronous event notification) to any hosts that are listed in the CLIENT.INI file with this option enabled.

This section describes the format of the SNMP traps that may be generated. There are 21 trap types, one for each FRU type and state.

F.1 Disk Device Failure Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 1
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.28
Value 3 = <disk device name>
Object 4 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 4 = <cabinet>
Object 5 = 1.3.6.1.4.1.36.2.15.21.3.2.1.35
Value 5 = <channel>
Object 6 = 1.3.6.1.4.1.36.2.15.21.3.2.1.36
Value 6 = <target ID>

F.2 Disk Device Recovery Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 2
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.28
Value 3 = <disk device name>
Object 4 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 4 = <cabinet>
Object 5 = 1.3.6.1.4.1.36.2.15.21.3.2.1.35
Value 5 = <channel>
Object 6 = 1.3.6.1.4.1.36.2.15.21.3.2.1.36
Value 6 = <target ID>

F.3 Power Supply Device Failure Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 3
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 3 = <cabinet>
Object 4 = 1.3.6.1.4.1.36.2.15.21.3.2.1.29
Value 4 = <power supply location>

F.4 Power Supply Device Recovery Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 4
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 3 = <cabinet>
Object 4 = 1.3.6.1.4.1.36.2.15.21.3.2.1.29
Value 4 = <power supply location>

F.5 Fan Device Failure Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 5
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 3 = <cabinet>
Object 4 = 1.3.6.1.4.1.36.2.15.21.3.2.1.30
Value 4 = <fan location>

F.6 Fan Device Recovery Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 6
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 3 = <cabinet>
Object 4 = 1.3.6.1.4.1.36.2.15.21.3.2.1.30
Value 4 = <fan location>

F.7 Cache Battery Failure Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 7
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.31
Value 3 = <cache battery location>

F.8 Cache Battery Low Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 8
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.31
Value 3 = <cache battery location>

F.9 Cache Battery Recovery Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 9
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.31
Value 3 = <cache battery location>

F.10 Temperature Sensor Over Threshold Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 10
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 3 = <cabinet>
Object 4 = 1.3.6.1.4.1.36.2.15.21.3.2.1.32
Value 4 = <temperature sensor location>

F.11 Temperature Sensor Below Threshold Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 11
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 3 = <cabinet>
Object 4 = 1.3.6.1.4.1.36.2.15.21.3.2.1.32
Value 4 = <temperature sensor location>

F.12 Communication Failure Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 12
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>

F.13 Communication Recovery Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 13
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>

F.14 Controller Failure Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 14
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>

F.15 Controller Recovery Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 15
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>

F.16 LUN Failure Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 16
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.34
Value 3 = <lun name>

F.17 LUN Reconstructing Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 17
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.34
Value 3 = <lun name>

F.18 LUN Reduced Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 18
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.34
Value 3 = <lun name>

F.19 LUN Recovery Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 19
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.34
Value 3 = <lun name>

F.20 EMU External Input Failure Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>

Generic = 6
Specific = 20
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 3 = <cabinet>

F.21 EMU External Input Recovery Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 21
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 3 = <cabinet>

Setting Up Controllers and Switches

G.1 Introduction

The host bus adapters (installed in Chapter 1) attach to the storage system through Fibre Channel switches (also called “FC switches” or just “switches”). The switches constitute the fabric connection. This appendix explains how to attach the cables.

NOTE: Power to the host computer, switches, and storage subsystem should be OFF at the start of this procedure. Powering on the equipment in order so the switches can automatically configure the fabric.

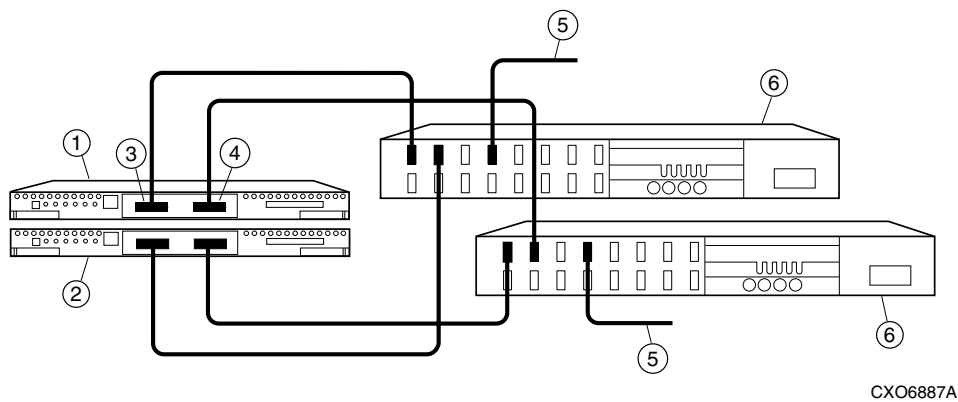
G.2 Cabling

The storage subsystem can contain either one or two controllers. The figures and their keys are as follows:

- Table G-1 is the key to Figure G-1 that shows cabling for systems with two controllers and two FC switches.
- Table G-2 is the key to Figure G-2 that shows cabling for systems with two controllers and one FC switch.
- Table G-3 is the key to Figure G-3 that shows cabling for systems with one controller and one switch.
- Table G-4 is the key to Figure G-4 that shows cabling for systems with one controller and one switch.

Table G-1
Cabling Two Controllers and Two Switches

Figure Legend	Description
❶	Controller A
❷	Controller B
❸	Host port 1
❹	Host port 2
❺	FC cable to host bus adapter
❻	FC switch

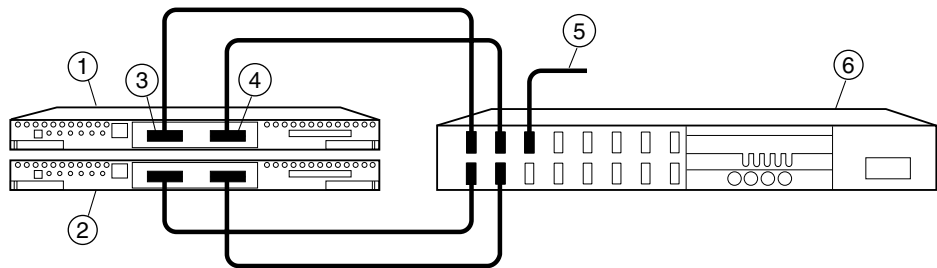


CXO6887A

Figure G-1. Cabling two controllers and two switches

Table G-2
Cabling Two Controllers and One Switch

Figure Legend	Description
①	Controller A
②	Controller B
③	Host port 1
④	Host port 2
⑤	FC cable to host bus adapter
⑥	FC switch

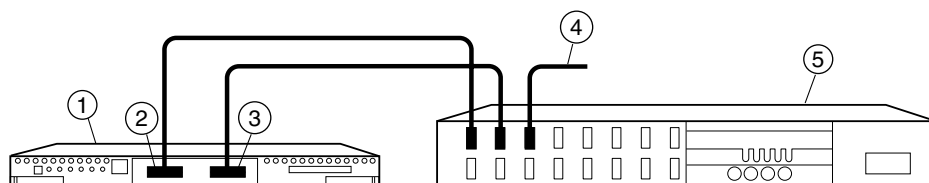


CXO6882A

Figure G-2. Cabling two controllers and one switch

Table G-3
Cabling One Controller and One Switch

Figure Legend	Description
❶	Controller
❷	Host port 1
❸	Host port 2
❹	FC cable to host bus adapter
❺	FC switch

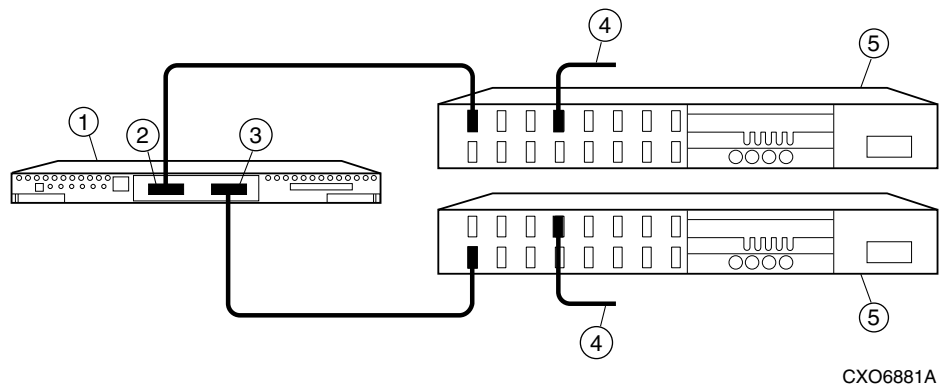


CXO6880A

Figure G-3. Cabling one controller and one switch

Table G-4
Cabling One Controller and Two Switches

Figure Legend	Description
❶	Controller
❷	Host port 1
❸	Host port 2
❹	FC cable to host bus adapter
❺	FC switch



CXO6881A

Figure G-4. Cabling one controller and two switches

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A

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